# CLINICAL GUIDELINES

## Physical and Occupational Therapy Services

Version 1.0
Effective February 14, 2020

Clinical guidelines for medical necessity review of physical and occupational therapy services.
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# Physical and Occupational Therapy Guidelines

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# PTOT-1.0: Utilization Management Policy Physical Therapy and Occupational Therapy


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## Purpose

This policy outlines the process for determining medically necessary, appropriate and reasonable physical therapy and occupational therapy services.

## Definitions

### Utilization Management

The Institute of Medicine (IOM) Committee on Utilization Management by Third Parties recognizes UM as "a set of techniques used by or on behalf of purchasers of health care benefits to manage health care costs by influencing patient care decision-making through case-by-case assessments of the appropriateness of care prior to its provision."

- There are 3 types of Utilization Management:
  - *Precertification/prior authorization* is conducted before a service or treatment and is rendered in order to eliminate or reduce unnecessary services.
  - *Concurrent review*s performed during the episode of care. Periodic review occurs at varied intervals and may encompass case management activities such as care coordination, discharge planning, and care transitioning.
  - *Retrospective review* is conducted after the service has been completed and assesses the appropriateness of care provided.

### Physical Therapy

Physical therapy (PT) is a dynamic profession with an established theoretical and scientific base and widespread clinical applications in the restoration, maintenance, and promotion of optimal physical function. Physical therapists are health care professionals who help individuals maintain, restore, and improve movement, activity, and functioning, thereby enabling optimal performance and enhancing health, well-being, and quality of life. Their services prevent, minimize, or eliminate impairments of body functions and structures, activity limitations, and participation restrictions. Physical therapy is provided for individuals of all ages who have or may develop impairments, activity limitations, and participation restrictions related to (1) conditions of the musculoskeletal, neuromuscular, cardiovascular, pulmonary, and/or integumentary systems or (2) the negative effects attributable to unique personal and environmental factors as they relate to human performance. [11]



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## Occupational Therapy

The practice of Occupational Therapy means the therapeutic use of occupations, including everyday life activities with individuals, groups, populations, or organizations to support participation, performance, and function in roles and situations in home, school, workplace, community, and other settings. Occupational therapy services are provided for habilitation, rehabilitation, and the promotion of health and wellness to those who have or are at risk for developing an illness, injury, disease, disorder, condition, impairment, disability, activity limitation, or participation restriction. Occupational therapy addresses the physical, cognitive, psychosocial, sensory-perceptual, and other aspects of performance in a variety of contexts and environments to support engagement in occupations that affect physical and mental health, well-being, and quality of life.[12]

## Medically Necessary Services

- To be considered reasonable and necessary the following conditions must each be met:
  - The services shall be considered under accepted standards of medical practice to be a specific and effective treatment for the patient's condition.
  - The services shall be of such a level of complexity and sophistication or the condition of the patient shall be such that the services required can be safely and effectively performed only by a therapist, or in the case of physical therapy and occupational therapy by or under the supervision of a therapist.
  - Services that do not require the performance or supervision of a therapist are not skilled and are not considered reasonable or necessary therapy services, even if they are performed or supervised by a qualified professional.
  - There must be an expectation that the patient's condition will improve significantly in a reasonable (and generally predictable) period of time. Medicare coverage does not turn on the presence or absence of a beneficiary's potential for improvement from the therapy, but rather on the beneficiary's need for skilled care.
  - The amount, frequency, and duration of the services must be reasonable under accepted standards of practice.
- For these purposes, "generally acceptable standards of practice" means standards that are based on credible scientific evidence published in the peer-reviewed literature generally recognized by the relevant healthcare community, specialty society evidence-based guidelines or recommendation, or expert clinical consensus in the relevant clinical areas.



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## Rehabilitative Therapy

Therapeutic care is care provided to relieve the functional loss associated with an injury or condition and is necessary to return the patient to the functioning level required to perform their activities of daily living, instrumental activities of daily living and work activities. Therapeutic care generally occurs within a reasonable period of time and is guided by evidence based practice of physical therapy.

### Acute Phase

Acute care is care of an injury or condition characterized by short and relatively severe symptom complex, generally up to the first month following onset of injury. The condition may be induced by either traumatic or non-traumatic factors and may consist of a new condition or an exacerbation of an existing one. Need for care is proportional to the severity of the signs and symptoms of the particular case, modified by the status of healing tissues. The therapeutic goals of acute care are patient education in the recovery/healing process, reduction of symptoms and minimization of functional loss, in preparation for resolution of the injury or condition. Means and methods include a combination of direct care and a home management program to progress towards recovery of function.

### Subacute Phase

Subacute care is care of an injury or condition characterized by a less severe symptom complex and intermediate course. Typically, it follows an acute injury or exacerbation, and can extend up to three months from onset. Subacute care is characterized by a combination of direct care and home management consisting of exercise, symptom management, patient education, and an emphasis on compliance. The therapeutic goal of this phase is to improve functional status by increasing existing range of motion and muscle strength and reducing signs and symptoms associated with the condition or injury. Means and methods include progression of exercise, instruction in self-care, and monitoring patient compliance and motivation. Intensity of care is guided by the condition of healing tissue structures, generally including therapy visits supplemented by a home management program.

### Chronic Phase

This phase of care may last up to 6 month from onset. It may also refer to treatment of conditions that are chronic in nature and do not occur in conjunction with an acute or subacute phase. The therapeutic goals of this phase are reduction and management of symptoms with a goal of maximizing function over time. Means and methods include progression of exercise, continued patient education, and transition to self-management. Intensity of care is guided by functional status, focusing on home management, supplemented by therapy visits.



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## Condition Severity Criteria

Severity is classified as mild, moderate and severe conditions.

- Mild conditions result from a variety of conditions, member may or may not require treatment, symptoms are low-grade and generally do not affect activity of daily living tasks. Anticipated duration of care is 1-6 weeks.
- Moderate conditions also result from a variety of causes; pain is usually mid-range (5-6/10), member may have work restrictions for 0-2 weeks and the condition may have a mild to moderate effect on the performance of activities of daily living. Anticipated duration of care is 6-10 weeks.
- Severe conditions mostly result from accidents or injuries, symptoms are intense, condition may result in loss of work of 5 days or more, and will have a pronounced (moderate to severe) decrease in the ability to perform activities of daily living. Anticipated duration of care is 10 or more weeks.

## Skilled Maintenance Care

Maintenance care is defined as services required to maintain the member's current condition or to prevent or slow deterioration of the member's condition.

- Skilled maintenance care for Medicare and Medicaid enrollees is covered if the specialized skill, knowledge and judgment of a qualified therapist are required
  - To establish or design a maintenance program appropriate to the capacity and tolerance of the member
  - To educate/instruct the member or appropriate caregiver regarding the maintenance program
  - For periodic re-evaluations of the maintenance program
  - For delivery of maintenance programs
- Skilled care is necessary for the performance of a safe and effective maintenance program only when:
  - The therapy procedures required to maintain the patient's current function or to prevent or slow further deterioration are of such complexity and sophistication that the skills of a qualified therapist are required to furnish the therapy procedure or
  - The particular patient's special medical complications require the skills of a qualified therapist to furnish a therapy service required to maintain the patient's current function or to prevent or slow further deterioration, even if the skills of a therapist are not ordinarily needed to perform such therapy procedures.
  - The need for maintenance care is not determined by the presence or absence of a member's potential for improvement but by the need for skilled care.
  - Skilled Maintenance Programs in an Outpatient and Home Health setting will not be covered if furnished by a Physical Therapist Assistant. [15]
  - eviCore will authorize maintenance care when the member's plan of care establishes that the member requires the specialized skill, knowledge and judgment of a qualified therapist to maintain the member's current condition or to prevent or slow deterioration of the member's condition.



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## Habilitation

Health care services that help you keep, learn, or improve skills and functioning for daily living. Examples include therapy for a child who isn't walking or talking at the expected age. These services may include physical and occupational therapy, speech-language pathology, and other services for people with disabilities in a variety of inpatient and/or outpatient settings. [14] Most states have their own definition, but they have adopted some version of the National Association of Insurance Commissioners definition.

**Palliative Care**
Palliative care is typically given to alleviate symptoms and does not provide corrective benefit to the condition treated. A patient receiving palliative care, in most instances, demonstrates varying lapses between treatments. If an exacerbation of a condition occurs, care becomes therapeutic rather than palliative, and documentation of the necessity for care (e.g., etiology of exacerbation, objective findings, and desired outcomes) must be obtained. Palliative care is non-covered because the skills of a therapist are not required but may be approved at the direction of a health plan based on the plans benefit language.

**Preventive Care Examinations**
Preventive care includes management of the asymptomatic patient. Preventive care examinations may include pre-participation athletic examination. Preventative care is non-covered because the skills of a therapist are not required, an exception is children covered by Early and Periodic Screening, Diagnostic and Treatment guidelines.

## PTOT-1.1: Criteria/Guidelines for Provision of Physical Therapy (PT) and Occupational Therapy (OT)

## Indications for Coverage

- Authorization is based on available benefits and certificate of coverage
- The services must be reasonable and necessary
- The services requested must be require the expertise, knowledge, clinical judgment, decision making and abilities of a therapist that a caregiver or member cannot provide independently
  - A qualified provider of Physical/Occupational therapy service is one who is licensed where required and performs within the scope of licensure.
  - Services provided by PT/OT aides or other non-qualified professionals are not covered (coverage is determined by State Law or Health Plan Rules).
- Services are of the appropriate type, frequency, intensity and duration for the individual needs of the member
- Documentation should establish the variables that influence the member's condition and factors that influence the clinician's decision to provide more services than are typical for the member's condition (typical is established using eviCore Guidelines which is based on published professional literature and professional guidelines)



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- PT and OT services meet the functional needs of the member who suffers from a physical impairment due to illness, disease, or injury and are appropriate treatment for the condition. The patient must have functional deficits that interfere with Activities of Daily Living, Instrumental Activities of Daily Living or return to work
- PT and OT services achieve a specific diagnosis-related goal for a member, who has a reasonable expectation of achieving measurable improvement, in a reasonable and predictable period of time or documentation supports the need for skilled maintenance care.
  - Significant is defined as a measureable and meaningful increase (as documented in the patient's record) in the patient's level of physical and functional abilities that can be attained with short-term therapy, usually within a 60-90 day period.
- PT/OT services inherently include the introduction and provision of, and education about a home (self) management program, appropriate for the condition(s) under treatment. In keeping with professional standards, this home management program should be introduced into the course of treatment at the earliest appropriate time.
- The need for ongoing care is supported by documentation that shows objective measurements (using a functional outcome tool or standardized test) that the member is progressing towards goals or documentation shows the need for skilled maintenance care.

## Services not considered medically necessary

- Service(s) that can be self-administered or safely and effectively furnished by an unskilled person without the direct or general supervision of a therapist
- Training in nonessential self-help, recreational tasks, or sport specific performance.
- Services related to activities for the general good and welfare of the member e.g., general exercises to promote overall fitness and flexibility and activities to provide diversion or general motivation
- Passive modalities that extend beyond the acute phase of recovery.
- Non-skilled routine, repetitive and reinforced procedures that do not require one-to-one intervention such as stationary bike riding, progressive resistive exercise after instruction, and passive range of motion.
- Services not provided under a therapy plan of care
- Services provided by staff who are not qualified or appropriately supervised
- The unavailability of a competent person to provide a non-skilled service, does not make it a skilled service when the therapist furnishes the service

## Non-covered Services

Providers should reference Health Plan Policies for non-covered services



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## Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## Disciplines that may use the PT/OT Benefit

- The Patient Protection and Affordable Care Act of 2012 allows provider specialties such as Chiropractors, Massage Therapist, Acupuncturists, Naturopathic practitioners and physicians who utilize various approaches and adjunct modalities to achieve therapeutic benefit in the treatment of neuro-musculoskeletal conditions, to utilize the Physical therapy and Occupational Therapy benefit to bill for adjunct therapeutic modalities. Physical therapy and Occupational Therapy services are provided according to the members' benefit certificates and the health plan's medical policies. Services billed "incident to" by MDs/DOs/DPMs must meet the Centers for Medicare & Medicaid Services (CMS) "incident to" guidelines for physical therapy and occupational therapy and must be rendered by "qualified providers" as defined by CMS.



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## Authorization of Services

### Management Rules

- Place of Service requiring authorization
  - Outpatient therapy as defined by the Health Plan or CMS
  - Home health care.
- Time-frame for submission
  - Initial authorization: a request for prior authorization for the first request is typically submitted within 7 days of the initial evaluation (Time-frames may change based on health plan rules).
  - Ongoing care: the request may be submitted within 7 days prior to the expiration date of the last authorization (Time-frames may change based on health plan rules). A request submitted greater than 7 days must have clinical information that supports ongoing care.
  - Some health plans may not require prior-authorization; therefore this suggested time-frame will not apply.
- Clinical Information
  - Acute and subacute conditions – It is recommended that clinical information may be collected within 14 days of the submission date (unless otherwise dictated by State Medicaid Laws or Health Plan Rules)
  - Chronic Conditions – It is recommended that clinical information may be collected within 20 days of the date of submission (unless otherwise dictated by State Medicaid Laws or Health Plan Rules)
- Vision benefits
  - Rehabilitation benefits allow treatment for visual deficits that affect ADLs and require skilled therapy. Repetitive vision exercises may be transitioned to a home program. Coverage is dependent upon health plan medical policies and/or available benefits and certificate of coverage.
- Authorizations
  - Authorizations of visits and units over a specific period of time are based on a set of clinical data for the condition.
    - Some health plans allow dynamic waivers. A dynamic waiver allows a range of visits from 6-12 visits based on the complexity of the condition (surgical/non-surgical diagnosis, date of surgery, and a functional outcome measurement score)
    - Some health plans allow a set number of visits to be completed before prior authorization are required.
    - Updated clinical information is required for ongoing care.
- Benefit limit
  - The member's benefit limit and remaining benefits are checked at the time of case build. Authorizations are based on medical necessity. Every effort is made to authorize within the benefit limit, however, it is the responsibility of the member and provider to monitor the use of the member's benefits.



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- Initial evaluations
  - Do not require prior approval. The initial evaluation should be completed before a request for authorization is submitted.
- State or Federal Mandates
  - eviCore makes every effort to authorize care according to state and federal mandates.
- Duplicate care (the same or similar treatment plan for the same body part or diagnosis)
  - Request for care for the same body part or diagnosis by more than one provider is considered duplicate care. Duplicate care is not medically necessary, as the member's condition can improve with care provided under one treatment plan and by one provider. eviCore will authorize additional care when specialized care is needed such as lymphedema, vestibular rehabilitation, women's health issues etc.
- Retrospective review
  - Is conducted after the services are completed
  - In order to determine if services were medically necessary and required the skills of a therapist, documentation must be reviewed. The provider must submit all case notes such as: initial evaluation, progress notes, daily treatment notes, modality/exercise logs and discharge summary
- Reconsideration
  - The provider may ask for a reconsideration of an authorization decision when the case is denied or when a portion of the visits, units or dates of service is approved (partial approval).
  - Reconsideration can be requested in writing or by requesting a peer to peer call.
  - The provider must follow the specific rules as outlined by Centers for Medicare Medicaid or the Health Plan.
- Appeals
  - eviCore is delegated for first level appeals for some health plans.
  - Appeals for Medicare members must be filed through the Health Plan unless delegated to eviCore.
  - To appeal an authorization decision, the provider can submit new information in writing for review or the provider may request a peer to peer call and provide new information for review on behalf of the member.
  - Appeal instructions are outlined in the provider/member denial letters



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## PTOT-1.2: Applicable Federal and State Mandates

The Federal Government and many state insurance mandates require health insurance companies to pay for medically necessary and evidence-based treatments for certain population groups or conditions. eviCore takes into consideration these applicable federal and state mandates when authorizing care.

Early and Periodic Screening Diagnostic and Treatment (EPSDT) Mandate

In 1967, Congress introduced the Medicaid benefit for children and adolescents, known as Early and Periodic Screening, Diagnostic and Treatment (EPSDT). The goal of this benefit is to ensure that children under the age of 21 who are enrolled in Medicaid receive age-appropriate screening, preventive services, and treatment services that are medically necessary to correct or ameliorate any identified conditions – the right care to the right child at the right time in the right setting. This broad scope supports a comprehensive, high-quality health benefit. States share responsibility for implementing the EPSDT benefit with the Centers for Medicare & Medicaid Services [14]. eviCore will adhere to the applicable federal and state guidelines when authorizing therapy for children covered by the EPSDT mandate.

## PTOT-1.3: eviCore's Evidence Based Guidelines

eviCore bases clinical guidelines on published national guidelines and research from evidence-based, peer-reviewed literature. In addition, eviCore's Medical Advisory Committee continually evaluates the clinical guidelines based on new evidence in peer-reviewed literature.

- Purpose of the Guideline
  - Describe appropriate care based on the best available scientific evidence and broad consensus;
  - To reduce inappropriate variation in practice;
  - To promote efficient use of resources;
  - To act as focus for quality control
  - Criteria used by clinical reviewers to make authorization decisions
- Process for developing new guidelines and updating current guidelines:
  - New Guidelines are created by a physical or occupational therapist who is a subject matter expert.
  - Current guidelines are updated annually
  - New guidelines are reviewed by external subject matter experts
  - The recommendations from the external subject matter expert may be incorporated into the guideline
  - The eviCore Medical Advisory Committee will review the new guidelines and updates to the current guidelines annually
  - The guideline is then sent to the Health Plan for review
  - Accepted changes will be incorporated into the guideline before publication on the eviCore website.



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- Intended Audience:
  - Utilization Management Clinical Reviewers
  - Providers of physical therapy and occupational therapy services
  - Health Plans that contract with eviCore

## PTOT-1.4: Medicare Coverage Policies

The coverage policies of CMS (Centers for Medicare and Medicaid Services) take precedence over eviCore's guidelines for Medicare and Medicare Advantage enrollees.

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# PTOT-2.1: Lymphedema

## PTOT-2.1.1: Diagnoses Included

- Primary Lymphedema
- Secondary Lymphedema
- Head and Neck Cancer related Lymphedema

## PTOT-2.1.2: Definition

Lymphedema is a chronic, progressive, high-protein form of edema resulting from impaired flow of the lymphatic system. The lymphatic system is a network of specialized vessels (lymph vessels) throughout the body whose purpose is to collect excess lymph fluid that contains proteins, lipids and waste products from the tissues. This fluid is then carried to the lymph nodes, which filter waste products and contain infection-fighting cells called lymphocytes. The excess fluid in the lymph vessels is eventually returned to the bloodstream [3]

Lymphedema most often affects the extremities but may also occur in the face, neck, trunk, abdomen or genital area. It impairs mobility and joint movement as the swollen areas increase in size and weight, often causing postural alterations and pain as the individual struggles to perform activities of daily living. It may progress over time leading to skin changes, fibrosis and cellulitis. A four-stage system is used to classify Lymphedema in terms of degree of swelling and skin condition. [2]

**Staging of Lymphedema**

| Stage | Description |
|---|---|
| 0 | Subclinical: Swelling is not evident, although lymphatic transport is impaired. May exist for months or years before lymphedema becomes evident. |
| I | Early onset: Swelling subsides with limb elevation. Edema may be pitting. |
| II | Limb elevation rarely reduces swelling, and pitting is present. Late in stage II fibrosis begins to occur. |
| III | Tissue is fibrotic, and pitting is absent. Skin changes, including thickening, hyperpigmentation, increased skin folds, fat deposits, and warty overgrowths, develop. |

**Primary Lymphedema (inherited abnormality of lymphatic system):**

- Results from congenital deficit in the number or size of lymph nodes and/or pathways



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**Secondary Lymphedema (acquired abnormality of lymphatic system):**

- Affects upper and lower extremities
- More common and results from obstruction, removal or damage to lymph nodes and/or pathways due to:
  - Surgery – lymph node dissection, peripheral vascular surgery, vein stripping, lipectomy, burn scar excision
  - Radiation, trauma, burns, infection
  - Long-standing Chronic Venous Insufficiency (CVI)
  - Pressure from large tumors

**Head and Neck Lymphedema:**

- Manifestations of lymphedema in patients with head and neck cancer are both internal (difficulty swallowing, vocal cord swelling) and external (swelling of the face, jaw and neck)

## PTOT-2.1.3: Symptoms

**Head and Neck Cancer related Lymphedema[13]**

- Visible swelling under the chin, in the neck or face including eyes and lips with a feeling of tightness or restricted movement in these areas, including the jaw or shoulders.

**Upper and Lower Extremity Lymphedema[15]**

- Initially painless (maybe painful in axillary web syndrome), progressive, beginning with smooth and pitting edema progressing to non-pitting edema
- Usually involves one extremity but can involve both extremities, face, neck, trunk and/or genitals depending on etiology
- Positive Stemmer's sign (inability to lift a fold of skin at the dorsum of the fingers or toes)
- Progressive atrophic skin changes – indurated and brawny
- Frequent Infections – cellulitis, lymphangitis, onychomycosis
- Feeling of fatigue, heaviness, pressure, numbness and tingling or tightness in the affected area
- Impaired ROM and loss of mobility
- Impaired wound healing
- Fibrotic tissue changes
- Loss of ankle contour (tree trunk), and buffalo hump (appearance of dorsum of foot) may appear in lower extremity lymphedema
- Axillary Web Syndrome (cording) in upper extremity lymphedema.



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## PTOT-2.1.4: Requirements for Physical/Occupational Therapy Visits for CDT:

- The following findings must be present to establish medical necessity. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Documentation should support a diagnosis of lymphedema and not tissue edema due to other etiologies (chronic venous insufficiency, congestive heart failure, acute infection(s), etc.). Recent changes in the patient's condition as well as prior unsuccessful therapies (elevation, diuresis, compression garments, etc.) should be reported to justify the need for skilled services.
  - Circumferential measurements demonstrating asymmetrical swelling of 2 cm or more, which is considered clinically significant by experts
  - Clinician determination of lymphedema Stage (II or III) and Severity (moderate or severe) causing functional limitations
  - Stage I and/or mild lymphedema can be treated with education and compression garments
  - Documentation of the presence of lymphedema symptoms which may include: Positive Stemmer's sign, Swelling of dorsum of foot, Fibrosis, Skin breakdown, wounds, or ulcerations due to long-term swelling, Papillomas, Repeated infections, with or without hospitalization, Lymphatic blisters or weeping
  - The treatment should be carried out by or under the supervision of an appropriately trained healthcare provider

Treatment frequency and duration:

- Stage I and/or mild lymphedema can usually be treated in 2-4 visits with education and compression garments
- A program of CDT provided 3–5 times per week for 2 -4 weeks is generally considered medically necessary for the treatment of stage II or III lymphedema, in the absence of any contraindications. Frequency and duration should take into consideration:
  - Stage of lymphedema
  - Severity of objective clinical findings
  - Presence of fibrosis/wounds
  - Presence of and number of complicating factors and comorbidities
  - Patient and/or caregiver ability to self-manage
  - Expectation for functional improvement with skilled intervention
  - Response to treatment provided



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## PTOT-2.1.5: Discharge Criteria

- The patient is discharged when the patient/care-giver can reasonably continue management of symptoms with an independent home program.
- Discharge occurs when reasonable functional goals and expected outcomes have been achieved.
- Therapy is discontinued when the patient is unable to progress towards outcomes because of medical complications, psychosocial factors or other personal circumstances.
- Therapy is discontinued when the patient is no longer objectively demonstrating benefit from therapy including but not limited to, a plateau of limb volume change and lack of meeting Minimally Clinical Important Differences in functional measures (i.e. LEFS, PFSF)
- No objective clinical improvement has been made after the initial course of CDT
- If the member has been non-compliant with therapy as is evidenced by the clinical documentation, and/or the lack of demonstrated progress, therapy will be deemed to be not medically necessary and the member should be discharged from therapy.

**Specific Examination Considerations**

Lymphedema is progressive and early diagnosis leads to more effective treatment. Early detection of lymphatic insufficiency, coupled with appropriate intervention, may be important to prevent progression of the condition and may provide a cost-effective approach. While treatment can begin at any stage, outcomes are less optimal in the later stages due to adipose and fibrotic changes within the tissues. [14]

Prior to establishing a plan of care, clinicians obtain a history and perform tests and measures to rule out other causes of edema, such as cardiac, renal, hepatic, and thyroid dysfunction and to assess the stage and/or severity of the condition. Lymphedema is most often diagnosed by clinical history, physical examination of tissue quality, symptomology and the presence of increased limb volume. Family history is important in the diagnosis of primary lymphedema. There is moderate evidence to suggest that subjective assessment through patient self-reported changes (e.g., limb heaviness, swelling, change in fit of garments, redness, and tenderness) and functional changes (e.g., reduced range of motion) is sensitive to the development of lymphedema[11]

**Examination**

- The most common diagnostic criteria used for lymphedema is a difference of 200 mL or 10% difference limb volume increase (LVI) or a 2 cm difference in contralateral limb circumference
- Assess the condition of the patient's skin for wounds, scars, dryness, pigmentation, dermatitis, cellulitis
- Assess for Stemmer's sign (inability to lift a fold of skin at the dorsum of the fingers or toes)



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- Palpation for fibrosis, pitting, and overall tissue quality may be clinically helpful for staging; however, it has not been investigated for diagnostic purposes (Level II validity).[11]

**Validated Clinical tools for Diagnosing Lymphedema[11]**

- Water displacement volumetry is considered by experts to be the "gold standard" of measurement for clinical evaluation of patients presenting with limb swelling since it offers a sensitive and accurate volume measurement but it is not used much clinically due to inconvenience.
- **Circumferential Measurements** taken at regular intervals along the limb is the most commonly used form of measurement. The measurements should be taken in the same place each time for consistency and volume differences between the affected and unaffected extremity should be calculated.
- **Bioimpedance Analysis** – to detect edema and monitor the outcome of treatment. There is moderate evidence to support use in detecting early stages of lymphedema
- **Perometry** – uses infrared light beams to measure the outline of the limb, limb volume can be calculated quickly from these measurements
- **MRI & CT** –detects lymphatic obstruction by a tumor and to differentiate lipedema and lymphedema
- **Ultrasound** – assesses tissue characteristics for skin thickening and tissue fibrosis. There is moderate evidence to support use of this method in late stage II and stage III; also used to rule out venous disease

**Contraindications to treatment:**

- Absolute contraindications to lymphedema therapy include: [1] Acute infection of the affected limb
  - Venous or arterial obstruction (deep vein thrombosis)
  - Active malignancy, confirmed or suspected local disease
  - Acute pulmonary edema
  - Acute/Severe Congested Heart Failure
- Relative contraindications/precautions to lymphedema therapy include:
  - suspicion of deep vein thrombosis prior to starting treatment
  - Performing MLD in an area of irradiated soft tissue
  - Sensation deficits
  - Arterial disease

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## PTOT-2.1.8: Management/Intervention

The goal of lymphedema management is to reduce swelling, restore function the limb, and prevent the development of infection. It is important to initiate therapy for lymphedema as early as possible before extensive, irreversible fibrosclerotic changes occur in the interstitium. Patients should be educated on self-care as early as possible to promote carryover and improved outcomes [19]

### High Recommendation

### Compression bandages/garments
Level 1 evidence [10]

- Compression bandaging and compression garments that provide external compression are important components of CDT. Compression bandaging uses inelastic or low-stretch bandages to stimulate lymph flow. There is strong evidence to support the use of compression garments and/or bandaging with or without manual lymph drainage (MLD) for reducing volume and for long term self-management.
  - Compression Garments are recommended as the treatment of choice for Stage I Lymphedema
  - In stage II and III lymphedema, compression bandages are initially applied daily because the rapid change in limb girth will cause the bandages to loosen and fall down
  - Once the limb is decompressed, the patient is fit with a custom compression garment to continue independent management.

### Moderate Recommendations

- CDT (Complete decongestive therapy) Level II evidence [3, 15]CDT is considered the standard of care for stage II and stage III lymphedema. It is a comprehensive approach to treatment with a goal of reducing and controlling the amount of swelling in the affected limb and restoring function. There is agreement among reviews that CDT is effective in reducing limb volume. However, the most effective components of CDT cannot be identified. CDT has two phases, phase 1 is considered the intensive phase and involves treatment by an appropriately trained healthcare professional consisting of:
  - The greatest reduction in volume is typically reported after the first 5 days of treatment with reductions continuing at a slower rate in the next weeks until progress plateaus.
  - Phase 2 is the maintenance phase which transitions care to the patient (once the volume of the limb has stabilized) by teaching them how to perform self-care activities, including self-MLD, appropriate skin care, exercise, and the use of compression garments.



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### Special Considerations for CDT

- This is a high utilization approach and during the intensive phase, most research protocols are based on patients being treated 4-5 times per week for 2-4 weeks depending on the stage and severity of lymphedema.
- Some patients may have good results from CDT with modifications of the frequency and duration of treatment. CDT frequency and duration should be individualized to produce the greatest reduction of swelling and improvement of skin condition in the shortest period of time.

### Exercise [9, 12]

- Physiologically, exercise activates the musculoskeletal pumping mechanism that increases venous and lymphatic return in the extremity affected by lymphedema
  - There is moderate evidence to support its usefulness in enhancing lymph flow and possibly improving protein reabsorption
  - The evidence indicates that resistive exercise does not increase the risk of or worsen lymphedema in patients with breast cancer
  - There is strong evidence to support its usefulness for improving range of motion and functional limitations in lymphedema patients

### Conflicting Recommendations
### Manual Lymph Drainage (MLD)

- MLD is a gentle manual treatment technique that uses light skin stretch to activate the lymphatic system in order to improve drainage of the obstructed areas and to direct the fluids to unobstructed areas
  - Based on a 2015 systematic review, MLD is safe and may offer additional benefit to compression bandaging for swelling reduction in Breast Cancer related lymphedema [10]
  - The evidence shows conflicting outcomes on the effectiveness of MLD on LE and head and neck lymphedema as a stand-alone treatment

### Low level laser therapy (LLLT)[6]

- LLLT (PBM) is a non-invasive form of phototherapy that utilizes wavelengths of light between 650 and 1000 nm to deliver low irradiance and doses to the target tissue. It has been used to reduce inflammation, promote lymph vessel regeneration, improve lymphatic motility, and prevent tissue fibrosis
- Conflicting evidence regarding differences between LLLT (PBM) and conventional therapy for short-term limb circumference reduction



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### Low Recommendations

- Compression bandaging/garments for head and neck Lymphedema
  - There is insufficient evidence to support the use of compression bandages/garments for patients with head and neck cancer-related lymphedema
- Pneumatic Compression Pump (PCP) [3]
  - The current studies on PCP are small in sample size and use different types of pumps and treatment protocol leading to a lack of consensus between reviews
  - There is low level evidence to support the use of PCP in conjunction with other components of CDT for reducing lower extremity volume
- Kinesiotaping [19]
  - Is thought to improve muscle function and mimic the effects of MLD, however, the available evidence does not show significant improvements with use of this method
- Surveillance or Self-Management Approach [17,] ,
  - This model relies more on patient education and less frequent clinic visits, the patient is seen for an initial assessment and self -bandaging clinic and monitored weekly until limb volume plateaued, then quarterly or monthly
  - There is growing evidence to support that this method is more cost effective than the high utilization CDT approach, however, there is no Level 1 evidence to support this.

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## PTOT-2.1.10: Home and Self-Care Techniques

- Self-administered MLD – No current objective results of effectiveness, further investigation is needed [3]
- Education on meticulous skin care and signs and symptoms of infection should begin very early in treatment
- Patients should be educated on a self-bandaging program. The evidence suggests that it is effective for management of upper and lower extremity lymphedema [17]
- Since obesity is a risk factor for lymphedema, weight control and weight reduction programs including limitation of caloric intake and appropriate exercise should be implemented
- Education on the importance of consistently wearing custom or ready to wear compression garments during daytime hours to maintain volume reduction [3]
- Specifically designed nighttime compression garments can be worn to bed if the patient's limb continues to swell at night



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# PTOT-2.2: Pelvic Pain Syndrome

## PTOT-2.2.1: Synonyms

- Vulvar Vestibulitis
- Vulvodynia
- Chronic Prostatitis/proctalgia
- Vaginismus/anismus
- Dyspareunia/painful intercourse
- Detrusor/Sphincter Dyssynergia
- Pudendal neuralgia
- Urethral syndrome
- Pelvic floor tension myalgia
- Levator ani syndrome
- Coccygodynia
- Interstitial cystitis
- Paradoxical puborectalis contraction (PPC)

## PTOT-2.2.2: Definition

Pelvic or perineal pain without evidence of regional infection.

### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma related; determine nature and extent of traumatic event.
- Determine OPQRST (Onset, Provocative/Palliative factors, Quality, Radiation/Referral pattern, Site [location], Timing of complaint).

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Ligament tear, fracture |
| Fever, severe pain | Infection |
| Palpable mass | Hemangioma; soft tissue tumor; foreign body |
| Diabetes; paresthesias | Neuropathy; other metabolic causes (e.g., B12 deficiency, hypothyroidism) |
| Constipation, symptoms worse or better with meals, bloody stools | GI conditions |
| Pain with urination, hematuria | UTI, renal stone |
| Immune compromised state | Infection |
| Altered reflexes/progressive weakness | Cord signs/cauda equina |



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## PTOT-2.2.3: Clinical Presentation

The patient presents with pelvic pain symptoms lasting at least six months and is non-cyclical in nature.

**Symptoms include:**

- Dull, aching, burning, or sharp pains in pelvis, perineum, and/or lower abdomen
- Pain radiating to the low back and rectum
- Bladder or bowel frequency, urgency, incontinence, hesitancy, or straining
- Chronic constipation
- Painful sitting
- Men may complain of constant burning pain in the penis and post-ejaculatory pain
- Women may complain of pain increased during or following sexual intercourse, menstrual periods and pregnancy

**Physical/Occupational Therapy Management**

Therapy must show measurable functional progress.

## PTOT-2.2.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Significant Functional Limitations (i.e. Activities of daily living, vocational activities) - Practitioners are strongly encouraged to utilize peer reviewed, standardized tools to quantify Functional Limitations such as Pelvic Floor Impact Questionnaire, Pelvic Floor Distress Inventory, Chronic Prostatitis Symptom Index, Oswestry or Pain Disability Index, and a health related quality of life questionnaire.
  - Impaired muscle performance
  - Impaired functional mobility (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain with urination, pain with intercourse, pain with sitting for prolonged periods, pain limiting function and at least 3/10
- Treatment frequency and duration must be based on:
  - Severity of clinical findings,
  - Presence of complicating factors,
  - Natural history of condition, and
  - Expectation for functional improvement.



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**Treatment Methods**
Frequency and duration of treatment requires continuous assessment and modification based on patient progress and response.

This is a chronic condition so therapy should focus on teaching management skills and techniques to be followed through by the client. Therapy focuses on stretching and strengthening of affected muscles and correction of aggravating postural and biomechanical factors. Breathing and relaxation training is often indicated. Modalities such as electrical muscle stimulation can be useful to decrease pain to allow participation in an active exercise program. Various other techniques may also be effective i.e. massage and exercise, stretching, ultrasound, biofeedback and behavior modification.

## PTOT-2.2.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.

## PTOT-2.2.6: Referral Guidelines

- Refer patient to their primary care provider for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines, or improvement has reached a plateau
  - Neurological deficits appear/progress

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## PTOT-2.2.8: Management/Intervention

Use of modalities and/or passive treatments should be limited. The goal is to transition the patient as quickly as possible to active care, self-management and functional independence.

| Expected Outcome | Procedures/Modalities Such As |
|---|---|
| Decrease pain/spasms | ➢ Modalities i.e. interferential current, electrical muscle stimulation, functional electrical stimulation, transcutaneous electrical nerve stimulation<br>➢ Cryotherapy<br>➢ Thermotherapy<br>➢ EMG Biofeedback<br>➢ Trigger point therapy |
| Restore flexibility of the affected musculature and vertebral joints | ➢ Segmental joint mobilization<br>➢ Range of motion within pain free range<br>➢ Sustained stretching exercises<br>➢ Soft tissue mobilization |
| Increase strength of the pelvic floor muscles | ➢ Isotonic exercises<br>➢ Resisted exercises using vaginal cones |
| Increase strength and endurance of the spine and extremities | ➢ Resisted Isometric Exercises<br>➢ Segmental strengthening<br>➢ Isotonic exercises<br>➢ Functional training |
| Improvement in body mechanics and postural stabilization | ➢ Body mechanics training<br>➢ Postural stabilization activities<br>➢ Postural Control |

## PTOT-2.9.9: Section intentionally left blank

## PTOT-2.2.10: Home and Self-Care Techniques

### Home Medical Equipment

- Hot pack
- Vaginal Cones
- Theraband for therapeutic exercises
- Gym ball for therapeutic exercises
- Home electrical stimulation unit

### Self-Care Techniques

- Pelvic Floor Muscle Exercises
- Stretching and strengthening exercises
- Postural advice, instruction on proper body mechanics
- Heat applications if needed to relieve discomfort



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- Deep breathing and relaxation techniques
- Adjunct Therapy
  - Acupuncture
  - Nerve stimulation devices
  - Injection of tender sites
  - Surgical treatment

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# PTOT-2.3: Pelvic Floor Dysfunction: Bowel and Bladder

## PTOT-2.3.1: Synonyms

- Functional Incontinence
- Stress Incontinence, female and male
- Urinary or bowel frequency
- Dysuria
- Mixed Incontinence, male and female
- Overflow Incontinence
- Urge Incontinence
- Pelvic Muscle Wasting/Atrophy
- Detrusor Sphincter Dyssynergia
- Neurogenic Bladder
- Enuresis
- Constipation

## PTOT-2.3.2: Definitions

Bowel and bladder dysfunction results in lifestyle alterations, emotional changes and/or feelings of pain or discomfort. They may occur throughout the lifespan. Urinary issues are usually addressed after age 5. Constipation issues may be addressed in physical therapy generally from school age on, once the child is able to be cooperative and follow the basic directions involved in treatment.

- Stress Urinary Incontinence
  - Involuntary leakage of urine with increased intra-abdominal pressure, i.e. physical exertion, physical activity, sneezing or coughing. In the elderly, it may result from rolling over in bed, sitting up from reclining, or getting up from a chair. In a younger population, running, bending over, lifting, and jumping are common activities which lead to stress urinary incontinence. Stress urinary incontinence is more frequent in women than in men. Most often it is associated with an incompetent bladder neck and sphincter, weakened urethral musculature, and following multiple vaginal deliveries or male/female pelvic surgery. Stress urinary incontinence results in smaller amounts of urine loss rather than a total loss of urine in one accident.
- Urge Urinary Incontinence
  - It is involuntary loss of urine preceded by a sudden unexpected feeling of urgency.



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- Mixed Incontinence
  - Involuntary leakage of urine associated with urgency and also with effort, exertion, coughing, or sneezing. Mixed incontinence is a combination of stress and urge incontinence.
- Functional Incontinence
  - It is involuntary leakage of urine when a person cannot get to or use the toilet in a timely fashion due to mobility, dexterity, environmental or psychological factors.
- Overflow Urinary Incontinence
  - Involuntary loss of urine in an oozing or unconscious small constant leaking due to the bladder outlet being blocked or the bladder muscles' inability to contract to push urine out in a consistent fashion. As the bladder fills without effective emptying, there is increased pressure on the outlet which causes constant leaking or oozing of urine.
- Total Urinary Incontinence
  - Involuntary loss of urine without any control and due to neurological or tissue damage.
- Frequency
  - Often defined as urinating more than 8 times per day. Nocturia is waking 2 or more times at night to void if under age 70 or 3 or more times if over age 70 Bowel frequency does not have a clinically accepted definition, however, people often seek treatment when the stool consistency changes or there is frequent interruption in daily activities.
- Dysuria
  - Painful or uncomfortable urination caused by infectious or non-infectious disorders.
- Detrusor Sphincter Dyssynergia (DSD)
  - Disturbance of the normal synergistic coordination between bladder contraction and external urethral sphincter muscle relaxation during voiding. It results in an alteration of normal flow and is most often found in neurologic conditions such as spinal cord injury and multiple sclerosis.
- Neurogenic Bladder
  - A flaccid or spastic bladder caused by neurologic damage. Symptoms include overflow incontinence, urge incontinence, frequency, urgency, and retention.
- Enuresis
  - Bedwetting
- Constipation
  - Constipation is the infrequent and difficult passage of stool. Rome III criteria states symptoms must have occurred > 3 months, and have at least 2 more of the following symptoms: straining, hard or lumpy stools, less than 3 BM's per week, sensation of incomplete emptying or blockage, manual maneuvers to evacuate, no loose stools without laxative.



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- Fecal Incontinence
  - Loss of bowel control, ranging from small to large amounts, in liquid or solid form. It also may present as a lack of control of gas.
- Encopresis
  - Fecal soiling by children in the absence of disease who have previously learned control over their bowels and are over the age of 4.
- Risk Factors
  - Age
  - Functional impairment
  - Parity, childbirth, and postpartum state
  - Menopause
  - Dietary factors
  - Smoking
  - Obesity
  - Genetic factors
  - Prostate disorders
  - Dementia
  - Psychiatric disorders, specifically depression
  - Diabetes
  - Urinary tract infection
  - Chronic gastrointestinal (GI) conditions such as irritable bowel syndrome (IBS), diarrhea, constipation, and inflammatory bowel diseases (IBD)
  - Cardiovascular and pulmonary conditions
  - Gastrointestinal, gynecologic, rectal, and urological procedures
  - Neurological disorders, such as stroke and spinal cord problems

**Specific Aspects of History**

- Rule out red flags (require medical management)
- Identify co-morbidities requiring medical management and those which affect therapy management
- Determine if trauma-related; determine nature and extent of traumatic event



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| Red Flag | Possible Consequence or Cause |
|---|---|
| Hematuria (reddish or dark brown urine) or blood in stools | ◆ Disease of genitourinary tract<br>◆ Acute glomerulonephritis<br>◆ GI cancer |
| Dark urine | ◆ Hepatic obstructive disease<br>◆ Biliary obstructive disease<br>◆ Acute exertional rhabdomyolysis |
| Urinary urgency | Infection, inflammation |
| Dysuria | Infection, Inflammation |
| Polyuria | Diabetes |
| Reduced force or caliber of flow | Benign prostatic hyperplasia<br>Pelvic Mass |
| Painful defecation | Abscess Pelvic Mass |
| Difficulty initiating urine stream | Benign prostatic hyperplasia<br>Pelvic Mass |
| Recent onset of urinary dysfunction, saddle anesthesia with back pain | Neurologic disease |

**Subjective Complaints**
Complaint of involuntary leakage of urine or stool with or without urgency, day or night. Symptoms may be related to effort, exertion, sneezing, or coughing. Complaint of increased frequency of bladder or bowel emptying, or decreased frequency of bowel emptying. Straining to empty.

**Scope of Musculoskeletal Examination**
**Normal Bladder Function (age 5+):**

- (To be used as a reference to define abnormal function)
  - Toileting every 2-4 hours during the day
  - Presence of a controllable awareness of the need to toilet on a 2-4 hour basis
  - Strong, continuous flow of urine for 10-20 seconds in duration
  - Urine is light yellow color and without strong odor
  - Automatic initiation and completion of urine flow without hesitancy or dribbling
  - Absence of leaking with physical activities, coughing, sneezing, bending, lifting, exercise, getting up from sitting or reclining
  - Absence of frequent uncontrollable urge feelings with loss of urine.
  - Sleeping 7-8 hours throughout the night without toileting
- Exceptions to guidelines include:
  - Pregnancy - toileting will increase in frequency
  - Aging - after 65 years of age, frequency of toileting in the day and at night increases

**Normal Bowel Function (age 4+)**

- 4-9 bowel movements per week, with normal consistency without straining

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## PTOT-2.3.4: Section intentionally left blank

## PTOT-2.3.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.

**Management/Intervention**
Use of modalities and/or passive treatments should be limited. The goal is to transition the patient as quickly as possible to active care, self-management and functional independence.

| Expected Outcome | Procedures/Modalities Such As |
|---|---|
| ➢ Normalize frequency and timing of bowel and bladder control<br>➢ Efficient emptying of bowel and bladder | ➢ Therapeutic Exercise<br>➢ Neuromuscular Re-education<br>➢ Manual therapy<br>➢ Electrical Stimulation or biofeedback (not needed routinely. Use when patient cannot actively contract the pelvic floor muscles, needs motivation, assistance for adherence or for locating targeted musculature.) |
| ➢ Teach self-management techniques | ➢ Self-care/home management training |

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## PTOT-2.3.7: Section intentionally left blank



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## PTOT-2.3.8: Physical/Occupational Therapy Management

- For Bowel and Bladder Dysfunction:
  - Education
    - Review anatomy and function of the urogenital system
    - Review relation to bowel patterns and changes
  - Lifestyle changes
    - Food, drink, sleep, walking, social and recreational activities.
  - Autonomic Nervous System Retraining
    - Biofeedback, EMG resting tone retraining
    - Physiological Quieting techniques
  - Visceral Organ Alignment
    - Wedge inversion, manual techniques
  - Pelvic Muscle Retraining
    - Pelvic muscle exercises including Kegels and Roll for Control exercises
    - Biofeedback – using internal or external sensor
    - Electrical Stimulation
    - Vaginal or rectal cones
  - Postural Correction, seating on toilet
  - Align pelvis to assist with muscle function
  - Functional Activity Retraining: coordinate breathing with abdominal and pelvic musculature. Connect pelvic floor muscle training with timing and efficiency of voiding. Teach lifting techniques that avoid strain on the pelvic floor.
- For Functional Incontinence
  - Treatment of non-urogenital dysfunctions such as cognitive and/or physical impairments
  - Includes gait, balance, activities of daily living, therapeutic activities

## PTOT-2.3.9: Section intentionally left blank

## PTOT-2.3.10: Home and Self-Care Techniques

- The patient can be taught to use medical equipment and administer self-care at her or his residence.
  - Home Medical Equipment
  - Vaginal or rectal weights
  - Home electrical stimulation unit
- Self-Management Techniques
  - Bladder and bowel training
  - Bladder and bowel diaries
  - Lifestyle interventions
  - Home exercise program
  - Weight loss



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# PTOT-2.4: Systemic Autoimmune Arthropathy

## PTOT-2.4.1: Primary Diagnoses

- Rheumatoid Arthritis
- Juvenile Rheumatoid Arthritis
- Ankylosing Spondylitis
- Spondyloarthritis
- Psoriatic arthritis
- Reiter's arthritis

## PTOT-2.4.2: Definition

There are many autoimmune diseases that affect different body systems and functions. This guideline will pertain to those of a chronic inflammatory nature affecting synovial joints. Chronic autoimmune attacks of the synovial linings result in inflamed and enlarged tissues. These diseases may have differing presentations but are characterized by joint swelling, joint tenderness, joint destruction and progressive disability. There may be the presence of autoantibodies such as rheumatoid factors, but not in all cases. Joint destruction is not typically present in the early stages and it accumulates over time.[1]

Rheumatoid Arthritis is more predominantly present in appendicular articulations. It can present in one joint or several at a time.[1] The juvenile form presents much the same, but at a much younger age; a mean onset of 5 years old with a maximum age of diagnosis being 16.[2] Diagnosis after the age of 16 is generally not considered of the juvenile form.

Spondyloarthritis encompasses several inflammatory conditions with both axial and appendicular presentations. Ankylosing Spondylitis is more predominantly present within the axial articulations; however it can at times affect the hips and shoulders. It is the more common arthropathy of the spondyloarthritis classification (autoimmune joint disease of the spinal column) of which Reiter's and psoriatic arthritis can be part. Psoriatic arthritis more predominantly affects small joints of the hands and feet, and may be combined with knee or other large joint presentation.[3]

This practice guideline is meant to guide decisions on skilled care in cases where the primary condition is related predominantly to an autoimmune arthropathy. In cases of post-surgical care or post-trauma care (i.e. post joint replacement, post fracture) or when there is a more pressing primary diagnosis (i.e. vestibular conditions, neurological rehabilitation, primary mobility training) , other diagnosis specific guidelines may be more appropriate for use even if the patient presents with a history of an autoimmune joint condition.



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## PTOT-2.4.3: Clinical Presentation

- Patient history may include:
  - Progressing joint inflammation with or without redness and swelling of synovial joints
  - Progressing decreases in joint mobility
  - Articular damage present on joint imagery
  - Pain with functional activities
  - Decreases in function
  - Presence of Rheumatoid Factors in blood work
  - Body region specific – axial versus appendicular joints
  - Family history of rheumatic diseases
  - Stiffness
  - Muscle atrophy
  - Fatigue
  - Children not able to keep up with peers
  - Excessive sleep
  - Patients may present with stiffness, and tenderness of affected joints. Pain on joint motion may be due to damage of cartilage and bone. Enlargement of synovial membrane and deformity of the joint may develop over time as articular and supporting structures are damaged by the inflammatory process. The patient may also present with limitation of motion, generalized malaise and fatigue. In more advanced stages, patients may present with movement dysfunctions and physical deformities.

**Rule out red flags (require medical management)**

- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma- related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture, ligament tear |
| Fever, severe pain | Infection |
| Diabetes | Neuropathy |
| Unilateral edema | Deep vein thrombosis |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of extremity | Arterial occlusion |
| Immune-compromised state | Infection |



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## PTOT-2.4.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Standardized Functional Outcome Measurements (FOM) showing significant functional limitations using the **Patient Specific Functional Scale (PSFS)**– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score =1.2 points[4])
    - AND/OR other standardized FOM or Patient Reported Outcome (PRO) tool that is diagnosis specific; i.e. BASFI, HAQ-DI (See Functional Assessment Section in Objective Findings heading below)
    - AND/OR other body area specific FOM or PRO; i.e. DASH, ODI, (See Functional Assessment Section in Objective Findings heading below)
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
  - The patient's ability to understand and follow a regular home program between skilled care visits and assessments
  - Available assistance from any care-givers
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently



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## PTOT-2.4.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- The goals of therapy are for improvement in restoration of function, motor ability, and range of motion.

## PTOT-2.4.6: Referral Guidelines

- Refer patient to their primary care provider, for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines or improvement reaches a plateau;
  - Atrophy in areas of concern occurs

**Primary Considerations**
Conditions within this classification may be diagnosed at any age, however diagnosis is generally early in adulthood. Juvenile rheumatoid arthritis is generally diagnosed prior to the age of 16 with the mean age being 5 years old.

**Youth Considerations**
Children and youth with RA may demonstrate balance and strength deficits. They may also display structural and movement pattern differences from peers. Participation in sport or other peer activity maybe greatly limited. All of this may affect the individual's confidence, socialization, formation of identity and other psychological aspects of life.[2]



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### Subjective Findings

- Complaints of joint stiffness after sleep or periods of inactivity
- Pain, redness, swollen and warm joints
- Multiple joint complaints, frequently symmetrical but not always
- Joints in question may be either more axial or more appendicular
- Fatigue
- Possible weight loss
- Possible loss of strength or endurance
- Reduced range of motion compared to normal for age

### Functional Assessment

The following standardized tests have been identified in peer reviewed evidence as the most common and recommended. The evidence strongly recommends their use as part of any skilled care program to identify and track functional limitations:

### Disease Specific[2,3,5,6]

- Ankylosing Spondylitis Quality of Life Scale – ( ASQoL)
- Bath Ankylosing Spondylitis Functional Index – (BASFI)
- Stanford Health Assessment Questionnaire Disability Index for RA – (HAQ – DI)
- Western Ontario and McMaster University OA Index (WOMAC)
- Child Health Assessment Questionnaire – (CHAQ) has been recommended for use in Juvenile RA.

### Body Region Specific

- Disability of Arm, Shoulder and Hand Score (DASH) - Validation for use in RA[7]
- Lower Extremity Functional Scale (LEFS) – Validation for use in Osteoarthritis[8] and may have utility with lower extremity function in patient with autoimmune joint pathology
- Hip Disability and Osteoarthritis Outcome Score (HOOS)
- Knee Disability and Osteoarthritis Outcome Score (KOOS)
- Back Oswestry Disability Index (ODI)
- Neck Disability Index (NDI)



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**Function Specific**

- Grip strength testing
- Six Minute Walk Test
- Timed Up and Go (TUG)
- Dynamic Gait Index (DGI)
- Patient Specific Function Scale (PSFS)

## PTOT-2.4.7: Section intentionally left blank

## PTOT-2.4.8: Physical/Occupational Therapy Management

Evidence-based literature regarding both adult and child patients with an autoimmune arthropathy can be used to guide decision making on treatment and intervention in skilled care. There is some limited strong evidence for the utility of exercise, but for most questions about treatment evidence is lacking in strength and utility. Information is also lacking on the detail concerning the best intensity, frequency and duration of care. Larger and more controlled trials need to be conducted. [9-11]

- Goals of Intervention:
  - Education on course of disease and expectations for function and quality of life along the continuum of progression
  - Achieve age-appropriate functional strength, flexibility, and balance as shown through regular progress in standardized scores
  - Maximize functional independence with gross and fine motor skills
  - Establish a home exercise program (HEP) to address continued progress or maintenance of progress gained and help patient to transition from skilled care to self-care with said program.

**Recommendations based on strong evidence**

- Exercise:
  - Rheumatoid Arthritis
    - Dynamic type exercise is strongly recommended due to positive effects on function, strength and aerobic capacity. Six Level 1 studies[9] and 13 CPGs [10-11]
    - Home exercise programs should be provided. Home exercise programs given through occupational therapy can be effective in improving strength, mobility and symptoms. Two Level 1 studies.[9]
    - Hand Specific home exercise programs can be cost effective. However, evidence is based on British medical system.[12]
    - Resistive and Aerobic exercise both result in improvements of quality of life, however strong evidence suggests resistive exercise also results in improvements of strength and function where aerobic does not. Recommendation for exercise programming with both types of exercise in mind. Based on Five levels I studies [9] and 12 CPG. [10]



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- Juvenile RA - Supervised or partially supervised (parents) exercise programs by therapist and/or parents can improve measures of quality of life and activity levels and are strongly recommended. High impact exercise led to pain with activity and may not be a recommended method of exercise. Based on systematic review of 9 level 1-2 studies.[2]
- Spondyloarthroses – Stretching, strengthening, posture, mobility and aerobic exercise are recommended. A structured program can be created and periodically reviewed by skilled care provider. There is also strong evidence that unsupervised, structured, home exercise can improve quality of life and BASFI, BASDAI and BASMI score. Based on multiple level I-II RTC [3,13-14]

- Limited Care with Home Program:
  - Rheumatoid Arthritis – Limited visits for education and training followed by an unsupervised home program can result in improvements of DASH score, grip strength and decreases in pain. Recommendation that skilled care for UE RA can be successful with limited visits. Based on one (Level 1) RCT with 4 days of training followed by 12 weeks of self-care[15] and evidence presented in above heading.

- Splinting
  - Rheumatoid Arthritis – Wrist splints for work or work related activity can be used to improve hand function and grip. Based on nine RTC[16]

**Recommendations based on Moderate or emerging evidence**

- Exercise:
  - Rheumatoid Arthritis –
    - Fatigue associated with RA can be improved with general physical activity. Moderate level evidence summarized via Cochrane Review of 6 studies. Not enough evidence to show physical activity should be supervised.[17]
    - Home-based exercise programming is recommended. Evidence shows there may be functional improvements of up to a year in as little as 4 weeks with a home program. Based on one moderate level study. More study is need in this area.[18]
  - Spondyloarthroses – For those with active symptoms physical therapy is recommended over no treatment. Also, that active physical therapy (supervised exercise) is recommended over passive physical therapy. Based on low – moderate quality evidence.[19]
    - Unsupervised back exercises with some initial instruction[19]



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### Interventions with low quality evidence or not supported

- Manual Therapy:
  - Spondyloarthroses –
    - Part of multi-modal care – Low to very low quality studies suggest clinically important improvements in functional outcomes immediately post-treatment, however these benefits decrease over time and were not shown to be sustained in the long term. No specific recommendation can be supported for the use of regular manual therapy[3]
    - Standalone treatment – No evidence found to support the use of manual therapy alone in the care of spondyloarthropathies [3]
    - Spinal manipulation – not recommended in patients with history of advanced osteoporosis or spinal fusion (Ward 2015)
- Electrotherapies:
  - There is insufficient evidence to support the use of muscle stimulation in those with rheumatoid arthritis. Also there is insufficient evidence to recommend the long term use of TENS, laser therapy or ultrasound [10]
- Aquatic Therapy:
  - Rheumatoid Arthritis – Not able to recommend aquatic based therapy over land-based therapy as improvements were similar with either type of care.[9] However, some evidence suggests aquatic therapy can have positive effects, there is no information to recommend on long term improvements.[20]
  - Spondyloarthroses – Low to very low evidence to support the use of hydrotherapy as an adjunct therapy for reductions in pain and improvement of function.[3]

## PTOT-2.4.9: Section intentionally left blank

## PTOT-2.4.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self-care at his or her residence. There is evidence to support patients can experience increases in ability and reduction of symptoms through home exercise and other types of group programs (Yoga, Tai Chi, pool programs, etc).[3,9,12]

### Home Medical Equipment

- Orthotic and splinting devices are strongly recommended as appropriate for long term maintenance of joint positioning.[10,16]
- Resistive elastic bands, weights or other equipment for therapeutic exercises
- Cold packs
- Heating pads
- Splints
- Assistive and safety devices



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# PTOT-2.5: Vestibular- Benign Paroxysmal Positional Vertigo

## PTOT-2.5.1: Diagnoses included

- Benign paroxysmal positional vertigo
- Benign positional vertigo
- Benign positional vertigo
- Paroxysmal positional vertigo
- Positional vertigo
- Benign paroxysmal nystagmus
- Paroxysmal positional nystagmus

## PTOT-2.5.2: Definition

### Benign Paroxysmal Positional Vertigo

- Benign paroxysmal positional vertigo (BPPV), by far the most common cause of vertigo, is characterized by brief spinning sensations (usually less than one minute), which are typically induced by a change in head position such as looking up, bending over, getting in/out of bed, rolling over in bed.
- The condition is reported in adults of all ages with the mean age onset of 49.4 years with increasing incidence most notably around 70 years of age. It is present, but uncommon in children.
- The recurrence rate of BPPV is 27%, and relapse largely occurs within the first 6 months after treatment [23]
- BPPV is largely idiopathic but can occur due to other pathology including post-head trauma, viral labyrinthitis/neuritis, post general or ear surgery, Meniere's Disease, chronic otitis/mastoiditis, ototoxicity, and after ischemia occurs in the distribution of the anterior vestibular artery.
- The fundamental pathophysiological process in BPPV involves dislodged otoconia from the macula of the utricular otolith that enter the semicircular canals (SCC). When there is a change in the static position of the head with respect to gravity, the otolithic debris moves to a new position within the semicircular canals, leading to a false sense of rotation.
- Prevalence of SCC involvement:
- Posterior Semicircular Canal: 75%-86% of patients
- Anterior Semicircular Canal: 1.2%-13% of patients
- Horizontal Semicircular Canal: 5%-13.6% of patients



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- Risk factors include:
  - Greater than 60 years of age appears to increase the risk of developing BPPV
  - TBI
  - Female gender
  - Presence of other vestibular disorders
  - Osteoporosis- may be an increased risk for recurrent BPPV

## PTOT-2.5.3: Presentation

### Subjective Findings of BPPV

- History should include date of and conditions of onset including symptoms, length of dizziness episode, provoking and remitting circumstances and associated past medical history including but not limited to migraine, psychosocial and past incidences of vestibular disorders, traumas or surgeries.
- Patient may report history of head trauma, labrynthitis/neuritis, or ischemia in distribution of anterior vestibular artery, recent surgery, and/or associated vestibular problems such as Meniere's Disease or ototoxicity.
- Patient may report insidious onset
- Patient reports brief episodes of vertigo when head moved into different positions. Vertigo commonly occurs when lying in bed, rolling over in bed, bending over, and looking up.
- Patient reports resolution of vertigo with position change or immobility.
- Patient reports postural instability which can include difficulty walking, veering to involved side, difficulty turning or walking while head is turning; instability in low lighting or darkness or over uneven ground.

### Objective Findings

Objective findings may include:

- Positive Positional testing, including the Dix-Hallpike (a.k.a. Barany or Nylen-Barany Maneuver) test, Side-Lying test, Roll test and others (see Scope of Examination).
- Fall Risk using Functional Outcome measures including, but not limited to:
  - Dynamic Gait Index
  - Timed Up and Go (TUG)
  - Functional Gait Assessment
  - Functional Reach Test
  - Multi-directional Reach test
  - Berg Balance Scale



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## PTOT-2.5.3.1: Specific Examination Considerations

**Results if Benign Paroxysmal Positional Vertigo**
Diagnosis is based on characteristic findings:

- Canalithiasis:
  - Latency of one or more seconds after head is moved into provoking position before vertigo and nystagmus occur together
  - Initial heightening then gradual decrease in reduction of symptoms (less than 60 seconds)
  - Decreased intensity of vertigo with repeated movements (fatigability)
- Cupulolithiasis:
  - No latency period
  - Symptoms persist > 60 seconds
- Characteristic nystagmus:
  - Posterior Canal - up beating with torsional nystagmus rotating toward involved side (down ear)
  - Anterior/Superior Canal – down beating with torsional nystagmus rotating toward involved side (down ear)
  - Horizontal canal – geotropic (intense beating towards the affected ear) when canalithiasis or ageotropic (apogeotropic) likely when cupulolithiasis
- Clear lateralization remains unclear in about 20% of horizontal canal cases [6]
  - Reversal of nystagmus and recurrence of vertigo when returning to sitting
- Atypical BPPV
  - BPPV may be positive without characteristic nystagmus including lack of any nystagmus (Subjective BPPV) [11] provided that the described symptoms and history are characteristic of BPPV
  - Some sources consider horizontal and superior canal involvement to be Atypical BPPV

## PTOT-2.5.4: Requirements for Physical/Occupational Therapy Visits

Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:

- Functional Outcome Measurements showing significant functional limitations using the **Patient Specific Functional Scale (PSFS)**– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points) OR one or more of the following:
  - Timed Up and Go (TUG)- >13.5 seconds
  - Berg Balance Test- <45/56
  - Dizziness Handicap Inventory (DHI)- >30 points
  - Activities-specific Balance Confidence Scale (ABC)- <67% indicating a fall risk
  - Vertigo Symptom Scale-short form (VSS-sf)- >12 points ; 3 point change is clinically significant



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- Tinetti Scale- <26/28
- Dynamic Gait Index (DGI)- <22/24

- A positive Dix Hallpike Test or Side lying test or Roll Test
- Confirmed diagnosis by physician or specialist

**Treatment frequency and duration must be based on:**

- Severity of objective clinical findings,
- Presence of and number of complicating factors and comorbidities,
- Natural history and chronicity of condition,
- Expectation for functional improvement with skilled intervention,
- Response to treatment provided

## PTOT-2.5.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.



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## PTOT-2.5.6: Referral Guidelines

- Refer patient to their primary care provider, for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines or improvement reaches a plateau;
  - Failure to respond to treatment resulting in the need for further assessment to confirm diagnosis;
  - Increased neurologic signs/symptoms

## PTOT-2.5.7: Section intentionally left blank

## PTOT-2.5.8: Physical/Occupational Therapy Management

### Strong Recommendations

- Clinicians should treat, or refer to a clinician who can treat, patients with posterior canal BPPV with a canalith repositioning procedure (CRP aka Canalith Repositioning Technique (CRT), Canalith Repositioning Maneuver (CRM))[6] . Procedures may include:
  - Posterior Canal Canalithiasis:
    - Epley Maneuver
    - Liberatory Maneuver (Semont Maneuver)[20]
    - Brandt-Daroff Habituation Exercises
  - Posterior Canal Cupulolithiasis:
    - Liberatory Maneuver (Semont Maneuver)
  - Anterior Canal Canalithiasis:
    - Epley Maneuver
    - Modified Epley Maneuver as described by Yacovino 2009
  - Anterior Canal Cupulolithiasis:
    - Reverse Liberatory Maneuver (Reverse Semont Maneuver)
- Horizontal Canal Canalithiasis:
  - Appiani (or Gufoni) Maneuver
  - 270 degree roll
  - Forced Prolonged side lying
  - Lempert Roll Maneuver (aka Barb-B-Que Roll)
  - Horizontal Canal Cupulolithiasis
    - Quick BBQ Roll Treatment for Cupulolithiasis
    - Modified Semont Maneuver for Horizontal Canal Cupulolithiasis (aka Casani)
    - Modified Brandt-Daroff for Horizontal Canal Cupulolithiasis
- Clinicians should not recommend post procedural postural restrictions after CRP for posterior canal BPPV [6]



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### Moderate Recommendations

- Clinicians should not order vestibular testing in a patient who meets diagnostic criteria for BPPV in the absence of additional vestibular signs and/or symptoms inconsistent with BPPV that warrant testing [6]
- Patient Education- Causes, mechanism and treatment of BPPV for basic understanding of their condition, and need for follow-up as appropriate

### Neutral Recommendations

- Neuromuscular re-education for static and dynamic balance and gait
- Fall Prevention Strategies

## PTOT-2.5.9: Section intentionally left blank

## PTOT-2.5.10: Home and Self-Care Techniques

- The patient can be taught to use medical equipment and administer self- care at his residence, provided there are no limiting factors for capacity to self-treat. Examples of limiting factors include age, dementia, safety, anxiety, pain, and ability to understand and correctly administer the techniques.

### Self-Care Techniques

- Post-procedural instructions. These vary among practitioners
- Self-administered canalith particle repositioning techniques
- Home exercise program for concomitant mobility deficits

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# PTOT-2.6: Vestibular Hypofunction

## PTOT-2.6.1: Diagnoses included

- Peripheral Vestibular Hypofunction (VH)
- Peripheral Unilateral Vestibular Hypofunction (UVH)
- Peripheral Bilateral Vestibular Hypofunction (BVH)
- Labrynthitis
- Vestibular Neuritis
- Meniere's Disease
- Vestibular Schwannoma with or without resection
- Chronic Otitis
- Ototoxicity
- Vestibular Migraine
- Central Vestibular Disorder
- Central Vestibular Hypofunction

## PTOT-2.6.2: Definition

Unilateral vestibular hypofunction is total or partial loss of function of one side of the vestibular system (of the labyrinth, vestibular nerve, vestibular nuclei, or central pathways) that can cause impairments in daily activity and social participation.

Bilateral vestibular hypofunction involves total and/or partial loss of vestibular function on both sides of the body. This is marked by vestibular ocular reflex (VOR) dysfunction and reduced or absent visual or somatosensory substitution of vestibular loss.

Central vestibular hypofunction refers to dysfunction occurring at the central nervous system level including vestibular nuclei and the vestibular cerebellum. It may also include connections between the vestibular nuclei, the vestibular and ocular motor structures of the brainstem, cerebellum, thalamus, and vestibular cortex. Central vestibular hypofunction may often be associated with systemic injuries such as traumatic brain injuries or strokes.

## PTOT-2.6.3: Clinical Presentation

- Peripheral Bilateral Vestibular Hypofunction
  - Motion-dependent positional vertigo
  - Oscillopsia during head movements (failure of the VOR)
  - Instability of gait and posture, which increases in darkness or on uneven ground (reduced or absent visual or somatosensory substitution of vestibular loss)
  - Typically symptom-free when head is stationary



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- Peripheral Unilateral Vestibular Hypofunction
  - Rotatory vertigo or apparent body tilt (for a few days or weeks)
  - Nystagmus
  - Oscillopsia
  - Nausea
  - Tendency to fall in direction of affected side
- Central Vestibular Hypofunction
  - Sustained rotational vertigo (vestibular nerve or vestibular nuclei)
  - Unsteady stance and gait
  - Dysmetric saccades
  - Skew deviation
  - Gaze saccades
  - Gaze nystagmus
- Meniere's Disease
  - Recurring postural vertigo persisting for minutes to hours and accompanied by hearing impairment
  - Tinnitus
  - A feeling of pressure in the affected ear
- Vestibular Migraine
  - Episodic positional or rotary vertigo lasting seconds to days
  - With or without headache
  - Mild gaze nystagmus
  - Mild gaze saccades or central positional nystagmus

**Recommended Functional Outcome Measures**

- Dynamic Gait Index
- Functional Gait Assessment
- Four Square Step Test
- Timed Up and Go
- Berg Balance Test
- Tinetti Scale

**Recommended Patient Reported Outcomes**

- Dizziness Handicap Inventory
- Activities Specific Balance Confidence Scale
- Vertigo Symptom Scale-short form



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If computerized dynamic posturography is available, then combining it with a walking balance test such as the TUG or DGI will provide more sensitivity to vestibular hypofunction. If computerized posturography is not available, then the Berg should be combined with one of the tests of walking balance. Thus, the combination of standing balance and walking tests is the best way to identify patients with uncompensated vestibular impairments [6]

## PTOT-2.6.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the **Patient Specific Functional Scale (PSFS)**– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points) OR one or more of the following:
    - Timed Up and Go (TUG)- >13.5 seconds
    - Berg Balance Test- <45/56
    - Dizziness Handicap Inventory (DHI)- >30 points
    - Activities-specific Balance Confidence Scale (ABC)- <67% indicating a fall risk
    - Vertigo Symptom Scale-short form (VSS-sf)- >12 points ; 3 point change is clinically significant
    - Tinetti Scale- <26/28
    - Dynamic Gait Index (DGI)- <20/24; 4 point change is clinically significant
  - Confirmed diagnosis by physician or vestibular functional laboratory specialist (Hall, C. D., et al 2016)
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings
  - Presence of and number of complicating factors and comorbidities
  - Natural history and chronicity of condition
  - Expectation for functional improvement with skilled intervention
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure or Patient Reported Outcome and the score meets medically necessary threshold
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently



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## PTOT-2.6.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-2.6.6: Referral Guidelines

- Refer patient to their primary care provider, for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines or improvement reaches a plateau;
  - Failure to respond to treatment resulting in the need for further assessment to confirm diagnosis;
  - Increased neurologic signs/symptoms

## PTOT-2.6.7: Section intentionally left blank



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## PTOT-2.6.8: Physical/Occupational Therapy Management

Vestibular rehabilitation is recommended for both unilateral and bilateral vestibular hypofunction based on Level 1 evidence studies [9] Vestibular rehabilitation exercises are designed to facilitate central nervous system plasticity by generating substitution, habituation, and adaptation mechanisms [3] Vestibular rehabilitation should be implemented in the absence of active pathology (such as active Meniere's or neuritis).

### Interventions with Strong Recommendation

- Isolated saccadic and smooth pursuit exercise without head movements are not recommended (Level 1 evidence) for UVH [9]

### Interventions with Moderate Recommendation

- Gaze stabilization and habituation exercises should be used for UVH based on Level 1-2 evidence [9]
- Home programs and education are effective in treatment of unilateral vestibular hypofunction [12]
- Treatment should be targeted and individualized based on the primary impairment or limitation of UVH (Level 2 evidence) [9]
- Balance and gait exercises

### Interventions with Weak Recommendation

- Exercise Dosage (Level 5 evidence) [9]
  - Acute/Subacute – 3x/day for 12 minutes per day
  - Chronic – 3x/day for 20 minutes per day
- Number of treatment sessions (Level 5 evidence) [9]
  - Acute/Subacute Unilateral – 1x/ week for 2-3 sessions
  - Chronic Unilateral – 1x/week for 4-6 weeks
  - Bilateral – 1x/week for 8-12 weeks

### Interventions for Central Vestibular Hypofunction (CVH)

High quality evidence specific to CVH is lacking however there is substantial evidence supporting rehabilitation for peripheral vestibular disorders which have shared exercise based rehabilitation strategies. Patients with stable CNS lesions or mixed central and peripheral lesions should not be excluded from treatment [10] Patients with CVH tend to have worse outcomes and longer periods of rehabilitation than those with peripheral VH[7]



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**Moderate Recommendations-** Two types of exercises are shown to be effective. Treatment should be individualized.

- **Substitution exercises** are used to promote balance and reduce falls by using other sensory stimuli (e.g., visual or somatosensory input) to substitute for absent or reduced vestibular function
- **Habituation exercises** are used to reduce movement/position-induced dizziness through repeated exposure to noxious stimuli. By systematically producing mild, temporary symptoms, a reduction of dizziness can result over time.

**Interventions for children with Vestibular Hypofunction**
Rehabilitation for vestibular impairments is similar to what is provided for adults with vestibular [16]

## PTOT-2.6.9: Section intentionally left blank

## PTOT-2.6.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self- care at his residence, provided there are no limiting factors for capacity to self-treat. Examples of limiting factors include age, dementia, safety, anxiety, pain, and ability to understand and correctly administer the techniques

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# PTOT-2.7: Chronic Wound Care

## PTOT-2.7.1: Synonyms

- Non-healing wounds
- Impaired Wound healing

## PTOT-2.7.2: Definition

- Chronic non-healing wounds are wounds that have the failed to progress through a timely sequence of repair, or one that proceeds through the wound healing process without restoring anatomic and functional results. Typically, there is a physiologic impairment that slows or prevents wound healing. Although there is no clear consensus in the duration of a wound that defines chronicity, a range of 4 weeks to 3 months has been used to define chronic wounds in the literature. The Wound Healing Society classifies chronic wounds into 4 major categories: pressure ulcers, diabetic foot ulcers, venous ulcers, and arterial insufficiency ulcers.

### Wound Types and Etiology

- Pressure Ulcer
  - Ischemia 2° to excess pressure on one area for a prolonged period
  - Staged based on severity. Healing ulcer stages are not reversed.
- Arterial Insufficiency
  - Complete or partial arterial blockage leading to tissue necrosis and/or ulceration
- Venous Stasis
  - Malfunctioning venous valves causing increased pressure in the veins
  - Most common type of ulcer affecting the lower extremities.
  - Lymphatic drainage and flow also plays a role in these ulcers.
- Diabetic (Neuropathic and Ischemic)
  - Foot ulcerations due to both neurologic and vascular complications.
- Traumatic
  - Trauma that results in a compromise to the arterial, venous or lymphatic systems.
- Burns
  - 1st Degree: superficial, reddened area of skin like a sun burn.
  - 2nd Degree: blistered injury site which may heal spontaneously after the blister fluid has been removed.
  - 3rd Degree: a burn through the entire skin; usually requires surgical intervention for wound healing.

## PTOT-2.7.3: Section intentionally left blank



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## PTOT-2.7.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Size of wound/stage
  - Amount (%) of necrotic tissue and drainage
  - Pain: limiting function and at least 3/10 for 50% of the time
  - Changes in patient functional outcome using a functional outcomes test such as
    - Functional Independence Measure scale (FIM)
    - Functional Life Scale (FLS)
    - DASH
    - LEFS
    - PSFS
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings (quantity of necrotic tissue, quantity of drainage, size of wound)
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
  - Patient's level of independence
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - The wound size decreased by 10%
  - The quantity of necrotic tissue decreased by 10%
  - Reduction in complicating factors such as lymphedema
  - The patient is unable to independently dress wounds or apply compression garments/wrapping

## PTOT-2.7.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress while decreasing the wound size.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.



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- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.

## PTOT-2.7.6: Referral Guidelines

- Refer patient to their primary care provider, for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines or improvement reaches a plateau;
  - There are signs of infection (drainage amount, color, smell and type)
  - The wound size or the percent of necrotic tissue increases

## PTOT-2.7.7: Section intentionally left blank

## PTOT-2.7.8: Physical/Occupational Therapy Management and Intervention

- Debridement[17, 18, 19, 20]
  - Non-selective Debridement: removal of devitalized tissue from a wound using wet to dry dressing, enzymatic application, abrasion or autolysis
  - Selective Debridement: removal of devitalized tissue from a wound using techniques such as pulsed lavage with suction (PLWS) and sharp debridement
  - Sharp debridement: non-surgical technique that includes use of a scalpel, scissors, and/or other sharp instruments to remove non-viable tissue.
  - Enzymatic Debridement: use of chemical enzymes to assist in wound healing. Enzymes that help slough off the dead tissue are often available as part of a topical ointment (i.e. Collagenase Ointment)
  - Autolytic Debridement: use of the body's own healing processes to remove dead tissue. This option, while slow, is often one of the least painful, yet due to the slow process, infection may pose a larger threat to the wound.
- Dressings [12,15, 18]
  - Optimal wound coverage requires wet-to-damp dressings, which support autolytic debridement, absorb exudate, and protect surrounding normal skin.
- Mechanical Adjunct in Wound Healing
  - Pulsed lavage has replaced whirlpool therapy. A review of the literature reveals that irrigation delivered at the wound surface with a pressure of 4-15 psi effectively removes debris, decreases bacterial colonization and prevents clinical infection.
  - Ultrasound – Summary of findings of 25 recent studies examining low frequency ultrasound (20-60 kHz) to be most effective when used 3 times a week and has the potential to decrease exudate and slough, decrease pain, disperse biofilms, and increase healing in wounds of various etiology. [16,17,18]



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- Negative Pressure Therapy - The efficacy of NPWT in promoting wound healing has been largely accepted by clinicians, yet the number of high-level clinical studies demonstrating its effectiveness is small.[13,15,18]
- Electrical Stim-29 RCT - unidirectional high voltage pulsed current (HVPC) with the active electrode over the wound was the best evidence-based protocol to improve wound healing.[5,7,8]

- Manual Lymphatic Drainage[11, 17,18]
- Therapeutic Exercises[1,2,3]

Venous Ulcers - Treatment of venous ulcers includes compression therapy, providing a moist wound environment and debridement of necrotic tissue. Most venous ulcers heal with these measures alone. Some require split-thickness skin grafting or application of bioengineered skin (e.g., Apligraf)[11]

Pressure Ulcers - Treatment of decubitus ulcers requires prolonged surgical and nursing care. During the extended period of treatment required, the patient remains at risk for the development of new pressure ulcers at other sites. Treatment is based on appropriate staging of the pressure ulcer.[15,16,18]

Diabetic Foot Ulcers - The treatment of diabetic foot ulcers requires the following: (1) appropriate therapeutic footwear, (2) daily saline or similar dressings to provide a moist wound environment, (3) debridement when necessary, (4) negative pressure wound therapy, e-stim and hyperbaric oxygen treatments may also be beneficial.[1,2,3,14,15]

## PTOT-2.7.9: Section intentionally left blank

## PTOT-2.7.10: Home and Self-Care Techniques

- Home exercise program
- Elevation of affected area
- Use of compression wraps and support hose
- Dressing changes
- Management and prevention of ulcers
- Pressure relieving techniques
- Use of support surfaces and positioning devices



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# PTOT-3.1: Concussion

## PTOT-3.1.1: Synonyms

- Mild Traumatic Brain Injury (mTBI)
- Minimal Traumatic Brain Injury

## PTOT-3.1.2: Definition

- An injury that may be caused either by a direct blow to the head, face, neck or elsewhere on the body with an "impulsive" force transmitted to the head. Typically this results in rapid onset of short-lived impairment of neurological function that resolves spontaneously. However, in some cases, symptoms and signs may evolve over a number of minutes to hours. Concussion may result in neuropathological changes, but the acute clinical symptoms largely reflect a functional disturbance rather than a structural injury and, as such, no abnormality is seen on standard structural neuroimaging studies. This results in a graded set of clinical symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course. However, it is important to note that in some cases symptoms may be prolonged. The clinical signs and symptoms of concussion cannot be explained by drug, alcohol, medication use, other injuries (such as cervical injuries, peripheral vestibular dysfunction etc.), or other comorbidities (e.g psychological factors or coexisting medical conditions etc).[1]
- An mTBI as defined by the World Health Organization (WHO) is an acute brain injury resulting from mechanical energy to the head from external forces. Operational criteria for clinical identification include: (i) one or more of the following: confusion or disorientation, loss of consciousness for 30 minutes or less, post-traumatic amnesia for less than 24 hours, and/or other transient neurological abnormalities such as focal signs, seizure, and intracranial lesion not requiring surgery; and (ii) Glasgow Coma Scale (GSC)[2] score of 13-15 after 30 minutes post-injury or later upon presentation for healthcare. These manifestations of mTBI must not be due to drugs, alcohol, medications, caused by other injuries (e.g. systemic injuries, facial injuries or intubation), caused by other problems (e.g. psychological trauma, language barrier or coexisting medical conditions) or caused by penetrating craniocerebral injury.[3]
- There is an emerging consensus that only severe concussions overlap the less severe end of mTBI spectrum. There is a movement to classify a concussion as a minimal TBI or at least acknowledge that mTBI and concussion are not synonymous. This definition would make concussions only a subset of mTBI. [1,4]



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***Table 1: Illustration of how severe a Concussion may be in relation to common Traumatic Brain Injury Classifications***

| Minimal Traumatic Brain Injury | Mild Traumatic Brain Injury | Moderate Traumatic Brain Injury | Severe Traumatic Brain Injury |
|---|---|---|---|
| ⇦ Concussion ⇨ | | | |

Because concussion and mTBI can present with heterogeneous symptoms, impairments, and functional limitations there are varied definitions. Each case is unique and a full battery of the tools available should be used to identify systems affected to help direct treatment and management of each individual's condition. Some clinical models and clusters of symptoms have been identified that may help group individuals into a specific treatment group. A thorough clinical evaluation including a history, observation, physical exam (e.g. range of motion, strength, and palpation), vestibular testing, and functional testing may help identify the correct group that an individual may fit.[5] In some instances individuals will overlap the established groups and need multifaceted rehabilitation methods and protocols. [6]

### Target Populations

- Inclusion ICD-10 Codes:
  - S06.0X0D Concussion without loss of consciousness, subsequent encounter
  - S06.0X9 Concussion with loss of consciousness of unspecified duration
  - S06.0X9D Concussion with loss of consciousness of unspecified duration, subsequent encounter
  - S06.0X9S Concussion with loss of consciousness of unspecified duration, sequela
  - F07.2 Postconcussional syndrome
- Exclusions
  - Moderate or Severe Traumatic Brain Injury
  - Acquired Brain Injury.

## PTOT-3.1.3: Clinical Presentation

There are at least 22 concussion symptoms that may be observed clinically or reported during a history/symptom evaluation on a concussion inventory. These alterations to body functions and structures can interfere with daily activities and limit participation in functional tasks like at school and work as well as in the home and community. The symptoms are listed below with percentages of individuals experiencing that from 1 study that reported the occurrence of symptoms within 72 hours of the injury.[11]



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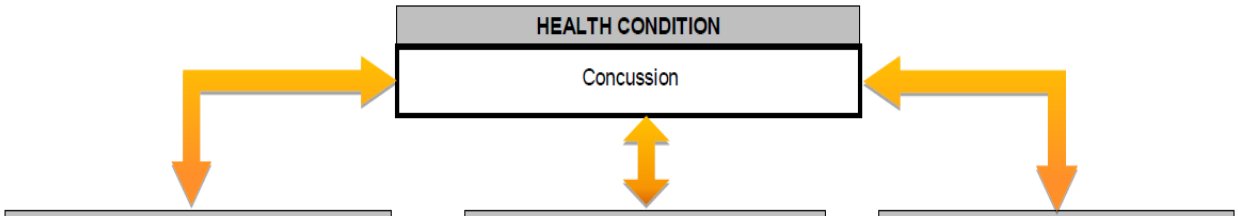
***Table 2: Common Concussion Symptoms and Frequency***

| Concussion Symptoms | |
|---|---|
| **Symptom** | **Frequency reported in 1 study** |
| **Headache** | **88.5%** |
| **Difficulty concentrating** | **82.7%** |
| **Feeling Slowed Down** | **78.8%** |
| **Dizziness** | **78.8%** |
| **Nausea** | **77.3%** |
| **Fatigue** | **76.9%** |
| **Felling mentally foggy** | **75.0%** |
| **Drowsiness** | **73.1%** |
| **Difficulty remembering** | **69.2%** |
| **Sensitivity to light** | **57.5%** |
| **Balance problems** | **55.5%** |
| **Sensitivity to noise** | **50.0%** |
| **Trouble falling asleep** | **45.0%** |
| **Irritability** | **38.5%** |
| **Sleeping more than usual** | **34.6%** |
| **Vision problems** | **32.7%** |
| **Sleeping less than usual** | **30.8%** |
| **Nervousness** | **30.8%** |
| **Feeling more emotional** | **19.2%** |
| **Sadness** | **19.2%** |
| **Numbness or tingling** | **15.4%** |
| **Vomiting** | **11.5%** |



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## *Table 3: ICF Model for Concussion*




### BODY STRUCTURE/FUNCTIONS IMPAIRMENTS

| | |
|---|---|
| Cognitive<br><br>-Standardized Assessment of Concussion (SAC) [19], ACE,[20] GCS[2], Post Concussion Symptom Scale (PCSS) [21] | -Problems with concentration, memory, and speed of processing[11]<br><br>-Confusion[11]<br><br>-"Fogginess"[11] |
| Physical<br><br>-GCS[2], PCSS[21] | -Headache or Neck pain/Cervical dysfunction[4,11]<br><br>-Dizziness and Balance problems[11]<br><br>-Nausea/Vomiting[11]<br><br>-Fatigue[11]<br><br>-Vision problems[11]<br><br>-Sensitivity to light or noise[11]<br><br>-Transient neurological abnormalities[11]<br><br>-Numbness or tingling[11] |
| Behavior/Emotional<br><br>-GCS[2], PCSS[21] | -Depression/sadness or anxiety, agitation, irritability, or impulsivity (change in normal behavior)[11]<br><br>-Sleep changes/disturbance (less, more, or inability to fall asleep[11] |

### ACTIVITY (TASKS)

| Assessment Tools | Description |
|---|---|
| Sport Concussion Assessment Tool (SCAT)[22] | -Assesses limitations in multiple areas and can provide helpful information regarding at baseline and with progress. |
| Immediate Post-Concussion Assessment Cognitive Testing (ImPACT)[23] | -Assesses limitations in multiple areas and can provide helpful information regarding at baseline and with progress. |
| Dizziness Handicap Inventory (DHI): Series of dizziness related questions[24] | -Questionnaire with physical, emotional, and functional subscales. |
| Balance Error Scoring System (BESS), SWAY, and coordination[22,25] | -Balance, postural control, and reaction time. |
| Vestibular/Occulomotor Screening (VOMS)[26] | -Smooth pursuits, saccades, convergence, vestibular ocular reflex, visual motion sensitivity. |
| Neck Examination | -Range of motion, strength, and palpation. |
| Other (Graded exercise, functional gait assessment[4] | -Exertion, walking, coordination, mood, and neurocognitive. |

### PARTICIPATION

| Outcome Measure | Description |
|---|---|
| Patient Specific Functional Scale (PSFS)[27] | -Assesses specific limitations and can provide helpful information regarding initial status as well progress. |
| Neck Disability Index[28] | May be useful after concussion (some of the items relate to common concussion symptoms including headaches and concentration problems). Problems with reading, driving, normal level of work, recreation, and sleeping may also be relevant especially when there is cervical involvement. May be helpful as part of a targeted approached in specific cases.[29] |



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## PTOT-3.1.4: Requirements for Physical/Occupational Therapy Visits

### Admission Criteria for Initial and Ongoing care

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of dysfunction should be specified at initiation of therapy, and periodically, to establish an objective response to therapy using a standardized assessment tool described above.
  - Cognitive and behavioral/emotion signs
  - Vestibular symptoms
  - Impaired function
  - Neck pain and headaches
  - Postural/balance disturbance
- Treatment frequency and duration must be based on:
  - Severity of clinical findings
  - Presence of complicating factors
  - Risk factors or predictors of delayed recovery
  - Natural history of condition
  - Expectation for functional improvement
  - Response to treatment
- Home program development, education and training
- Commonly used concussion tests and measures, as categorized by ICF domain, can be found in Table 4.



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### *Table 4: Commonly Used Concussion Tests and Measures by ICF Domain*

| Assessment | Description |
|---|---|
| **Body Structure/ Function** | |
| Basic therapy assessments and symptom evaluations | Examples: ROM, strength, BMI, blood pressure, pain, various joint integrity tests, etc. |
| Standard Assessment of Concussion (SAC)[19] | Multi-domain:<br>◆ provides immediate mental status assessment of individuals who may have incurred a concussion<br>◆ contains questions to assess orientation, immediate memory, concentration and delayed memory<br>◆ takes approximately 5 minutes to administer and does not require a neuropsychologist to evaluate test scores<br>◆ valid and reliable for use with children ages 6 and older[56] |
| Acute Concussion Evaluation (ACE)[20] | Multi-domain:<br>◆ physician/clinical form used to evaluate individuals for a concussion<br>◆ includes questions about concussion characteristics, 22 concussion symptoms and risk factors for protracted recovery<br>◆ can be used serially to track symptom recovery over time to inform clinical management decisions<br>◆ valid and reliable for use with children ages 3-18 (with parent informants)[18] |
| Post-Concussion Symptom Scale (PCSS)[21] | Multi-domain:<br>◆ Symptom inventory developed as part of the Pittsburgh Steelers concussion program<br>◆ Self-reported symptoms, ex: headache, fogginess, dizziness, are rated on a Likert scale of 0 to 6, with 0 meaning 'none' and 6 meaning 'severe'<br>◆ Total score ranges from 0 to 132<br>◆ Valid and reliable[59] |
| Glasgow Coma Scale (GSC) [2] | Eye response rated 1-4<br>Verbal response rated 1-5<br>Motor response rated 1-6 |
| **Activity (Tasks)** | |
| Balance Error Scoring System[22] | Posture/Balance:<br>◆ Quantifiable version of a modified Romberg test for balance which measures postural stability and balance<br>◆ Consists of single, double and tandem stance assessment on firm and foam (unstable) surfaces<br>◆ Most widely used balance assessment tool for concussion evaluation and management<br>◆ Reliable and valid clinical tool without evidence of a learning effect[57]<br>◆ One of the measures used in the Concussion Assessment & Response™: Sport Version mobile app (CARE SPORT) for healthcare professionals[58] |



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| Assessment | Description |
|---|---|
| SWAY[25] | Balance and Reaction Time:<br>◆ Application designed to be conducted with a smartphone or iOS device that has an accelerometer<br>◆ Consists of single, double and tandem stance assessment on a firm surface<br>◆ Requires a subscription and a compatible device with an accelerometer<br>◆ Reliable and valid clinical tool without evidence of a learning effect[57] |
| SCAT 5[22] | Multi-domain:<br>◆ standardized concussion screening tool designed for licensed healthcare professionals to assess individuals ages 13 and older for mental and physical changes following a concussion<br>◆ evaluates the following areas:<br>◆ red flags<br>◆ observable signs of concussion<br>◆ immediate memory<br>◆ Glasgow Coma Scale (GCS)<br>◆ Cervical spine assessment<br>◆ Athlete history<br>◆ Symptom evaluation<br>◆ Cognitive screening<br>◆ Neurological screen<br>◆ Delayed memory<br>◆ Valid and reliable test for concussion evaluation<br>◆ Supercedes previous versions of the SCAT [2,3]. However the SCAT 3 has been extensively researched. |
| Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT)[23] | Multi-domain:<br>◆ computerized concussion management program designed and validated to provide a guideline for evaluation, inform treatment and recommend return to activity<br>◆ consists of baseline and post-injury assessments for children ages 5-11 years and ages 12 years and older<br>◆ evaluates multiple aspects of neuropsychological function, including:<br>◆ health history and concussion-related symptoms<br>◆ attention span<br>◆ working memory<br>◆ motor processing speed<br>◆ reaction time<br>◆ non-verbal problem-solving<br>◆ impulse control |
| Dizziness Handicap Inventory[25] | Multi-domain:<br>◆ assesses an individual's handicap because of his/her dizziness using 25 items relating to physical, emotional and functional domains<br>◆ highest overall score on the test is 100 with higher scores indicating greater handicap resulting from dizziness<br>◆ 18-point change is considered clinically meaningful |



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| Assessment | Description |
|---|---|
| Vestibular Ocular Motor Screening (VOMS)[26] | Vestibular/Balance:<br>◆ Screening tool used to detect signs and symptoms of a concussion<br>◆ Assesses the systems responsible for integrating balance, vision and movement<br>◆ 90% accuracy in identifying patients with concussion<br>◆ Assists in determining the type of concussion suffered<br>◆ Requires 5-10 minutes to conduct using simple tools<br>◆ Designed for use with individuals ages 9-40<br>◆ Tests five areas of vestibular and ocular motor impairment:<br>◆ Smooth pursuits<br>◆ Saccadic or rapid eye movements<br>◆ Near point convergence<br>◆ Vestibular ocular reflex<br>◆ Visual motion sensitivity |
| **Participation Measures** | |
| Patient Specific Functional Scale)[27] | Three or more daily tasks ranked from 0 to 10<br>A score of 10 would indicate no difficulty with the task and 0 would indicate the inability to perform that task<br>An improvement of 1.3-2.7 points on the average score is the minimal clinically important difference (MCID) for detectable change<br>Literature supports the use of this scale. It has been found to be reliable and valid for many conditions.[30] |
| Neck Disability Index[28] | 10-item questionnaire with 5 options on each question<br>Questionnaire may be useful after concussion as some of the items relate to common concussion symptoms including headaches and concentration problems. Also problems with reading, driving, normal level of work, recreation, and sleeping are common after concussion<br>This may be especially helpful in a concussion with cervico genic issues<br>A score of 100% or 50 points on the raw score would indicate complete disability.<br>An improvement of 10-13% or 5-6.5 points on the raw score is the minimal clinically important difference (MCID) for detectable change<br>Has been found to be valid and reliable |

## PTOT-3.1.5: Discharge Criteria

- Discontinuation or discharge should occur when:
- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.



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- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-3.1.6: Referral Guidelines

- The patient should be referred to his/her primary care provider or doctor for evaluation of alternative treatment options if:
  - Improvement does not meet established guidelines or improvement reaches a plateau
  - The patient fails to respond to treatment resulting in the need for further assessment to address new or developing issues
  - Signs/symptoms of concussion have increased, ex: headache is prolonged or has intensified

## PTOT-3.1.7: Section intentionally left blank

## PTOT-3.1.8: Physical/Occupational Therapy Management and Intervention

- A comprehensive history and exam are an essential part of management of the complexities of this condition. Concussion can affect multiple domains of an individual's life. Proper management help avoid complications. Best practices and research indicate that an initial period of relative rest (cognitive and physical) is indicated for a short period (24-48 hours). Resting longer than 72 hours after the injury may be associated with prolonged recovery or increased symptoms.[40] Following a short period of rest, a gradual or graded return to light and moderate activity has been shown to be safe and beneficial[41].
- Recovery from a high percentage (80-90) of concussions in adults is expected within 7-14 days.[42, 43] If symptoms are persisting longer than this initial period, skilled care may be indicated. Some research indicates that this recovery period may be 21 to 30 days especially in younger individuals. If there is a high symptoms burden (severity or number of symptoms) skilled care may be indicated).
- A consensus is growing toward the benefit of aerobic activity below symptom threshold and even just into the symptom threshold in the rehabilitation after concussion41. These interventions have been found to be safe and offer the most benefit over the initial 30 days. Some interventions have been studied for 8 weeks of longer and are still beneficial in some cases however the progress is slower. This may indicate a transition to a home program may be indicated.



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- The most effective amount of rest and intensity of activity after concussion varies and is still currently being researched. Current management and interventions have focused on the initial rest period and then gradual return to activity.
- Education has been shown to be valuable for individuals in regard to then natural history of the condition and prognosis (expectation) full recovery. Negative views on the condition have been associated with poor outcomes at 6 month follow-ups after the injury and may be avoided through proper education about the condition.[14] Education alone may not be sufficient especially in those with a high symptom burden or those that are slow to recover.
- Some of the most common problems after concussion are dizziness, postural control/balance deficits, and headaches. Dizziness somewhat vague and has been divided into 3 subsets by some authors. Those subsets used to describe dizziness are vertigo (spinning feeling or the illusion of motion), lightheadedness (pre-syncopal), and, and disequilibrium (feeling off balance).[36] Dizziness, especially when prolonged may indicate and special testing of different body systems may indicate that vestibular therapy will be beneficial. Balance is commonly affected by concussion and can be the result of dysfunction in the vestibular, proprioceptive, or central systems. Balance testing and rehabilitation has often been used in these studies as part of the vestibular program along with work on gaze stability.[6] Cervical dysfunction that can also be related to a concussion and may be the source of the dizziness, headaches, and problems with proprioception for individuals. Vestibular rehabilitation has been shown to be effective in some studies.[43, 44] Often the treatment used in the vestibular rehabilitation studies is a combination of specific vestibular and visual exercises along with cervical treatment as needed. Some tests for vestibular involvement such as the VOMS can also be used as part of the treatment. Researchers have used testing in a way that is similar to sub-symptom threshold or minimal symptom provocation exercise has been used. Vestibular tests may be used to determine the threshold and then progress exercises based on that subjective and objective information that is gathered.
- Neurocognitive rehabilitation may also be indicated in some cases and similar to vestibular rehabilitation, it has often been studied as one component of a multimodal treatment plan. A collaborative intervention was used and included neurocognitive treatment. This research showed benefit to the individual who received. Neurocognitive testing may also be helpful to assess baselines and progress but is not always available and there is some argument about the reliability and usefulness of the information.[42]
- Specific treatment just targeting the cervical spine has been looked at with multiple studies and the evidence supports the use of manual therapy, specific exercises, and proprioceptive training when there is neck involvement.[6] Some have researchers have indicated that the cervical spine may be the source, generator, or magnifier of concussion symptoms due to the close relationship with the head and nervous system.



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- Use of dual task testing and treatment is showing promise in concussion rehabilitation. Many symptoms may resolve over the first few days to 1 week. Some tests that are initially helpful in assessing concussion become less helpful as the condition begins to resolve (cognitive and balance testing). The addition of dual task assessment and rehabilitation can help identify ongoing deficits and help determine progress.[44] Similar to the other treatments that have been studied (physical exertion/aerobic exercise and vestibular exercise), a gradual progression while limiting symptom exacerbation has been the model that is being followed
- Physical therapy and occupational therapy intervention is directly beneficial following concussion and has been described in **Table 5**

***Table 5: Literature Summary of Interventions for Children and Adolescents following Concussion in Physical and Occupational Therapy***

| Reference and Study Design | Oxford Level of Evidence | Intervention or Recommendation | Dosage |
|---|---|---|---|
| Reneker JC et al, 2016[43] Double-blind randomized clinical trial n=41 | 1 | Physiological, Vestibulo-ocular and Cervicogenic Intervention:<br>◆ Patient specific treatment consisting of manual therapy, vestibular rehabilitation, occulomotor rehabilitation, and neuromotor training for individuals ages 10-23 years of age. Treatment group was medically released a median of 10.5 days sooner than the control group on average and recovery was a median of 3.5 days sooner than control group. | 2x/week for a total of 8 visits or until return to play clearance, beginning at day 10 post-concussion; sessions were 30-60 minutes; included a home program |
| Schneider et al, 2014[49] Randomized Control Trial | 1 | Physiological, Vestibulo-ocular and Cervicogenic Intervention:<br>◆ A combination of vestibular rehabilitation, cervical spine manual therapy, range of motion exercises, stretching and graded exercise progression decreased the time until medical clearance for athletes ages 12-30 as compared to a control group receiving the local standard of care. | 1x/week for 8 weeks or until medical clearance for return to sport |
| Makdissi M et al, 2017[5] Systematic Review | 1 | Physiological Intervention:<br>◆ Low grade exercise in adolescents with slow recovery or persistent symptoms following concussion are effective in the reduction of symptoms and improvement in exercise tolerance | Timing of exercise initiation unclear |
| Lal A et al, 2018[15] Systematic Review and Meta-analysis | 1 | Physiological Intervention:<br>◆ Exercise significantly decreased Post-Concussion Symptom Scale (PCSS) score, improved the reaction time component of the ImPACT score and reduced symptom duration in patients with concussion. | Exercise dosing variable |



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| Reference and Study Design | Oxford Level of Evidence | Intervention or Recommendation | Dosage |
|---|---|---|---|
| Thomas et al, 2015[40] Randomized Control Trial n=370 | 2 | Physical Activity:<br>◆ Strict physical and cognitive rest for 5 days following concussion for individuals age 12-15 as compared to usual activity were associated with delayed recovery, more daily post-concussive symptoms and emotional symptoms throughout recovery. | n/a |
| Kurowski BG, et al 2016[50] Randomized Control Trial n=30 | 2 | Physiological Intervention:<br>◆ An individualized sub-symptom threshold aerobic exercise program for adolescents ages 12-17 is recommended over a full-body stretching program to reduce concussion symptoms, improve exercise tolerance and return to normal lifestyle and sport participation. | 5-6x/week at home for 6 weeks; continued until week 9 if symptoms persist |
| Zuckerbraun NS, et al, 2014[51] Multi-center observational study, n=354 | 2 | Patient and Family Education:<br>◆ Specific and detailed concussion discharge instructions from an emergency room visit improve patient follow-up and outcomes following concussion. | n/a |
| Quatman-Yates C, et al 2016[52] Systematic Review | 2 | Cervicogenic Intervention:<br>◆ Manual therapy, mobilization and muscle energy techniques are effective to identify areas of hypomobility, normalize cervical and thoracic spine mobility and reduce symptoms from headache and dizziness | Two treatments with follow-up 5 weeks later |
| Park K et al, 2018[53] Systematic Review | 2 | Vestibular Intervention:<br>◆ Vestibular rehabilitation is more effective than continued cognitive and physical rest for adolescents (12-18 years) with persistent symptoms of dizziness, unsteadiness, and imbalance following sport concussion. | Parameters for dosing were unclear; some studies included a home program |
| Leddy JJ et al, 2013[41] n=15 | 3 | Physiological and Cognitive Intervention:<br>◆ A controlled and progressive aerobic exercise program improved reaction time for individuals 17-52 years of age with post-concussion syndrome as compared to a stretching placebo group and healthy control subjects as measured with functional MRI. | 20 minutes/day, 6 days/week for 12 weeks |
| Storey EP et al, 2018[44] Retrospective Cohort Study n=109 | 3 | Vestibulo-Ocular Intervention:<br>◆ Children ages 5-18 years with visuovestibular dysfunction and balance dysfunction showed significant improvement on all visuovestibular tasks except for near point of convergence and had significant improvement in balance. | 1-4 visits a median of 24 days after concussion |
| Alsalaheen et al, 2010[54] Case series, n=114 | 4 | Vestibulo-Ocular Intervention:<br>◆ Vestibular rehabilitation for dizziness and balance disorders after concussion in children (age 8-18 years) and adults reduced dizziness report, improved gait and improved balance function. | 1-4 visits |



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# PTOT-3.2: Acquired Brain Injury

## PTOT-3.2.1: Diagnoses Included

- Stroke
- Cerebrovascular Accident
- Head injury
- Brain injury

## PTOT-3.2.2: Definition

Acquired brain injury refers to any damage to the brain that occurs after birth. There are two types of brain injury traumatic and non-traumatic. A traumatic brain injury can be classified as an open or closed injury. A closed injury is caused when the brain is bounced around in the skull due to a blow to the head or severe shaking such as in a road traffic accident. A closed motion can cause tearing, shearing or stretching of the brain tissue. These types of injury are much more common than open head injuries. An open injury occurs when an object such as a bullet, fractures the skull and enters the brain. These injuries usually damage relatively localized areas of the brain resulting in specific damage. A non-traumatic injury is an injury that does not occur as a result of trauma. This includes stroke, tumors, infectious diseases, lack of oxygen or toxicity.

### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Trauma | Active hemorrhage, fracture |
| Fever, severe pain | Possible infection, intracranial pressure |
| Progression of symptoms | Evolving CVA |
| Immune-compromised state | Infection |
| Cancer history | Cause of symptoms (metastatic or primary) |
| Transient neurological signs | TIA, may need medical management; multiple sclerosis |
| Exertional symptoms, history of cardiac disease | Syncopal episodes of cardiac origin possible |
| Abnormal, or sudden changes in blood pressure | Medication management |
| Diminished level of consciousness | Metabolic abnormalities (e.g., hypernatremia, hyperglycemia, severe hypothyroidism) |



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### Differential Diagnoses [39]

- Seizures
- Migraines
- Tumors
- Toxic Metabolic Disturbances
- Hypoglycemia
- Transient global Amnesia
- Carbon Monoxide Poisoning

## PTOT-3.2.3: Clinical Presentation

- Recurrent transient weakness
- Swallowing Dysfunction
- Speech Deficits
- Vertigo or Visual Disturbances
- Memory loss or confusion
- Sensory and motor symptoms can be unilateral or bilateral
- Headaches
- Fatigue
- Anxiety and or Depression
- Agitation
- Incontinence
- Decreased judgment or inhibition

## PTOT-3.2.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Stroke Impact Scale(long form) or SIS-16 (short form)
  - Berg Balance Scale score less than 45/56(Doggan et al, 2001; Hemiparetic Stroke)
  - Fugl-Meyer Assessment- FMA full or shortened version.
  - Must demonstrate active engagement in therapeutic activities.
- Treatment frequency and duration must be based on:
  - Severity of objective findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition and (time since injury)



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- Expectation for functional improvement with skilled intervention,
- Response to treatment provided

- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Stroke Impact Scale. (Strength 9.2, ADL/IADL 5.9, Mobility 4.5 or Hand Function 17.8 [55] or total change in score of 10 points on short form.
  - Minimum Detectable Change in Berg Balance Scale (5 points) [33]
  - Minimally Detectable Change in Fugl-Meyer Assessment-Motor Scores of 10 points has been met. [82]
  - Patient continues: to demonstrate active engagement in therapeutic activities
  - The patient is unable to maintain progress independently

## PTOT-3.2.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.

## PTOT-3.2.6: Referral Guidelines

- Recommend that if depression and motor, sensory, cognitive, communication, and swallowing deficits are found or become worse, all patients should be formally assessed by the appropriate clinician from the coordinated rehabilitation team.
- Mental changes
- Incontinence
- Low initial ADL scores
- Delay in initiating rehabilitation following onset



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## PTOT-3.2.7: Section intentionally left blank

## PTOT-3.2.8: Management/Intervention

### General Activity Advice and Education

- High level of evidence:
  - Most improvement is noted in the first 3 to 6 months post-brain injury with the greatest progress seen in the first 6 weeks [21, 32] Clinicians are encouraged to educate patients/clients early on the importance of regular exercise to improve cardiorespiratory fitness which will prevent further deconditioning, reduced socialization and heightened risk of further vascular events, including a second stroke. [13, 22, 85, 98]

### Activity-Specific and functional task practice

- High level of evidence:
  - Functional tasks should be practiced repeatedly with task specific training and graded to challenge an individual –use of circuit training is well supported [21, 111, 118]
  - Activity-specific training is recommended with all therapy interventions: transfers, balance, gait and ADL's and IADL's. [4, 8, 9, 36]
  - Task oriented exercises are preferable in acute rehabilitation in comparison to traditional approaches (Neurodevelopmental Theory (NDT), Bobath, Brunnstrum, Neuromuscular Facilitation (PNF)) [15, 47]

### Constraint Induced Therapy or Modified version

- High level of evidence:
  - Constraint induced movement therapy (CIMT) has been demonstrated to improve upper extremity activity, participation and quality of life in individuals with baseline ability to control wrist and finger extension with usual care. [5, 10, 30, 103, 108, 120]
  - Evidence does not support the original constraint induced therapy over the modified version at this time.
  - Results from a systematic review indicate that modified constraint-induced movement therapy (CIMT) is more effective than traditional rehabilitation in reducing a patient's disability level [120] It can improve upper extremity ability and increase movement spontaneity. Further studies are needed on CIMT's effectiveness in kinematic analysis.



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### Gait Training/Mobility Training

- High Level of Evidence:
  - Intensive, repetitive, mobility-task training is recommended for all individuals with gait limitations after stroke or neurological injury [24, 97, 111]
  - Lower limb resistance training in community settings or circuit training demonstrates an increase in gait speed, strength and functional outcomes in chronic neurologically involved patients (6 months post injury) [67, 83]
  - Neuromuscular Electrical Stimulation (NMES) or the use of an Ankle Foot Orthosis (AFO) with traditional physical therapy will assist in the improvement of gait capacity [25, 43, 79, 93]
  - NMES/electrical stimulation when used in conjunction with task training may improve upper limb motor function and range of motion in sub-acute and chronic stroke/neurological conditions. [3, 15, 26, 27, 91]
  - Treadmill training in the absence of partial body weight support in combination with conventional therapy or delivered alone shows good support for increased velocity, stride length, and lower limb functional mobility. However may not improve balance. [47, 59, 90]
  - Unweighted Gait Training is more effective at walking non-ambulatory stroke patients early after stroke. Treadmill training with body support and traditional gait training are equally effective in patients dependent on walking assistance [1, 21, 35, 52]
  - Strong evidence supporting the use of robotic assisted devices with upper extremity functional recovery. May not effect general strength[56, 64]
  - Strong evidence does not support the use of robotic assisted devices with gait training in stroke.[66, 72, 73, 90, 101]
- Moderate Level of Evidence:
  - Conflicting studies regarding benefit for aquatic therapy in the treatment of gait and balance related activities. [38, 66, 78]
- Insufficient Level of Evidence:
  - Biofeedback and virtual therapy [69, 70, 71, 121]
- Acupuncture as an adjunct to traditional therapy [14, 99, 106]

### Hemiplegic Shoulder Treatment

- High Level of Evidence:
  - Prevention with positioning techniques and avoidance of incorrect movement pattern that results in capsular tightness and lateral rotation of the scapula [77, 80]
  - Use of sensorimotor training, motor learning training engaging the client in repetitive tasks can be effective in reducing motor impairment (with adjunct use of electrical stimulation, imagery or biofeedback) [5, 6, 28, 45, 115, 116]



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- Moderate Level of Evidence:
  - Botulinium toxin injections in conjunction with traditional skilled therapy. [61, 125]
  - NMES (surface or intramuscular)/ Transcutaneus Electrical Stimulation (TENS)/Functional Electrical Stimulation may be considered for pain as well as for shoulder subluxation [16, 44, 104]
- Insufficient Level of Evidence:
  - Taping or strapping may be beneficial for pain reduction however not for function[5, 84]
  - Corticosteroids/Scapular nerve blocks and acupuncture may be beneficial for pain control[46, 24]
  - Overhead pulleys are NOT recommended[5, 26]

**Balance Treatment**

- High Level of Evidence:
  - Balance training exercises individually and in group settings are beneficial in mild and moderate strokes[96]
  - Strong evidence that trunk-specific balance training may improve balance outcomes[40, 96, 114]
- Moderate Level of Evidence:
  - Aquatic therapy [65, 109]
- Insufficient Level of Evidence:
  - Task oriented therapy and strategy training may improve motor performance and actual use of ataxic/apraxia limbs [20, 92, 117]

**Spasticity**

- High Level of Evidence:
  - Botox injections can reduce spasticity significantly [12, 29, 88]
  - Oral anti- spasticity medications or intrathecal baclofen [68]
  - NMES may not reduce spasticity in the wrist or elbow [44, 55, 101]
  - Hand splints and Taping are NOT recommended in the prevention of spasticity[7, 49, 102, 110, 113]

**Treatments for Visual Improvement**

- Moderate level of evidence:
  - Eyes exercises for convergence [7]
  - Prism glasses for visual field cuts (Barrett BT.2009, [112])
  - Cognitive rehabilitation for visual field loss or neglect (, , [58, 123],
  - Computer based compensatory therapy and virtual reality training may assist in perceptual impairments[41]

## PTOT-3.2.9: Section intentionally left blank



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## PTOT-3.2.10: Home and Self-Care Techniques

### Home Medical Equipment

- Hot packs/cold packs
- Resistance band(s), Swiss ball, for therapeutic exercises
- Assistive gait device
- AFO
- Shoulder sling
- Wheelchair
- Adaptive equipment for ADLs

### Self-Care Techniques

- Education prior to discharge from skilled therapy is absolutely necessary. Fitness trials demonstrate that exercise training in the chronic stages (greater than 6 months after stroke onset) of stroke are effective and necessary to avoid a decline in functional ability. [13, 21, 74, 85]
  - Incorporate principles of adult learning: observation, practice, repetition and relevance
  - Incorporate principles of self-managements: problem solving, goal setting, making choices, taking action and using resources
- Family and caregiver training
- Progression to therapeutic exercise and Periodic monitoring may be necessary strengthening exercises/task oriented

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# PTOT-3.3: Complex Regional Pain Syndrome (CRPS)

## PTOT-3.3.1: Diagnoses included

- Reflex Sympathetic Dystrophy (RSD)
- Causalgia
- Sudeck's Atrophy
- Post Traumatic Dystrophy
- Shoulder Hand Syndrome
- Reflex Neurovascular Dystrophy

## PTOT-3.3.2: Definition

- Complex Regional Pain Syndrome is described as a multifaceted (complex) pain syndrome, usually (but not always) having an initiating noxious event in the periphery, not limited to a single nerve (regional, nondermatomal), disproportionate to the inciting event, with altered sudomotor and vasomotor function, often causing trophic alterations and loss of function.
  - CRPS I**:** severe, deep, burning pain that is out of proportion to the injury without discernible nerve injury. Is formally known as RSD.
  - CRPS II**:** same as CRPS I but with the presence of peripheral nerve injury. Is formally known as causalgia.
- The cause of CRPS is unknown but some theories include:
  - sympathetic nervous system impairment
  - peripheral pain receptors hyper sensitivity
  - Alterations in pain signalling pathways
  - parietal lobe dysfunction
  - Hypersensitive immune system

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture, ligament tear |
| Fever, severe pain | Infection |
| Popliteal fossa pain, sudden onset | Popliteal aneurysm |
| Diabetes | Neuropathy |
| Multiple joint involvement, large tophus | Rheumatologic diseases, gout |
| Unilateral edema | Deep vein thrombosis |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of foot or leg | Arterial occlusion |
| Immune-compromised state | Infection |



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## PTOT-3.3.3: Presentation

### CRPS I

- **All** criteria **except** the first one listed are necessary for CRPS I diagnosis (first criteria is not always present)
  - Presence of an initiating noxious event of initiating a period of immobilization (not required for the diagnosis)
  - Continuation of pain, allodynia (sensitivity to light touch), or hyperalgesia (increased response to nonpainful stimulus) with which the pain is disproportionate to the inciting event
  - Evidence at some time of edema, changes in skin blood flow, or abnormal sudomotor (sweat gland) activity in the painful region
  - Diagnosis is excluded by the existence of conditions that would otherwise account for the degree of pain and dysfunction

### CRPS II

- **All** of these criteria must be satisfied for CRPS II diagnosis
  - Presence of continuing pain, allodynia (sensitivity to light touch), or hyperalgesia (increased response to nonpainful stimulus) after a nerve injury, not necessarily limited to the distribution of the injured peripheral nerve
  - Evidence at some time of edema, changes in skin blood flow, or abnormal sudomotor activity in the region of pain
  - Diagnosis is excluded by the existence of conditions that would otherwise account for the degree of pain and dysfunction
  - CRPS is relatively rare with the incidence estimated to be 26 per 100,000 individuals per year, with the incidence of CRPS I higher than CRPS II

### Three stages of CRPS

- Stage I – Traumatic/acute stage – onset to 3 months
  - Characterized by pain, pitting edema, discoloration, hyperalgesia/allodynia
- Stage II – Dystrophic stage – 3 to 6 months after initial onset
  - Characterized by pain, brawny edema, stiffness, redness, heat, bony demineralization, shiny skin, hyperalgesia/allodynia
  - Pain typically peaks in this stage
- Stage III – Atrophic stage – 6 months to years after initial onset
  - Characterized by joint thickening, joint contractures, hard swelling that is often unresponsive to treatment, substantial loss of function within the involved extremity, skin that is cool, pale, and dry
  - Pain typically subsides in this stage
  - No test or procedure conclusively confirms or rules out the presence of CRPS



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**Clinical Presentation**

- Intense prolonged pain
- Complaints of warmth or cold in limb
- Allodynia and hyperalgesia
- Abnormal vasomotor activity
- Swelling
- Pitting edema
- Tenderness
- Bluish skin color with shiny red discoloration
- Restricted movement
- Osteopenic changes on X-ray

## PTOT-3.3.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements (FOM) showing significant functional limitations
  - Suggested PROs/FOMS for children with CRPS:
    - Child Health Questionnaire (CHQ)
    - Pediatric Quality of Life Inventory (Peds-QL)
    - Patient Specific Functional Scale (PSFS)
    - Fear Avoidance Beliefs Questionnaire (FABQ)
    - Functional Disability Index (FDI)
    - Dallas Pain Questionnaire
    - Sheehan Disability Scale
    - Timed Up and Go (TUG) test
    - Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT-2) balance subscale
    - Pediatric Balance Scale (PBS)
    - 6-minute walk for distance test (6MWT)
    - WeeFIM
    - Peabody Developmental Motor Scales, Second Edition (PDMS-2)
    - Pediatric Evaluation of Disability Inventory (PEDI)
    - Short Form-10 (SF-10) Health Survey
  - Suggested PROs/FOMS for Adults:
    - Disabilities of the Arm, Shoulder and Hand (DASH) Outcome Measure (MCID 10 points; minimum requirement for PT/OT > 11 points)
    - Lower Extremity Functional Scale (LEFS) (MCID 9 points; minimum requirement for PT/OT < 64 points)



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    - Fear Avoidance Belief Questionnaire (FABQ) (MCID 14%)
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently

## PTOT-3.3.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.



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## PTOT-3.3.6: Referral Guidelines

- Refer patient to their primary care provider, for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines or improvement reaches a plateau;
  - Atrophy of lower extremity occurs

## PTOT-3.3.7: Section intentionally left blank

## PTOT-3.3.8: Physical/Occupational Therapy Management

- Therapy must show measurable functional progress. Use of modalities and/or passive treatments should be limited. The goal is to transition the patient as quickly as possible to active care, self-management and functional independence.
  - Evidence-based literature regarding treatment interventions to manage CRPS for both adults and children is limited and larger clinical trials need to be conducted. [28]
  - Both Physical and Occupational Therapy have proven effective in treatment of CRPS. [29]
- Goals of Intervention:
  - Desensitize involved extremity in order to assist with restoring normal, pain-free AROM and PROM as well as symmetrical weight-bearing
  - Restore and normalize soft tissue texture and girth through edema control and desensitization
  - Achieve age-appropriate functional strength, flexibility, and static and dynamic balance
  - Maximize functional, age-appropriate independence, gross and fine motor skills
  - Increase functional capacity/cardiorespiratory endurance and improve overall QOL
  - Maintain gains through consistent HEP

**Recommendations based on Strong to Moderate Evidence**

- A multidisciplinary approach is suggested based on success with other chronic pain conditions. [11, 16]
- Referral to a mental health professional is of particular importance for the patient and caregiver. [25]
- Aggressive strengthening and ROM activities are contraindicated and may cause extreme pain, edema, emotional distress, or fatigue. [16]
- For children, the approach should emphasize restored functional mobility, patient education, pain relief, and psychological support as needed through exercise therapy and physical modalities. [25]



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### Recommendations based on Moderate or Emerging Evidence

- Intensive programs of 5x/week for up to 6 hrs/day for up to 3 weeks have been suggested- largely based on 2 studies of a pediatric population. [22, 35]
- Exercise as tolerated (such as graded exposure), including aerobic, is heavily suggested with desensitization techniques and modalities tapered as pain reduces (Level 3-4 evidence) [16]
- Use of gradual weight bearing, functional exercises is recommended [16]
- Graded Motor Imagery (Level 2 evidence) and Mirror Visual Feedback are recommended early in intervention [36]
- Cognitive Behavioral Therapy (CBT) has shown to be effective [21]
- TENS may be effective in the short-term. [3]

### Interventions Not Supported

- Laser therapy[36]

## PTOT-3.3.9: Section intentionally left blank

## PTOT-3.3.10: Home and Self-Care Techniques

- The patient can be taught to use medical equipment and administer self- care at his residence. Clinicians should encourage shared decision making and guided treatment for self –management. This may include intermittent treatment sessions to progress and promote adherence the patient-centered program. [9]
- Home Medical Equipment
  - Hot packs
  - Resistance band for therapeutic exercises
  - Heating pad
  - Assistive devices
  - Home electrical stimulation unit



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# PTOT-3.4: Neurologic Impairment

## PTOT-3.4.1: Diagnoses Included

- Multiple Sclerosis
- Guillain-Barre Syndrome
- Myasthenia Gravis
- Progressive Muscular Atrophy (Amyotrophic Lateral Sclerosis, Primary Lateral Sclerosis, Cerebral Palsy etc.)
- Cognitive Impairments: Dementia, Alzheimer's

## PTOT-3.4.2: Definition

Neurologic impairments encompass a wide variety of diagnoses. The common issues that may be seen are generalized weakness, ataxia which shows awkward and uncoordinated movements with functional mobility and gait, loss of strength, loss of balance and coordination, and episodes of exacerbation (relapse or attack) with increased skilled need.

## PTOT-3.4.3: Clinical Presentation

- Pain on weight-bearing
- Weakness
- Limitation in joint motion
- Muscle Spasms
- Vertigo, visual disturbances, and confusion are common
- Sensory and motor symptoms can be unilateral or bilateral
- Ataxia
- Fatigue Issues
- Memory Loss
- Anxiety and/or
- Depression

### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.



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| Red Flag | Possible Consequence or Cause |
|---|---|
| Trauma | Active hemorrhage, fracture |
| Fever, severe pain | Possible infection, intracranial pressure |
| Progression of symptoms | Evolving CVA |
| Immune-compromised state | Infection |
| New unilateral weakness; speech abnormalities | Cerebrovascular accident |
| Marked extremity asymmetry; redness, point tenderness, swelling | Deep vein thrombosis |
| Diminished level of consciousness | Intracerebral hemorrhage; hydrocephalus; intracerebral tumor; metabolic abnormalities (e.g., hyponatremia, hyperglycemia, severe hypothyrodism) |
| Bowel or bladder incontinence | Spinal cord involvement |

## PTOT-3.4.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Lower Extremity Functional Scale (LEFS) with a score of 64 or less
  - Timed Up and Go score ( A score greater than 14 seconds) [50]
  - Box of Blocks Test [29] or 9 hole peg Test
  - Fatigue Severity Scale (FSS) [53]
  - Must demonstrate active engagement in therapeutic activities
- Treatment frequency and duration must be based on:
  - Expectation for functional improvement
  - Severity of objective findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition and (time since injury)
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
  - A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
    - Minimally Clinically Important Difference has been met on the LEFS (9 points)
    - Minimally Detectable Change has been made on the TUG( 3.5 with cognitive deficits and 10.6 seconds with neurological deficits[25]
    - Minimal Detectable Change has been made on the Box of Blocks Test(5.5 blocks or 20% change in 9 hole peg)[13]
    - Minimal Detectable Change in Fatigue Severity Score (1.9 points) [24]
    - Patient and or caregivers continues to demonstrate active engagement in therapeutic activities
    - The patient is unable to maintain progress independently.



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## PTOT-3.4.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.

## PTOT-3.4.6: Referral Guidelines

- Recommend that if depression and motor, sensory, cognitive, communication, and swallowing deficits are found, all patients should be formally assessed by the appropriate clinician from the coordinated rehabilitation team.

## PTOT-3.4.7: Section intentionally left blank

## PTOT-3.4.8: Physical/Occupational Therapy Management

### Management/Intervention

**1. General Activity Advice and Education**
**High level of evidence:**
Clinicians are encouraged to educate patients/clients early on the importance of regular exercise to improve cardiorespiratory fitness, flexibility and strengthening which will prevent further deconditioning, reduced socialization and heightened risk of obesity. There are restrictions that need to be monitored; such as frequency, severity, duration, intensity, precautions, and progression. [38]

- Exercise is supported with neurological conditions/progressive and non-progressive, where prior thoughts opposed due to exertion or fatigue[14, 16]
- Research supports moderate aerobic exercise for 30 minutes as least 2 days a week and large muscle strengthening 2 days a week. [23]



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- Resistance exercise as well as task oriented circuit training is beneficial in improving function and quality of life. [51, 55]
- Treadmill training, aerobic training is strongly recommended for increased gait tolerance, fatigue management and independence. Maintaining a program is important. [2, 3, 32, 34, 35, 54]

**2. Aquatic Therapy**
**High level of evidence:**

- Aquatic therapy is highly recommended for MS patients and others with neurological impairments showing benefits in physical, mental and social status. [6, 18, 43, 47]

**3. Balance Training with Neurological Impairment**
**High Level of Evidence:**

- Balance training exercises individually and in group settings are beneficial [27]

**Moderate Level of Evidence:**

- Core strengthening programs assist with improved balance and decrease postural sway. [28, 57]

**4. Fatigue Monitoring and Management:**
**High Level of Evidence:**

- Exercise training can reduce feelings of fatigue.[33, 42]
- Submaximal fitness testing can predict exercise capacity-using grip test, 6- Minute Walk Test and step test (mCAFT). Patients can monitor exercise programs. [21]
- Pedometers are also recommended to monitor gait/exercise endurance with fitness/maintenance home program. [39, 40]

**5. Spasticity**
**High Level of Evidence:**

- Botox injections can reduce spasticity significantly [5,12]
- Oral anti- spasticity medications or intrathecal baclofen [20, 28, 46]
- Hand splints and Taping are NOT recommended in the prevention of spasticity [1]

## PTOT-3.4.9: Section intentionally left blank



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## PTOT-3.4.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self- care at his/her residence.

### Home Medical Equipment

- Hot packs/cold packs
- Resistance band(s), Swiss ball, for therapeutic exercises
- Assistive gait device
- Ankle Foot Orthosis
- Wheelchair
- Adaptive equipment for Activities of Daily Living
- Pulse Oximetry/Heart rate monitor/Pedometer

### Self-Care Techniques

- Family and caregiver training
- Home ROM/maintenance exercises
- Progression to therapeutic exercise—strengthening exercises
- Gym/Fitness center (if available) - to maintain aerobic/cardiopulmonary status

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## PTOT-3.5: Parkinson's Disease

### PTOT-3.5.1: Diagnoses Included:

- Parkinson's disease
- Parkinson's syndrome
- Parkinson's Gaitanis
- Parkinson's
- Shaking Palsy

### PTOT-3.5.2: Definition

Parkinson's disease: A chronic, slowly progressive neurological disease usually occurring later in life that is characterized by a fixed inexpressive face, tremor of resting muscles of limbs and head, slowing of voluntary movements, stiffness of limbs and trunk, festinating gait with short, shuffling, accelerating steps, instability, muscle weakness, balance/coordination impairments, and slower, quieter, monotone speech. The cause is due to degeneration of the basal ganglia, and by low production of the neurotransmitter dopamine.

### PTOT-3.5.3: Clinical Presentation

Parkinson's is the second most common neurodegenerative disorder after Alzheimer's and the most common movement disorder. The majority of individuals who develop Parkinson's are 60 years or older (adult onset) but early-onset Parkinson's (onset between 21 – 40 years of age) and juvenile-onset (under 21 years of age) also exist. Men are affected 1.5 – 2 times more often than women. Risk factors may include head trauma, illness, or exposure to environmental toxins such pesticides and herbicides. A small number of individuals are at an increased risk due to family history.

Parkinson's follows a broad pattern of progression. Changes tend to come on slowly with symptoms worsening over time and new symptoms appearing.

**Condition Severity Classifications**
There are five stages of Parkinson Disease.

- **Stage 1: Mild.** There may be symptoms, but they are not severe enough to interfere with daily tasks or life style. The symptoms may be so mild they might be missed, but family and friends may notice changes in posture, walking, or facial expressions. A distinct symptom of this stage is that tremors and other difficulties in movement are generally exclusive to one side of the body.



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- **Stage 2: Moderate.** Symptoms are much more noticeable than those in stage 1. Stiffness, tremors, and trembling may be more noticeable, and changes in facial expressions can occur. This stage does not impair balance. Task completion may be slower, difficulties walking may develop or increase and posture may change. At this stage, symptoms will be felt on both sides of the body (one side may have stronger symptom), speech difficulties may develop. The majority of people at this stage is still able to live alone, but may find tasks and activities they are no longer able to complete.
- Progression from stage 1 to stage 2 is unpredictable and can take months to years.
- **Stage 3: Middle.** This stage is indicates a significant progression in the disease. Many of the same symptoms of stage 2 are present, but reflexes are decreased and balance impairments are likely present. Walking is impaired, but still possible without assistance. Falls are more common in this stage and movements are slower. Daily tasks are affected but may still be able to be completed. (Medication and OT may help with symptom management).
- **Stage 4: Severe / Loss of Independence.** At this stage, movements may require assistance or an assistive device. The majority of people are unable to live alone due to impaired reaction times and loss of movement.
- **Stage 5: Advanced.** At this stage, 24 hour per day care and wheelchairs will be needed for mobility. The majorities are unable to stand or walk due to advanced rigidity and freezing and are at a high risk of falling.
- **Stages 4 and 5:** Dementia is present in 75 percent of those diagnosed with Parkinson's. Thirty percent at these stages may experience confusion, hallucinations, and delusions.

**Symptoms**

- Pain
- Shaking / Tremors
- Limitation in joint motion / Stiffness
- Muscle Spasms
- Progressive weakness
- Swallowing Dysfunction
- Speech Deficits
- Memory loss or confusion
- Sensory and motor symptoms can be unilateral initially and progress to bilateral
- Fatigue
- Anxiety and/or Depression
- Incontinence/constipation



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### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Trauma | Active hemorrhage, fracture |
| Fever, severe pain | Possible infection, intracranial pressure |
| Postural hypotension | falls |
| Immune-compromised state | Infection |
| Excessive salivation/Swallowing changes | Aspiration pneumonia |
| Incontinence without awareness | Infections |
| Constipation | Decreased mobility, Dietary modification, Medication management |
| Osteoporosis | Fractures |
| Dementia | falls |

## PTOT-3.5.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Timed up and Go Score of greater than 14 sec
  - Berg Balance Score Less than 45/56 or
  - Tinetti score of less than 20
  - Functional Reach Score less than between 6-10inches is indicative of the need of skilled therapy. [11]
  - 9 hole peg test - must be two SD below the norm for patients age (See Table 1 and Table 2)



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**Table 1. Average and Standard Deviation of MALE Participants' Scores (314 total)**

| Age | *N* | *M*-right (seconds) | *M*-left (seconds) | *SD*-right | *SD*-left |
|---|---|---|---|---|---|
| 21–25 | 41 | 16.41 | 17.53 | 1.65 | 1.73 |
| 26–30 | 32 | 16.88 | 17.84 | 1.89 | 2.22 |
| 31–35 | 31 | 17.54 | 18.47 | 2.70 | 2.94 |
| 36–40 | 32 | 17.71 | 18.62 | 2.12 | 2.30 |
| 41–45 | 30 | 18.54 | 18.49 | 2.88 | 2.42 |
| 46–50 | 30 | 18.35 | 19.57 | 2.47 | 2.69 |
| 51–55 | 25 | 18.93 | 19.84 | 2.37 | 3.10 |
| 56–60 | 25 | 20.90 | 21.64 | 4.55 | 3.39 |
| 61–65 | 24 | 20.87 | 21.60 | 3.50 | 2.98 |
| 66–70 | 14 | 21.23 | 22.29 | 3.29 | 3.71 |
| 71+ | 25 | 25.79 | 25.95 | 5.60 | 4.54 |
| All Male Subjects | 314 | 18.99 | 19.79 | 3.91 | 3.66 |

**Table 2. Average and Standard Deviation of FEMALE Participants' Scores (389 total)**

| Age | *N* | AVG-right (seconds) | AVG-left (seconds) | STDEV-right | STDEV-left |
|---|---|---|---|---|---|
| 21–25 | 43 | 16.04 | 17.21 | 1.82 | 1.55 |
| 26–30 | 33 | 15.90 | 16.97 | 1.91 | 1.77 |
| 31–35 | 32 | 16.69 | 17.47 | 1.70 | 2.13 |
| 36–40 | 35 | 16.74 | 18.16 | 1.95 | 2.08 |
| 41–45 | 37 | 16.54 | 17.64 | 2.14 | 2.06 |
| 46–50 | 45 | 17.36 | 17.96 | 2.01 | 2.30 |
| 51–55 | 42 | 17.38 | 18.92 | 1.88 | 2.29 |
| 56–60 | 31 | 17.86 | 19.48 | 2.39 | 3.26 |
| 61–65 | 29 | 18.99 | 20.33 | 2.18 | 2.76 |
| 66–70 | 31 | 19.90 | 21.44 | 3.15 | 3.97 |
| 71+ | 31 | 22.49 | 24.11 | 6.02 | 5.66 |
| All Female Subjects | 389 | 17.67 | 18.91 | 3.17 | 3.44 |

Average Charts from: Grice, KO, et al 2017.

- Treatment frequency and duration must be based on:
  - Severity of objective findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition and (time since diagnosis)
  - Expectation for functional improvement with skilled intervention
  - Response to treatment provided

- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met: [39]
  - Minimal Detectable Change in Timed Up and Go (TUG) (4.85 seconds) [39]
  - Minimum Detectable Change in Berg (4 to 5 points)
  - Minimum Detectable Change Tinetti Score. (6 points)



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- Minimally Detected change in Functional Reach. (Forward functional reach: 9 cm; Backward reach: 5cm)
- Minimum Detectable Change 9 Hole Peg Test (dominant hand: 2.6 sec; non-dominant hand: 0.82 sec)
- The patient is unable to maintain progress independently



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## PTOT-3.5.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.

## PTOT-3.5.6: Referral Guidelines

- Recommend that if depression and motor, sensory, cognitive, communication, and swallowing deficits are found or become worse, all patients should be formally assessed by the appropriate clinician from the coordinated rehabilitation team.
- Mental changes
- Incontinence
- Low initial ADL scores
- Delay in initiating rehabilitation following onset

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## PTOT-3.5.8: Management/Intervention

### 1. General Activity Advice and Education
**High Level of Evidence:**

- Resistive Exercise is supported for Parkinson's: (Effectiveness of resistance training and physical function in people with Parkinson's disease: a systematic review and meta-analysis. [4]

### 2. Balance Training with Neurological Impairment
**High Level of Evidence:**

- Balance and Motor Function are supported for Parkinson's Stages 1, 2, and 3 by Tai Chi and Qigong: The Efficacy of traditional Chinese Medical Exercise for Parkinson's.[40]
- Balance and Gait are supported with Parkinson's BIG/ LSVT program of specific high intensity exercises.[13, 14, 18, 19, 29]
- Exercises and motor training with balance related activities increase balance in Parkinson's patients. Further research is needed to determine if fall risk is benefited.[1, 38]

**Moderate Level of Evidence:**

- Community exercise class has been shown to increase quality of life for neurological conditions. [24, 34]
- Dexterity and exercise are supported for Parkinson's: Effects of Single Hand-Exercise on Manual Dexterity and Strength in person's with Parkinson's: [27]

### 3. Use of External Cues
**High Level of Evidence:**

- Breaking activities down into one step (task –specific training) and using visual, auditory, or proprioceptive external cues assists in maintaining movement in Parkinson's patients. [16, 30, 35]

**Moderate Level of Evidence:**

- The use of music has been effective with helping with gait in Parkinson's patients. [7, 8, 20, 32]

### 4. Aquatic Therapy
**Moderate level of Evidence:**

- Water based therapy can increase balance and forward lean in patients with Parkinson's disease. [42]

## PTOT-3.5.9: Section intentionally left blank



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## PTOT-3.5.10: Home and Self-Care Techniques

### Home Medical Equipment

- Assistive gait device
- Wheelchair
- Adaptive equipment for ADLs

### Self-Care Techniques

Education prior to discharge from skilled therapy is absolutely necessary.

- Incorporate principles of adult learning: observation, practice, repetition and relevance
- Incorporate principles of self-managements: problem solving, goal setting, making choices, taking action and using resources
- Family and caregiver training
- Progression to therapeutic exercise and Periodic monitoring may be necessary—strengthening exercises/task oriented

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# PTOT-3.6: Spinal Cord Injury

## PTOT-3.6.1: Synonyms

- Tetraplegia
- Paraplegia

## PTOT-3.6.2: Definition

Spinal cord injury (SCI) is an insult to the spinal cord resulting in a change, either temporary or permanent, in its normal motor, sensory, or autonomic function. The International Standards for Neurological and Functional Classification of Spinal Cord Injury is a widely accepted system describing the level and extent of injury based on a systematic motor and sensory examination of neurologic function. The following terminology has developed around the classification of SCI:

- Tetraplegia (replaces the term quadriplegia) - Injury to the spinal cord in the cervical region, with associated loss of muscle strength in all 4 extremities
- Paraplegia - Injury in the spinal cord in the thoracic, lumbar, or sacral segments, including the cauda equina and conus medullaris
- Developmental disorders

**Injuries by American Spinal Injury Association (ASIA) classification**

- The ASIA Impairment Scale classifies the completeness of SCI on a scale from A-E, as follows :
  - A - Complete; no sacral motor or sensory sensation in segments S4-5
  - B - Sensory incomplete; preservation of sensation below the level of injury, extending through sacral segments S4-5
  - C - Motor incomplete; voluntary anal sphincter contraction or sensory sacral sparing, with sparing of motor function distal to 3 levels below the motor level of injury and with the majority of key muscles having a strength grade of less than 3
  - D - Motor incomplete; voluntary anal sphincter contraction or sensory sacral sparing, with sparing of motor function distal to 3 levels below the motor level of injury and with the majority of key muscles having a strength grade of 3 or greater
  - E - Normal; normal motor and sensory recovery (hyper-reflexia may be present)



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## PTOT-3.6.3: Clinical Presentation

### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event

### Red flags may include:

- Severe orthostatic hypotension
- Cardiovascular changes
- Respiratory changes
- Autonomic Dysreflexia
- Infected decubiti
- Depression with suicidal ideation

### Objective Findings

Comprehensive and detailed neurologic examinations that are performed early and are repeated often form an important component of patient assessment and of neurologic and functional outcome prediction. Key elements of the examination include motor and sensory testing, which allows for the designation of a neurologic level of injury (NLOI) and of the completeness of injury. In addition, rectal examination is required to assess motor and sensory functions.

### Functional Outcome Measures

Several functional outcome measures are reliable and valid for use in SCI. Outcome measures need to be standardized and validated so that clinicians know how to perform them, are clear on their measuring characteristics, and are capable of providing information about clinically meaningful outcome changes. At least one of the following is needed to provide medical necessity at initial evaluation and reassessments.

- Additional functional assessment scales are as follows:
  - Spinal Cord Independence Measure (SCIM) - Designed as an alternative to the Functional Independence Measure (FIM) to assess 16 categories of self-care, mobility, and respiratory and sphincteric function. The SCIM III is more sensitive to changes than the FIM. Total SCIM Minimally Clinically Important Difference (MCID) values varied from 12 for patients with complete tetraplegia to 45.3 for those with incomplete thoracic lesions. The MCID of Self-care varied from 3.3 to 8.5 and from 10 to 18 for Respiration and Sphincter Management, depending on the level and severity of the lesion. With regard to Mobility (room and toilet), the MCID varied from 1 to 3 and from 2.5 to 7.26 for Mobility (indoors and outdoors).[3] A total score of less than 67/100 would indicate a possible need for ongoing skilled intervention.



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- Timed Up and Go Test (TUG) score- Measures time it takes for patient to get up and walk 3 meters turn around and walk back. Anything greater than 14 seconds could establish skilled therapy need. Smallest real difference (SRD) 10.8 seconds. [23]
- Correlates highly with Six-Minute Walk test. May also use Six-Minute Walk Test (6MWT) - Measures the distance a patient can walk on a flat, hard surface in 6 minutes. Minimally clinically important difference (MCID) for 6MWT 0.13. [23] Limited community ambulation speed can be accomplished at 0.44 m/s and independent community ambulation at 0.80 m/s[24]
- Capabilities of Upper Extremity Instrument (CUE) - A 32-item measure for assessing upper extremity function with tetraplegia. Minimal detectable change (MDC) 33.8. [25] Overall score less than 96/128 may indicate need for skilled intervention.
- Braden Scale - A quick, 6 item test for assessing risk for pressure ulcers that assesses 6 areas: Sensory perception, moisture, activity, mobility, nutrition and friction and shear. Scores of 15-18 indicate mild risk, 13-14 moderate risk, 10-12 high risk and 9 or less severe risk for pressure ulcers. A score of less than 15 would indicate need for further skilled intervention.[29]

## PTOT-3.6.4: Requirements for Physical/Occupational Therapy Visits

- The patient's condition must indicate a potential for rehabilitation.
- LE strength post SCI is a reliable predictor of ambulation potential.[6]
- Therapy must show measurable functional progress via at least one of the following:
  - SCIM III- less than 67/100 or progress by at least the MCID at reassessment
  - TUG score or 6 MWT- slower than 14 seconds at initial evaluation and progress by at least the SRD for the TUG or the MCID for 6MWT
  - CUE score- less than 96/128 or progress by at least the MDC at reassessment
  - Braden Scale- a score less than 15 on the Braden scale. There is no MDC, MCID or SRD established for this test, need to establish skilled need for pressure ulcer prevention/intervention.
- The patient must not have a significant psychological diagnosis that would hinder his ability to benefit from the program.
- Comorbidities must not affect the patient's ability to participate and benefit from therapy (e.g., pain must be controlled, etc.). and must not put other patients or staff at risk (e.g., infectious disease)
- The patient must exhibit at least two of the following impairments:
  - Mobility Impairment (including inability to transfer safely, inability to operate a wheelchair, etc.).
  - Activities of Daily Living Impairment (may include bathing, grooming, dressing, feeding, and toileting).
  - Spasticity Control Problems
  - Risk of Decubitus ulcer formation associated with sensory deficit.
  - Perceptual impairment sufficient to limit safety or reasonable function.



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- Patient continues to demonstrate active engagement in therapeutic activities as well as caregivers.
- The patient is unable to maintain progress independently.

**Treatment Methods**
The objectives of rehabilitation after an individual has sustained an acute spinal cord injury (SCI) include maximizing the patient's medical, functional, and psychosocial outcomes, with functional outcomes being tied to the level of the individual's SCI. The majority of recovery occurs in the first 6 months. Providing education to the patient and his/her family is also essential. Rehabilitation should begin as soon as possible after injury in order to optimize outcomes and reduce complications.

Functional outcomes may vary by individual, depending on such factors as the level and completeness of the injury, neurologic recovery (or loss), associated medical complications (pain, spasticity, contractures, cardiac disease, musculoskeletal injury), the amount of rehabilitation training that the patient receives, and the rehabilitation team's level of expertise, as well as the patient's motivation, age, and family and financial resources.

The use of orthotics and assistive devices (some of which are mentioned below) can sometimes facilitate the patient's functional abilities. Advances in surgical reconstruction and functional electrical stimulation (FES) also may enhance the patients' functional abilities.

## PTOT-3.6.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.



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## PTOT-3.6.6: Referral Guidelines

- Refer patient to their primary care provider to explore alternative treatment options when you find:
  - Severe depression
  - Skin breakdown
  - Severe orthostatic hypotension
  - Signs of infection

**Appropriate Procedures/Modalities**

A spinal cord injury (SCI) at the cervical level results in tetraplegia, the loss of hand and upper limb function with impairment or loss of motor and/or sensory function. In incomplete spinal cord injuries, some neural transmissions can still pass through the spinal cord but it is often fragmentary or distorted which leads to additional neurological complications such as chronic pain or spasticity. Tetraplegia results in impairment of function in the arms as well as in the trunk, legs and pelvic organs. Individuals with tetraplegia rely on the use of their hands and upper limbs in order to complete basic activities of daily living such as self-feeding, dressing, bathing and toileting. Mobility needs such as transfers from surface to surface, transitional movements such as rolling, bridging and sit to lying down, crutch walking and wheeled mobility is also completed by using their arms.[10]The level at which the injury or lesion occurs and the completeness of the lesion (incomplete or complete) indicate the level of independence of the person (Ditunno1999).

The main focus in rehabilitation of the spinal cord injured person is compensation of functional loss and using those parts of the sensorimotor system, which are still intact Research findings regarding neuroplasticity and neurological.[37] recovery of the spinal cord also include current rehabilitation practices that should focus on strategies to restore functional lost after SCI.[38]noted that the amount of movement practice that happens in inpatient SCI therapy is low and does not progress with time and higher repetitions may help to improve outcomes further.

Updated guidelines for aerobic and strengthening exercise in individuals with SCI were established.[9] Guidelines state to improve cardiorespiratory fitness and muscle strength, adults with SCI should engage in at least 20 min of moderate to vigorous intensity aerobic exercise 2 times per week, and three sets of strength exercises for each major functioning muscle group, at a moderate-vigorous intensity, 2 times per week. [9] These guidelines can help with establishing home exercise programs and educating patients and caregivers on appropriate exercise levels after discharge.



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## Upper Extremity Rehabilitation

- There is level 1 evidence based on one retrospective clinical trial that physical capacity continues to improve after 1- year post discharge.
- There is level 2 evidence based on one pre/post study that neuromuscular stimulation-assisted ergometer alone and in conjunction with voluntary arm crank exercise was an effective strengthening intervention for chronically injured individuals.
- There is level 2 evidence based on one study that muscle strength continues to improve up to 15 months post hospital discharge for both tetraplegic and paraplegic individuals.
- There is level 4 evidence based on one study that neuromuscular stimulation-assisted exercise improves muscle strength over conventional therapy.
- There is level 1 evidence (from 2 RCTs) that augmented feedback is not effective in improving upper limb function in tetraplegia.
- The use of neuroprosthesis appears to have a positive impact on pinch and grip strength and ADL functions in C5-C6 complete tetraplegia, however, access to the devices are limited and continue to be expensive in use.
- There is level 1 evidence from one RCT that showed that massed practice (repetitive activity) and somatosensory stimulation (median nerve stimulation) demonstrated significant improvement in grip and pinch strength required for functional activity use.
- There is level 2 evidence from one RCT that showed that the use of concomitant auricular and electrical acupuncture therapy may improve the neurological and functional recovery of acutely injured spinal cord individuals.
- There is level 2 evidence based on one RCT that wearing a thumb opponens splint will improve pinch strength and functional use of the hand.
- There is level 1 evidence based on two RCTs that a shoulder exercise and stretching protocol reduces the intensity of shoulder pain post SCI.
- There is level 2 evidence that general acupuncture is no more effective than Trager therapy in reducing post-SCI upper limb pain.
- There is level 4 evidence from multiple studies that support the use of reconstructive surgery for the tetraplegic upper limb for the improvement of ADL and quality of life.
- There is level 4 evidence from multiple studies that support the use of neuroprosthesis for persons with C5-C6 complete tetraplegia in the improvement of pinch and grip strength and ADL functioning. However, many devices are only available in clinical trials in specialized rehabilitation centers and the overall cost of the device continues to be expensive.
- Robot-assisted upper extremity training can improve movement without impacting pain or spasticity in chronic SCI patients. It can also sensitively measure changes after therapy interventions. [4] (moderate level of evidence)



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- Assist-as-needed robotic therapy has potential after incomplete SCI injury but has not yet shown gains in arm function, further research is still needed.[8] (low level of evidence)

**Lower Extremity Rehabilitation**

- High Level of Evidence:
  - Patterned Electrical Stimulation (PES) programs are beneficial in preventing and restoring lower limb muscle atrophy as well as improving lower limb muscle strength and endurance.
  - Functional Electrical Stimulation (FES)-assisted exercise programs are beneficial in preventing and restoring lower limb muscle atrophy as well as improving lower limb muscle strength and endurance.
  - For patients less than 6 months post-SCI, body weight supported treadmill training has equivalent effects on gait outcomes to conventional rehabilitation consisting of over-ground mobility practice. Body weight-support gait training strategies can improve gait outcomes in chronic, incomplete SCI, but no body weight-support strategy (over-ground, treadmill, with FES) is more effective.
  - FES-assisted walking can enable walking or enhance walking speed in incomplete SCI or complete (T4-T11) SCI. Regular use of FES in gait training or activities of daily living can lead to improvement in walking even when the stimulator is not in use.
  - Contracture management should be simple and not require a large amount of time, allowing for sustainability from people with SCI with priority placed on positioning programs for joints most likely to impacted. [12]
  - Partial body weight supported treadmill training performed in a controlled aquatic environment led to significant improvements of moderate to large magnitude in physical function and walking ability. (including speed and endurance) There is the potential for smaller in home portable use and community use of underwater treadmills for SCI and other physical disabilities and diseases. [27]
- Moderate Level of Evidence:
  - The most sensible approach to strength training in individuals with SCI injuries may be a combined approach of resistance training and repetitive practice of functional tasks with low loads and high repetitions. There is little evidence that using electrical stimulation alone will increase voluntary strength. [12]
  - Activity-based therapies (ABT) may promote neuromuscular recovery and increased function post-SCI; however, not everyone will benefit. Clinicians need to advise individuals with SCI of the time and effort needed for ABT. [14]
  - There is limited evidence that bracing alone does not enable significant gains in functional ambulation for people with complete SCI. The advantages of bracing appear largely restricted to the general health and well-being benefits related to practice of standing and the ability to ambulate short-distances in the home or indoor settings. The benefits of bracing-alone on functional ambulation are primarily with people with incomplete spinal lesions.
  - There is limited evidence that a combined approach of bracing and FES results in additional benefit to functional ambulation in paraplegic patients with complete



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SCI. Locomotor training programs are beneficial in improving lower limb muscle strength although in acute SCI similar strength benefits can be obtained with conventional rehabilitation. The real benefit of locomotor training on muscle strength may be realized when it is combined with conventional therapy. This should be further explored in acute, incomplete SCI where better functional outcomes may be realized with the combination of therapies.

- Insufficient Level Evidence:
  - Robot-assisted gait training has shown mixed results. Acute SCI patients have shown improvement with walking distance, strength and independence. Chronic SCI patients have shown improvement in speed and balance but no improvement in distance/strength or independent mobility. Also, there are aerobic and cardiovascular benefits to robot-assisted gait training. More research is needed on types of devices.[26]
  - Benefits of robot-assisted gait training also include ability to initiate gait training early in dependent patients, less effort for therapists, longer duration and higher intensity of gait and more consistency with gait patterns.[26]
  - There is no data to compare locomotion assistance with exoskeleton versus conventional Knee Ankle Foot Orthotics (KAFOs). There is no consistent benefit from rehabilitation using an exoskeleton versus a variety of conventional methods in chronic SCI patients.[7]
  - The Hybrid Assistive Limb (HAL) exoskeleton did result in increased functional improvements in the 10 Minute Walk Test (10 MWT), 6MWT and Walking Index for Spinal Cord Injury II (WISCII) score when not wearing the exoskeleton in incomplete SCI and complete SCI patients. It is currently a training device not an everyday walking aid.[11]

## PTOT-3.6.7: Section intentionally left blank

## PTOT-3.6.8: Section intentionally left blank

## PTOT-3.6.9: Section intentionally left blank

## PTOT-3.6.10: Home and Self-Care Techniques

The patient/caregiver can be taught to use medical equipment and administer self-care at his residence.

**Home Medical Equipment**

- Manual/power wheelchairs
- Orthotics
- Assistive gait device
- Hospital bed and shower chair/drop arm commode
- Hoyer lift
- Standers



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## Self-Care Techniques

- Instruction in home exercise program for ROM and strengthening
- Cold packs, if needed, to relieve discomfort
- Heat packs

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| PTOT-4.0: Orthopedic – Cervical | |
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# PTOT-4.1: Cervical Radicular Conditions

## PTOT-4.1.1: Synonyms

- Lateral recess entrapment of cervical nerve root
- Cervical radiculopathy
- Pain in upper limb
- Radiating pain in a dermatome
- Disc herniation
- Bulging disc
- Cervical disc herniation
- Herniated nucleus pulposus in cervical spine
- Brachial Neuritis
- Cervical Radiculitis
- Neck pain with radiating pain (radicular)

## PTOT-4.1.2: Definition

Neurogenic pain following the distribution of one, or less commonly, more than one cervical nerve root(s). Pain may be accompanied by upper extremity numbness, weakness, or hyporeflexia, and may be due to cervical disc herniation (younger patients), or foraminal encroachment (older patients).

## PTOT-4.1.3: Clinical Presentation

- Patient may report trauma or insidious onset. Incidence of disc herniation in patients over age 40 decreases due to dehydration of the nucleus pulposus.
- Cervical ROM restrictions may be present, may be a loss of cervical lordosis
- Muscle spasms in corresponding myotomes or paravertebral muscles
- Nerve root tension signs (shoulder depression) are typically positive but may be absent in cases involving a free fragment of disc tissue
- Foraminal compression may cause radiating upper extremity pain
- Extension with rotation of cervical spine may cause shoulder or arm pain
- Dejerine's triad may be positive
- Dural tension signs
- Extremities symptoms and findings, if present, follow nerve root pattern
- Sensory abnormalities in dermatome
- Loss of reflex



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- Motor power weakness of upper extremity (particularly the hand)
- Decreased upper extremity girth may be present (Muscle atrophy)

**Specific Considerations**

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Direct trauma to the head with loss of consciousness LOC) | Subdural hematoma; epidural hematoma; fracture |
| Nuchal rigidity, and/or positive Brudzinskis, or Kernigs sign | Subarachnoid hemorrhage; meningitis |
| Bladder dysfunction associated with onset of neck pain | Myelopathy; spinal cord injury |
| Associated dysphasia | Cerebrovascular Accident |
| Associated cranial nerve, or central nervous system (CNS) signs/symptoms | Tumor; intracranial hematoma |
| Onset of a new headache | Tumor; infection; vascular cause (older patients, also consider temporal arteritis; glaucoma) |
| Co-morbidities of rheumatoid arthritis, seronegative arthritides, Down syndrome | Atlantoaxial instability due to associated transverse ligament laxity |
| Cancer | Cause of symptoms (metastatic or primary) |
| Alcoholism, drug abuse | Side effect or withdrawal phenomenon |
| Immune-compromised state | Infection |

## PTOT-4.1.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points [58] OR The Neck Disability Index (NDI) with a score of 16% or higher (Minimum Clinically important difference 10% [114]
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
  - Positive neurological testing



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- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
  - Patient's level of independence
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently

## PTOT-4.1.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.



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## PTOT-4.1.6: Referral Guidelines

- Refer patient to their primary care provider, for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines or improvement reaches a plateau;
  - Atrophy of upper extremity occurs;
  - Signs of fracture or dislocation occurs;
  - Increased neurologic signs/symptoms: increased UE numbness/tingling, increased UE weakness, increased UE pain, decreased UE reflexes.

## PTOT-4.1.7: Section intentionally left blank

## PTOT-4.1.8: Physical/Occupational Therapy Management

Neck pain has a good natural course with 80-90% of cases diminishing within 4-6 weeks .[1, 35] Head, neck and upper back pain can be described as having a normal expected course and an abnormal one. In a normal course of head, neck and upper back pain, symptoms should diminish over time and can be improved with appropriate intervention. An abnormal episode occurs when a patient's symptoms and/or disabilities do not decrease over time and either stay the same or increase. The role of the therapist is to provide appropriate therapeutic interventions and education of the patient/client in appropriate preventive measures in cases where the patient/client symptoms and/or disabilities exhibit an abnormal course.

- Clinical Interventions (Recommended)
  - Cervical passive mobilization/manipulation techniques (Level I, Strong evidence)
  - Cervical mobilization and manipulative passive motion procedures are recommended, especially in conjunction with appropriate cervical exercises.[14, 25, 38, 51, 59, 79, 108]Manual Therapy combined with exercise has good evidence to support it [8]
  - Cervical Coordination, Strengthening and Endurance Exercises (Level I, Strong evidence)
  - Clinicians should consider active exercise interventions that emphasize coordinated movement, endurance development and strength training of the cervical spine [21, 64, 65, 100, 112] Strength training, stretching, and aerobic exercise can reduce pain and disability (Systematic Review Level 1 and 2 evidence) [20]
  - Upper Quarter Neural Mobilization Procedures (Level I, Level II, moderate evidence)
  - Neural element upper quarter mobilization procedures are recommended to be used in conjunction with diagnostic procedures that indicate the anatomical source of the client/patient symptoms in order to specifically reduce peripheral nerve entrapment [3, 29]
  - Manual or Mechanical Traction (Level I, Level II, moderate evidence) [49, 88]
  - Traction procedures apply longitudinal/axial distraction forces on the cervical spine in order to maximize the neuroforamina of the spine and or distract the discal elements of the spine. Traction is best recommended when the following factors are present: 1) patient reported symptom peripheralization with lower cervical (C4-7) segmental mobility testing, 2) positive shoulder abduction sign,



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3) Age greater than or equal to 55 years, 4) positive upper limb neural tension test and 5) relief of symptoms with cervical manual distraction test.[47, 85] Adding mechanical traction to exercise for patients with cervical radiculopathy resulted in lower disability and pain, particularly at long-term follow-ups. Level 2b evidence[44]
- Patient/Client Education and Counseling (Level I, strong evidence)
- Educating the patient/client regarding favorable outcomes, early movement interventions and self-care is recommended. The patient/client is educated that early return to normal, non-provocative movement is important and that return to function and full recovery are the most common outcomes over the long term.[93,105]

- Clinical interventions with neutral recommendation (Level II evidence or based on weak evidence)
  - Thoracic mobilization/manipulation techniques (Weak evidence)
  - Thoracic mobilization and manipulative passive motion procedures are proposed with neutral recommendations [24, 25]
  - Cervical or upper thoracic muscle or soft tissue stretching techniques (Weak evidence)
  - Manual muscle stretching or other soft tissue mobilization/manipulation techniques have been found to be helpful in treatment of non-specific neck pain. Treatment typically places an emphasis on assessment and treatment of impaired flexibility in the suboccipital, anterior/medial/posterior scalene, upper trapezius, levator scapulae, pectoralis minor and pectoralis major muscle groups[15, 111]
  - Centralization Procedures and Exercise (Weak evidence)
  - These procedures include those that require specific, directional repeated movements intended to centralize the patient's symptoms. [69,76] Similar (though not as well researched) to LBP, directional preference and centralization may be associated with improved outcomes. [37]
- Clinical interventions not recommended (Poor evidence or expert opinion)
  - Activity Limitation/Participation Measures
  - Evidence supporting the long term benefit of patient education procedures, use of soft cervical collars, and activity limiting interventions in isolation of other more active interventions is generally lacking, therefore it is not recommended that physical therapy clinicians utilize activity limiting interventions and use education methods that are easily reproduced by the patient [30, 65, 89, 93]
  - Therapeutic Modalities and Acupuncture (Poor or insufficient evidence)
  - Therapeutic modalities including pulsed electromagnetic therapy, electrical stimulation, therapeutic ultrasound, transcutaneous electrical nerve stimulation are not recommended due to poor or insufficient evidence of treatment efficacy(TENS)[51,70,106]



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## PTOT-4.1.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents [60]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences. [31, 42]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[72]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[32, 33]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[26, 104]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - So far, growth has not been shown to be related to decreased flexibility. [31]
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development. [75]



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## Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest[5]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation. [104]

## Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without. [92]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers. [103]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility [27]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Selection of activity that does not exacerbate symptoms.
  - Home programs be continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits be scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if showing decline in function.



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## PTOT-4.1.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self- care at his residence.

### Home Medical Equipment

- Use of a cervical pillow while sleeping may be helpful
- Theraband for therapeutic exercises
- Cervical traction unit
- Hot packs/cold packs
- Home electrical stimulation unit
- Gym ball

### Self-Care Techniques

- Postural advice, postural exercises
- Flexibility exercises
- Cervical stabilization exercises, isometrics
- Aerobic conditioning, such as walking or swimming
- Heat applications, cold packs, if needed, to relieve discomfort/stiffness.

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## PTOT-4.2: Cervical, Post-Surgical Conditions

- Post Open Reduction Internal Fixation (ORIF) Syndrome
- Post Fusion Syndrome
- Post Discectomy Syndrome
- Post Laminectomy Syndrome

### PTOT-4.2.1: Synonym

Failed Spinal Surgery Syndrome

### PTOT-4.2.2: Definition

Post-surgical course, in which patient continues to show abnormal findings for strength, ROM, and pain with referral to upper back, shoulder, arm, and/or hand. Patient may also have altered reflexes and sensation. Because multiple factors can contribute to this syndrome, patients are considered to be suffering from a chronic pain syndrome. It is recommended that patients be treated by a multidisciplinary team including at least an MD/anesthesiologist, physical therapist, occupational therapist and psychologist to help manage the rehabilitation.

### PTOT-4.2.3: Clinical Presentation

- Patient presents with continued signs and symptoms post operatively. There may be surgery specific precautions that vary by surgeon and procedure.
  - Cervical ROM restrictions may be present
  - Muscle spasms in corresponding myotomes
  - Nerve root tension signs (shoulder depression) are typically positive but may be absent in cases involving a free fragment of disc tissue
  - Foraminal compression may cause radiating upper extremity pain
  - Extension with rotation of cervical spine may cause shoulder or arm pain
  - Dejerine's triad may be positive
  - Dural tension signs
  - Extremities symptoms and findings, if present, follow nerve root pattern
  - Sensory abnormalities in dermatome
  - Loss of reflex
  - Motor power weakness of upper extremity
  - Decreased upper extremity girth may be present

#### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.



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| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Fever, focal redness | Infection |
| Direct trauma to the head with loss of consciousness (LOC) | Subdural hematoma; epidural hematoma; fracture |
| Nuchal rigidity, and/or positive Brudzinskis, or Kernigs sign | Subarachnoid hemorrhage; meningitis |
| Bladder dysfunction associated with onset of neck pain | Myelopathy; spinal cord injury |
| Associated dysphasia; unilateral weakness | Cerebrovascular accident |
| Associated cranial nerve or central nervous system (CNS) signs/symptoms | Tumor; intracranial hematoma |
| Onset of a new headache | Tumor; infection; vascular cause (older patients, also consider temporal arteritis; glaucoma) |
| Co-morbidities of rheumatoid arthritis, seronegative arthritides, Down syndrome | Atlantoaxial instability due to associated transverse ligament laxity |
| Cancer | Cause of symptoms (metastatic or primary) |
| Alcoholism, drug abuse | Side effect or withdrawal phenomenon |
| Immune-compromised state | Infection |

## PTOT-4.2.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the **Patient Specific Functional Scale (PSFS)**– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points (Horn, K. K., 2012)) OR **The Neck Disability Index (NDI)** with a score of 16% or higher (Minimum Clinically Important Difference 10% [44]
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time

- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided

- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold



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- The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
- Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
- Reduction in complicating factors (such as positive neurological signs)
- The patient is unable to maintain progress independently

## PTOT-4.2.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-4.2.6: Referral Guidelines

- Refer patient to their primary care provider for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines, or improvement has reached a plateau
  - Atrophy of upper extremity occurs
  - Signs of demyelinating condition, tumor or infection
  - Increased neurologic signs/symptoms: increased Upper Extremity (UE) numbness/tingling, increasing UE weakness, increasing UE pain, decreasing UE reflexes

## PTOT-4.2.7: Section intentionally left blank



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## PTOT-4.2.8: Physical/Occupational Therapy Management

- Therapy must show measurable functional progress. The type of physical therapy intervention for post-operative patient of the cervical spine depends on the diagnosis and the type of surgical approach. The start of care typically is 3-6 weeks post operatively. Therapists should take into consideration:
  - Anterior vs. Posterior approach
  - Wound healing
  - Signs of infection
  - Physical and Psychological condition of the patient
  - Patient motivation
  - Specific goals

**Initial Rehabilitation Phase 0-6 weeks (3-6 weeks post-operative)**

- Goals
  - Perform transfers and gait safely and independently.
  - Ensure understanding of good posture.
  - Achieve full shoulder ROM.
  - Advise patient regarding pacing and discuss expectations.
  - Return to driving at 4-6 weeks (as per precautions below)
  - Proprioception: upper limbs and lower limbs.
  - Deep neck flexor activation.
  - Return to work at 4- 6 weeks.
  - Ensure understanding of use of collar and length of time to be worn (depends on procedure and surgeon).
- Precautions
  - During the first 4-6 weeks it is important to gradually increase activities and also pace activities throughout the day dependent on pain. Current evidence supports a steady paced up increase in activity whilst respecting post-operative soreness, healing times, nerve recovery times, neural sensitivity and patient's previous level of fitness.
  - Avoid driving; until approximately 4-6 weeks post-operatively or longer if required. It is important that the patient can sit comfortably in the car, turn their neck as required for driving and be able to carry out an emergency stop without hesitation.
  - For the first 4- 6 weeks lifting may be limited to less than 10 pounds
  - Walking; no restrictions, should be increased gradually each day.
  - Sitting; should be in a supportive chair.
  - Sleeping; Advice on neutral cervical spine position
- Treatment
  - Evidence supporting specific treatment interventions with respect to specific post-operative cervical conditions is scarce. The following recommendations are based on healing phases and their milestones. Continuation of care must be based on patient presentation with adequate progress as measured through objective findings.



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- Pain relief:
  - Ensure adequate analgesia and positioning
  - Use of modalities as appropriate
- Patient education:
  - Advise patient on pacing and activities.
  - Advise patient on posture and movement and ergonomic correction.
  - Reinforce importance of lifting no load heavier than 10 pounds (per surgeon).
  - Expectations of treatment and recovery time.
  - Scar management.
- Exercises
  - Core stability activation; lumbar and cervical
  - Encourage normal functional movement.
  - Proprioception and balance – UL & LL
  - Kinetic chain
- Mobility
  - Ensure patient can manage transfers and gait independently taking into account pre-operative mobility.
- Multidisciplinary Care
  - Referral onwards as necessary to appropriate service i.e.; OT, psychology, orthotics
- Milestones to progress to next rehab phase:
  - Adequate pain relief.
  - Achieving goals as above
  - Managing normal activities and gradually increasing.
  - Basic core stability.
  - Attain functional cervical spine AROM (60 degrees or more of cervical rotation)

**Recovery/rehabilitation phase: 6 weeks to 6 months**

- Goals
  - Increase normal ADLs
  - Return to work at 4-6 weeks (unless heavy manual work-aim to return at 3 months with a phased return)
  - Graded return to fitness
  - Increase lifting
  - Regain functional cervical spine movement
  - Regain normal glenohumeral and scapular ROM and dynamics
- Precautions/Restrictions
  - Return to work approximately 4-6 weeks.
    - Phased as appropriate for job role (ie driving, travelling or computer based).
    - Heavy manual work should be phased in after 3 months check providing surgical team are in agreement and will be based on the demands of the job. Further information from occupational health services may be needed.



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- Avoid lifting anything heavier than 10kg until 3 months post-operatively or until the surgeon advises.
- Light upper limb resistance exercises
- Rowing and increasing upper body weights from 3-6 months as control allows
- No breast stroke or front crawl swimming until 6 months
- Running not usually allowed until fusion confirmed at about 3-6 months. Discussion with surgical team may be necessary.
- No Contact sports until 9 months: to be discussed at 6 month review with surgical team.

- Treatment
  - Treatment frequency should be tapered at this phase to ensure adequate transition to self-management of symptoms. Slow progress does not in and of itself constitute medical necessity.
- Pain relief
  - Ensure adequate pain relief coincides with appropriate level of exercise and activity.
- Patient education
  - Ensure patient is pacing at appropriate level and is not over or under exercising. Ensure good knowledge of importance of posture in all positions.
  - Encourage normal movement patterns.
  - Advise patient on healing times
  - Ergonomic advice.
- Exercises
  - Progress core stability and kinetic chain
  - Ensure good muscle endurance
  - Ensure adequate cervical ROM.
  - Scapular and glenohumeral posture dynamics and ROM
  - Assist to increase general fitness and functional retraining following restrictions. Swimming-backstroke to start and then front crawl after 6 months if technique good
  - Can attend gym but no rowing or upper body weights until 3 months post op
  - Proprioception: upper limb, lower limb and cervical spine
  - Increase walking
- Manual therapy
  - Soft tissue, scar tissue and joint mobilisations as appropriate
  - Aggressive manipulative (grade v) techniques to the cervical spine should be avoided
  - Neural dynamics assessment and treatment as indicated
- Milestones to achieve by 6 months:
  - Return to normal activities
  - Achieving above goals
  - Continuing independence with exercise program
  - Recovery can take up to 18 months.



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- Failure to meet milestones:
  - Refer back to surgical team. Outpatient physical therapy can continue only if the patient is still making progress in pain levels and functional outcome measures. Slow progress does not in and of itself constitute medical necessity.
    -adapted from Royal National Orthopedic Hospital, 2014

**Additional Proposed Cervical Interventions**

- ROM (as per specific protocols in regards to limitations) progressive to tolerance
- Stabilization with neuromuscular re-education for deep neck flexors
- Flexibility: posterior paraspinals, upper traps, levator scapula, scalenes
- Strengthening of upper quarter muscles
- Mobility–manual therapy to cervico-thoracic joints (where appropriate)
- Aerobic conditioning program
- Cognitive behavioral therapy
- Patient education
- Activity modification
- Postural awareness
- Body mechanics for work or ADLs
- HEP

## PTOT-4.2.9: Section intentionally left blank

## PTOT-4.2.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self-care at his residence.

**Home Medical Equipment**

- Hot packs/cold packs
- Theraband
- Gym ball
- Home electrical stimulation unit

**Self-Care Techniques**

- Postural advice, postural exercises
- Cervical isometric exercises, cervical stabilization exercises, flexibility exercises (when precautions are lifted)
- Aerobic conditioning



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- Cold/heat applications, if needed, to relieve discomfort/stiffness
- Brief use of cervical collar, if necessary, in acute stages, to limit motion
- Instruct patient in any surgery specific precautions.

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# PTOT-4.3: Stenosis – Cervical / Thoracic Spine

## PTOT-4.3.1: Synonyms

- Spondylosis
- Spinal canal narrowing
- Cervical Stenosis
- Foraminal Stenosis

## PTOT-4.3.2: Definition

Condition caused by a narrowing of the spinal canal, usually present with pain or weakness in extremities on walking. Condition may be mistaken for intermittent claudication due to vascular disease. Size of canal may be small since birth due to some congenital or developmental factors in certain individuals. Later in life when degenerative changes occur, canal is further narrowed by osteophytes from facet joints and vertebral body, thickening of posterior longitudinal ligament or ligamentum flavum, or retrolisthesis of vertebral body secondary to narrowing of disc space.

## PTOT-4.3.3: Clinical Presentation

- Lateral cervical stenosis (radiculopathy) is typical of lower motor neuron disorders.
  - Signs typically include hyperreflexia of affected upper extremity accompanied by motor weakness and sensory disturbances consistent with level of compression of nerve root.
  - Cervical ROM is typically limited, and extension and ipsilateral side-bending may exacerbate upper extremity symptoms.
  - Spurling's test is usually positive. Upper extremity symptoms may be reduced or relieved with manual cervical traction.
  - Neck pain is not always present.
  - Unsteadiness in gait or clumsiness often is an early symptom.
  - Central cervical stenosis (myelopathy) involves upper motor neuron or long-tract disorders.
  - Weakness with spasticity may be present, along with clonus and a positive Babinski sign.
  - Vibratory sensation typically, is diminished in lower extremities, and both upper and lower extremity reflexes may become hyperactive.
  - Cervical ROM is typically restricted in all planes.
  - Lhermittes sign may be present.
  - Spurling's test is expected to be negative, and manual cervical traction has no effect on symptoms.
  - Possible loss of bowel and bladder control.
  - Wide-based gait pattern-ataxia.
  - Proprioception affected.



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### Findings of Stenosis

- Foraminal compression may cause radiating upper extremity pain
- Extremities symptoms and findings, may follow nerve root pattern
- Sensory abnormalities may follow a dermatomal distribution
- Signs of upper motor neuron involvement (clonus, hyperreflexia, Babinski reflex) may suggest compression of spinal cord, which should be evaluated medically

### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.
- The following table presents common red flags for this diagnosis and their possible causes.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Direct trauma to the head with loss of consciousness (LOC) | Subdural hematoma; epidural hematoma; fracture |
| Nuchal rigidity, and/or positive Brudzinskis, or Kernigs sign | Subarachnoid hemorrhage; meningitis |
| Bladder dysfunction associated with onset of neck pain | Myelopathy; spinal cord injury |
| Associated dysphasia | Cerebrovascular accident |
| Associated cranial nerve, or central nervous system (CNS) signs/symptoms | Tumor; intracranial hematoma |
| Onset of a new headache | Tumor; infection; vascular cause (older patients, also consider temporal arteritis; glaucoma) |
| Co-morbidities of rheumatoid arthritis, seronegative arthritides, Down syndrome | Atlantoaxial instability due to associated transverse ligament laxity |
| Exertional pain, history of CAD | CAD |
| Pleuritic pain, chronic cough, dyspnea | Pulmonary diseases |
| Cancer | Cause of symptoms (metastatic or primary) |
| Alcoholism, drug abuse | Side effect, or withdrawal phenomenon |
| Immune-compromised state | Infection |



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## PTOT-4.3.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points (Horn, K. K., 2012)) OR The Neck Disability Index (NDI) with a score of 16% or higher (Minimum Clinically important difference 10%[75])
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently

## PTOT-4.3.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.



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- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-4.3.6: Referral Guidelines

- Refer patient to their primary care provider for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines, or improvement has reached a plateau
  - Atrophy of upper extremity occurs
  - Signs of demyelinating condition, tumor or infection
  - Increased neurologic signs/symptoms: increased UE numbness/tingling, increasing UE weakness, increasing UE pain, decreasing UE reflexes

## PTOT-4.3.7: Section intentionally left blank

## PTOT-4.3.8: Physical/Occupational Therapy Management

Therapy must show measurable functional progress.

### Management/Intervention

- Use of modalities and/or passive treatments should be limited. The goal is to transition the patient as quickly as possible to active care, self-management and functional independence.
- Therapy intervention is frequently aimed at providing symptomatic relief in acute exacerbations of a pain complaint.
- Short term modality intervention is appropriate if significant relief is provided.
- If successful in reducing pain complaint, strengthening of weak musculature, restoration of function and instruction in self-management techniques to stabilize condition is also appropriate.
- Activities and exercises should have a flexion bias, as extension is thought to be aggravating.



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- Home program, individually prescribed, is central to the care of all patients. The teaching for this program should be started on the first day of therapy and continue throughout the formal therapy program with a planned transition.

**A. Clinical Interventions (Recommended)**

**1. Cervical passive mobilization/manipulation techniques (Level I, Strong evidence)**

Cervical mobilization and manipulative passive motion procedures are recommended, especially in conjunction with appropriate cervical exercises.[10, 19, 26, 35, 41, 51, 72] Manual Therapy combined with exercise has good evidence to support it. [7]

**2. Cervical Coordination, Strengthening and Endurance Exercises (Level I, Strong evidence)**

Clinicians should consider active exercise interventions that emphasize coordinated movement, endurance development and strength training of the cervical spine. [15, 27, 43, 44, 45, 68, 76] Strength training, stretching, and aerobic exercise can reduce pain and disability (Systematic Review Level 1 and 2 evidence). [14]

**3. Upper Quarter Neural Mobilization Procedures (Level I, Level II, moderate evidence)**

Neural element upper quarter mobilization procedures are recommended to be used in conjunction with diagnostic procedures that indicate the anatomical source of the client/patient symptoms in order to specifically reduce peripheral nerve entrapment. [2]

**4. Manual or Mechanical Traction (Level I, Level II, moderate evidence)**

Traction procedures apply longitudinal/axial distraction forces on the cervical spine in order to maximize the neuroforamina of the spine and or distract the discal elements of the spine. Traction is best recommended when the following factors are present: 1) patient reported symptom peripheralization with lower cervical (C4-7) segmental mobility testing, 2) positive shoulder abduction sign, 3) Age greater than or equal to 55 years, 4) positive upper limb neural tension test and 5) relief of symptoms with cervical manual distraction test.[32] Adding mechanical traction to exercise for patients with cervical radiculopathy resulted in lower disability and pain, particularly at long-term follow-ups. Level 2b evidence[29]

**5. Patient/Client Education and Counseling (Level I, strong evidence)**

Educating the patient/client regarding favorable outcomes, early movement interventions and self-care is recommended. The patient/client is educated that early return to normal, non-provocative movement is important and that return to function and full recovery are the most common outcomes over the long term.[63, 73]



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**B. Clinical interventions with neutral recommendation (Level II evidence or based on weak evidence)**

**1. Thoracic mobilization/manipulation techniques (Weak evidence)**

Thoracic mobilization and manipulative passive motion procedures are proposed with neutral recommendations.[16, 17, 23]

**2. Cervical or upper thoracic muscle or soft tissue stretching techniques (Weak evidence)**

Manual muscle stretching or other soft tissue mobilization/manipulation techniques have been found to be helpful in treatment of non-specific neck pain. Treatment typically places an emphasis on assessment and treatment of impaired flexibility in the suboccipital, anterior/medial/posterior scalene, upper trapezius, levator scapulae, pectoralis minor and pectoralis major muscle groups.[11, 82]

**3. Centralization Procedures and Exercise (Weak evidence)**

These procedures include those that require specific, directional repeated movements intended to centralize the patient's symptoms.[49, 53] Similar (though not as well researched) to LBP, directional preference and centralization may be associated with improved outcomes.[26]

**C. Clinical interventions not recommended (Poor evidence or expert opinion)**

**1. Activity Limitation/Participation Measures**

Evidence supporting the long term benefit of patient education procedures, use of soft cervical collars, and activity limiting interventions in isolation of other more active interventions is generally lacking, therefore it is not recommended that physical therapy clinicians utilize activity limiting interventions and use education methods that are easily reproduced by the patient.[24, 46, 62, 66]

**2. Therapeutic Modalities and Acupuncture (Poor or insufficient evidence)**

Therapeutic modalities including pulsed electromagnetic therapy, electrical stimulation, therapeutic ultrasound, transcutaneous electrical nerve stimulation are not recommended due to poor or insufficient evidence of treatment efficacy(TENS).[36, 49, 77]

## PTOT-4.3.9: Section intentionally left blank



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## PTOT-4.3.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self- care at his residence.

### Home Medical Equipment

- Hot packs/cold packs
- Theraband for therapeutic exercises
- Home traction unit

### Self-Care Techniques

- Rest, reduce strenuous activities
- Home ROM exercises, stretching
- Progression to therapeutic exercise—strengthening exercises
- Hot packs/cold packs, if needed, to relieve discomfort

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## PTOT-4.4: Cervicalgia with or without Headache

### PTOT-4.4.1: Diagnoses included

- Cervicalgia
- Mechanical neck pain
- Neck pain
- Cervical Spondylosis
- Whiplash Associated Disorders (WAD)
- Cervicogenic Headache
- Tension Type Headache
- Stress Headache

### PTOT-4.4.2: Definition

Head, neck, and upper back pain is defined as pain that consists of soreness, tension, pain, and/or stiffness in the neck and upper back region without a radicular component. This includes neck and upper back pain that is typically increased with movement or prolonged positioning, decreased with rest, and is of mechanical and/or chemical origin. Head, neck and upper back pain can be categorized according to the International Classification of Functioning, Disability and Health (ICF) impairment-based category of low back pain[120] in the following ways:

- Neck pain with mobility deficits (b7101 Mobility of several joints)
- Neck pain with headaches (b28010 Pain in head and neck)
- Neck pain with movement coordination impairments (b7601 Control of complex voluntary movements)

### PTOT-4.4.3: Clinical Presentation

- Pain is usually of insidious onset
- May report prior history of episodic neck pain
- May begin between the 3rd and 6th decades of life and persist for years
- Limited active cervical range of motion
- Neck pain
- Tenderness to palpation
- Normal neurological findings



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### WAD (whiplash associated disorders) conditions

WAD conditions can be classified 5 types- 93% of are WAD II (neck pain and a musculoskeletal symptom such as loss of ROM or point tenderness) and are often treated by physical therapy.[104]

According to a systematic review and meta- analysis done in 2015, there is very little Level 1 or Level 2 evidence supporting conservative management of **acute** WAD. The evidence that does exist is favorable but does not meet minimally clinically significant differences for pain or ROM. [119]

A systematic literature review in suggests that although different central mechanisms seem to be involved in sustaining the pain complaints in whiplash patients, hypersensitivity of the central nervous system plays a significant role. [113]

Clinicians should incorporate a WAD Clinical Prediction Rule to help guide their patient care.[94]

The results of a systematic review suggest that both patients with idiopathic neck pain and patients with WAD have poorer balance than healthy controls. [103]

### Headache conditions

Diagnosis of cervicogenic headaches cannot be made without use of an anesthetic blockade. However, tension type headaches are classified by the presence of myofascial trigger points. [6]

Differential diagnosis of cervicogenic headache may include pain with active range of motion, pain with passive intervertebral mobility, and a positive Cervical Flexion Rotation Test [96]

These outcome scoring methods are useful in identifying baseline, interval progress, and discharge status.

### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.



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| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Direct trauma to the head with loss of consciousness (LOC) | Subdural hematoma; epidural hematoma; fracture |
| Nuchal rigidity, and/or positive Brudzinskis, or Kernigs sign | Subarachnoid hemorrhage; meningitis |
| Bladder dysfunction associated with onset of neck pain | Myelopathy; spinal cord injury |
| Associated dysphasia | Cerebrovascular accident |
| Associated cranial nerve or central nervous system (CNS) signs/symptoms | Tumor; intracranial hematoma |
| Onset of new headache | Tumor; infection; vascular cause (older patients, also consider temporal arteritis, glaucoma) |
| Co-morbidities of rheumatoid arthritis, seronegative arthritides, Downs syndrome | Atlantoaxial instability due to associated transverse ligament laxity |
| Cancer | Malignancy, or primary site |
| Alcoholism, drug abuse | Side effect, or withdrawal phenomenon |
| Immune-compromised state | Infection |

## PTOT-4.4.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points (Horn, K. K., 2012)) OR The Neck Disability Index (NDI) with a score of 16% or higher (Minimum Clinically important difference 10 points[125]
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time



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- Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
- Reduction in complicating factors (such as positive neurological signs)
- The patient is unable to maintain progress independently

## PTOT-4.4.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-4.4.6: Referral Guidelines

- Refer patient to their primary care provider, for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines or improvement reaches a plateau;
  - Atrophy of upper extremity occurs;
  - Signs of fracture or dislocation occurs;
  - Increased neurologic signs/symptoms: increased UE numbness/tingling, increased UE weakness, increased UE pain, decreased UE reflexes.
  - No objective clinical improvement after 6 weeks of direct care

## PTOT-4.4.7: Section intentionally left blank



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## PTOT-4.4.8: Management/Intervention

Neck pain has a good natural course with 80-90% of cases diminishing within 4-6 weeks.[34] Head, neck and upper back pain can be described as having a normal expected course and an abnormal one. In a normal course of head, neck and upper back pain, symptoms should diminish over time and can be improved with appropriate intervention. An abnormal episode occurs when a patient's symptoms and/or disabilities do not decrease over time and either stay the same or increase. The role of the therapist is to provide appropriate therapeutic interventions and education of the patient/client in appropriate preventive measures in cases where the patient/client symptoms and/or disabilities exhibit an abnormal course.

- Clinical Interventions (Recommended)
  Cervical passive vertebral mobilization/manipulation techniques (Level I, Strong evidence)
- Cervical mobilization and manipulative passive motion procedures are recommended, especially in conjunction with appropriate cervical exercises.[10, 25, 37, 49, 51, 62, 86, 117]
- Cervical Coordination, Strengthening and Endurance Exercises (Level I, Strong evidence)
  Clinicians should consider active exercise interventions that emphasize coordinated movement, endurance development and strength training of the cervical spine and scapulothoracic musculature.[20, 38, 52, 66, 67, 108, 123]
  - WAD Considerations
    - A RCT study indicates that supervised neck-specific exercise with, or without a behavioral approach, may have greater clinical benefits than general physical activity for patients with chronic WAD.[78]
  - Patient/Client Education and Counseling (Level I, strong evidence)
    - Educating the patient/client regarding favorable outcomes, early movement interventions and self-care is recommended. The patient/client is educated that early return to normal, non-provocative movement is important and that return to function and full recovery are the most common outcomes over the long term.[101]
- Clinical interventions with neutral recommendation (Level II evidence or based on weak evidence)
  - Thoracic mobilization/manipulation techniques (Weak evidence)
  - Thoracic mobilization and manipulative passive motion procedures are proposed with neutral recommendations.[24, 25, 39, 68]
  - Joint mobilization may be more effective than massage therapy for cervicogenic headaches (weak evidence).[126]
  - Cervical or upper thoracic muscle soft tissue stretching techniques (Weak evidence)



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- Manual muscle stretching or other soft tissue mobilization/manipulation techniques have been found to be helpful in treatment of non-specific neck pain. Treatment typically places an emphasis on assessment and treatment of impaired flexibility in the suboccipital, anterior/medial/posterior scalene, upper trapezius, levator scapulae, pectoralis minor and pectoralis major muscle groups.[15, 123] However stretching alone has not been shown to have any benefit.[51]
- Low level laser therapy (Weak evidence)
- Weak evidence supports LLLT for cervical osteoarthritis. There is moderate evidence supporting LLT for chronic neck pain.[50]
- Dry Needling (Moderate evidence)
- Trigger Point Dry Needling may decrease neck pain intensity and widespread pressure pain sensitivity, and also increase active cervical range of motion, in patients with acute mechanical neck pain.[77, 82]
- Trigger point dry needling may be useful in conjunction with other modalities to reduce cervicogenic and tension type headaches.[42]
- Transcutaneus Electrical Nerve Stimulation (TENS) (Weak evidence)
- Moderate to weak evidence supports TENS for acute neck pain.[64] Clinical interventions not recommended (Poor evidence or expert opinion)
- Activity Limitation/Participation Measures
  Evidence supporting the long term benefit of patient education procedures, use of soft cervical collars, and activity limiting interventions in isolation of other more active interventions is generally lacking, therefore it is not recommended that physical therapy clinicians utilize activity limiting interventions and use education methods that are easily reproduced by the patient. [30, 67, 95, 101]
- Therapeutic Modalities (Poor or insufficient evidence)
  Therapeutic modalities including pulsed electromagnetic therapy, electrical stimulation, therapeutic ultrasound, transcutaneous electrical nerve stimulation are not recommended due to poor or insufficient evidence of treatment efficacy(TENS).[48, 72, 115] Galvanic current, iontophoresis, EMS, and a static magnetic field are not recommended.[73]
- Mechanical Traction
  - No strong evidence supports continuous nor intermittent traction for non-specific neck pain nor chronic neck pain. There may be some short-term pain relief but the evidence is insufficient.[8, 21, 46]
- WAD Specific Considerations
  - Acupuncture and/or dry needling have no effect on WAD.[107]
  - Vestibular rehabilitation can have positive effects on balance and postural control.[56]



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## 4.4.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[60]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[31, 42]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[72]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[32, 33]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[26, 104]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - So far, growth has not been shown to be related to decreased flexibility.[31]
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[75]



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### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[5]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[104]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without [92]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers. [103]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[27]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Selection of activity that does not exacerbate symptoms.
  - Home programs be continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits be scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if showing decline in function.

## PTOT-4.4.9: Section intentionally left blank



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## PTOT-4.4.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self- care at his residence.

### Home Medical Equipment

- Use of a cervical pillow while sleeping may be helpful
- Theraband for therapeutic exercises
- Hot packs/cold packs
- Home electrical stimulation unit
- Gym ball

### Self-Care Techniques

- Postural advice, postural exercises
- Flexibility exercises
- Cervical stabilization exercises, isometrics
- Aerobic conditioning, such as walking or swimming
- Heat applications, cold packs, if needed, to relieve discomfort/stiffness

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# PTOT-5.0: Section intentionally left blank

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# PTOT-6.1: Fibromyalgia

## PTOT-6.1.1: Diagnoses included

- Fibromyalgia
- Fibromyalgia Syndrome
- Myalgia/Myositis

## PTOT-6.1.2: Definition

Etiology is mostly unknown but believed to be neurogenic in origin due allodynia, central sensitization, hyperalgesia and altered autonomic nervous system responses. [28] Diagnosis was established by the American College of Rheumatology as the patient must have widespread musculoskeletal pain for at least three months, and excessive tenderness in at least 11 of 18 defined tender points. [18]

**Rule out red flags (require medical management).**

- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture, ligament tear |
| Fever, severe pain | Infection |
| Popliteal fossa pain, sudden onset | Popliteal aneurysm |
| Diabetes | Neuropathy |
| Multiple joint involvement, large tophus | Rheumatologic diseases, gout |
| Unilateral edema | Deep vein thrombosis |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of foot or leg | Arterial occlusion |
| Immune-compromised state | Infection |

## PTOT-6.1.3: Clinical Presentation

- Widespread complaint of bilateral pain above and below the waist including the trunk, sleep dysfunction, cognitive issues, poor activity tolerance, and in some cases depression or anxiety.



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## PTOT-6.1.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements (FOM) showing significant functional limitations using the **Patient Specific Functional Scale (PSFS)**– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score =1.2 points [17]) OR **The Oswestry Disability Index (ODI)** with a score of 20% or higher (Minimally Clinically Important Difference of 12.8% or 6.4 raw points [13] ) )) OR **The Neck Disability Index (NDI)** with a score of 16% or higher (Minimum Clinically important difference 10 points (Young, et al, 2009)) OR Fibromyalgia Impact Questionnaire (FIQ) [5] (MCID 14%; minimum requirement for PT/OT >39 total score) [4]
    OR other body part specific FOM or Patient Reported Outcome (PRO) tool
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently



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## PTOT-6.1.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-6.1.6: Referral Guidelines

- Refer patient to their primary care provider, for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines or improvement reaches a plateau

## PTOT-6.1.7: Section intentionally left blank

## PTOT-6.1.8: Physical/Occupational Therapy Management

- Therapy must show measurable functional progress. Use of modalities and/or passive treatments should be limited. The goal is to transition the patient as quickly as possible to active care, self-management and functional independence.

**Recommendations based on Strong Evidence**

- Exercise, particularly given its effect on pain, physical function and well-being, availability, relatively low cost and lack of safety concerns. [21]



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**Recommendations based on Moderate or emerging evidence**

- Individual characteristics such as physical fitness, function and symptom severity, goals and personal preferences should be taken in consideration when developing programs. A gradual intensity progression for deconditioned individuals with fibromyalgia toward "moderate" intensity is recommended. [11]
- Multimodal rehabilitation programs should be considered for those with severe disability.[21]
- Aerobic exercise may be superior to moderate-intensity resistance training for reducing pain and improving sleep in women with fibromyalgia.[10, 12]
- Moderate-quality evidence revealed that aerobic exercise improved health-related quality of life.[6]
- Cognitive Behavioral Therapy.[21]

**Interventions with Low Quality evidence or Not Supported**

- Chiropractic[21]
- Low-quality evidence showed aerobic exercise showed improvement in physical function and decreased pain, fatigue, and stiffness compared with control. [6]
- Acupuncture is not supported by research.[22]

**Skilled Maintenance Care**

Maintenance care is defined as services required to maintain the member's current condition or to prevent or slow deterioration of the member's condition. (Chapter 15, Section 220.2 Subsection D of the Medicare Benefit Policy Manual)

- Skilled maintenance care for Medicare and Medicaid enrollees is covered if the specialized skill, knowledge and judgment of a qualified therapist are required:
  - To establish or design a maintenance program appropriate to the capacity and tolerance of the member
  - To educate/instruct the member or appropriate caregiver regarding the maintenance program
  - For periodic re-evaluations of the maintenance program
  - When skilled services are required in order to provide reasonable and necessary care to prevent or slow further deterioration, coverage will not be denied based on the absence of potential for improvement or restoration as long as skilled care is required.
- Skilled Maintenance Programs in an Outpatient and Home Health setting will not be covered if furnished by a Physical Therapist Assistant. [23]

## PTOT-6.1.9: Section intentionally left blank



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## PTOT-6.1.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self- care at his residence. Clinicians should encourage shared decision making and guided treatment for self –management. This may include intermittent treatment sessions to progress and promote adherence the patient-centered program. [14]

### Home Medical Equipment

- Hot packs
- Resistance band for therapeutic exercises
- Heating pad
- Assistive devices
- Home electrical stimulation unit

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## PTOT-6.2: General Debility Impaired Mobility

### PTOT-6.2.1: Primary Diagnoses Included

- Deconditioned
- Frail/Frailty
- Impaired mobility without a specific cause
- Impaired gait without a specific cause
- Balance impairment due to general debility
- Debility due to hospitalization
- Debility related to cancer and cancer treatments
- Debility related to other chronic or critical illness
- Loss of normal function not otherwise classified under a more specific guideline

### PTOT-6.2.2: Definition

Despite the best efforts of modern medicine and health care, there can still be many reasons for loss of normal abilities that are not due to a direct trauma or one specific treatable diagnosis. A decline in general health and ability may lead to deconditioning, debility/disability and even frailty: An age-related biological status presenting as a decline in the ability to cope with life stress and resulting in progressive decline of multiple physiological systems.[1] This is often seen in the elderly as they continue to age, however this may not capture all cases of debilitation. Chronic or neoplastic illness can often result in deconditioning and loss of normal function even in young, previously healthy, individuals.[2] As the debility and deconditioning progress, individuals may also present with significant risk of further harm to themselves (such as risk of falling) during daily tasks. Regardless of the reason or cause, any significant loss of an individuals' ability to care for themselves, access their community or complete other necessary daily activities should be a concern. Access to the appropriate skilled care provider may be needed to help improve these types of functional declines.

General debility could include a large number of diagnoses, causes and injuries. This guideline will focus on those reasons that are not more appropriately addressed through a more specific guideline. The majority of available research in regards to general deconditioning, debility or other frailty has been done in the elderly population. This is the population with the greatest concentration of people presenting with generalized debility. However, due to lack of applicable research, the recommendations may be useful to guide decisions in the care of any individuals presenting with a loss of normal function if a more appropriate guideline is not apparent.



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Falls can be due to deconditioning and frailty; or injuries from a fall can result in hospitalization and continued decline. Falls can be very serious and occur frequently among the elderly. Fall risk and prevention of falls should be taken seriously and addressed correctly. As it can be closely related or part of a patient's decline in health status, general recommendations on skilled care for falls will also be included.[3] Chronic illness (such as COPD) can significantly increase a person's risk of fall and should be considered along with other factors.[4] Primary treatment of falls due to vestibular or neurologic reasons may be more appropriately guided through recommendations from those specific guidelines.

## PTOT-6.2.3: Clinical Presentation

- Poor endurance and strength
- Difficulty accessing the community – transit, shopping, social centers
- Difficulty caring for self and place of residence
- Difficulty walking
- Recent falls
- Recent hospitalization
- Chronic illness or end stage disease
- Cancer and/or cancer treatments
- Decline in energy
- Gradual weight loss
- Decreased nutrition
- Complaint of being unsteady or dizzy
- Increase reliance on assistive devices
- Recent transition to assisted living (center or with family)

**Rule out red flags (require medical management)**
Identify co-morbidities requiring medical management, and those that affect therapy management.

Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture, ligament tear |
| Fever, severe pain | Infection |
| Diabetes | Neuropathy |
| Unilateral edema | Deep vein thrombosis |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of extremity | Arterial occlusion |
| Immune-compromised state | Infection |



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## PTOT-6.2.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Standardized Functional Outcome Measurements (FOM) showing significant functional limitations using the **Patient Specific Functional Scale (PSFS)**– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score =1.2 points[5])
    - AND/OR other standardized FOM or Patient Reported Outcome (PRO) tool that is function specific; i.e. 6-min Walk, Berg Balance Scale, Timed Up and Go (TUG), Tinetti (See Functional Assessment Section in *Objective Findings* heading below)
    - AND/OR other body area specific FOM or PRO; i.e. DASH, ODI, (See Functional Assessment Section in *Objective Findings* heading below)
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
  - The patient's ability to understand and follow a regular home program between skilled care visits and assessments
  - Available assistance from any care-givers
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently



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## PTOT-6.2.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.

## PTOT-6.2.6: Referral Guidelines

- Refer patient to their primary care provider, for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines
  - Improvement reaches a plateau
  - Acute and significant decline in health or functional status despite active skilled care
  - Red flags become present

**Primary Considerations**

Improvement of the daily functional status is recommended as a primary concern of skilled care providers in the care of individuals presenting with debility. As much as possible, skilled care should concentrate on the individual's ability to care for themselves in instrumental daily tasks and daily abilities. Prevention of further injury or harm (such as falls) and debility should be emphasized. Most individuals will also benefit from improved ability to access needed services (health care appointments, shopping) and even social or recreational opportunities (group programs, senior centers).



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Consideration of available assistance should also be a part of the whole rehabilitation program. Some individuals may not be able to return to a full independent status. Training of family, friends or caregivers may be part of the skilled care to allow for transition to a home or independent program. Eventual transition to community services should be strongly considered.

**Functional Assessment** – Whereas immobility, deconditioning, debility and frailty are largely characterized by decline in physical function, it becomes imperative that the ability of the patient be assessed and monitored regularly. It is strongly recommended that standardized methods of assessing functional ability be used regularly (Level 1 Evidence).[1, 6] It is also strongly recommended that falls risk assessments be performed by the health care professional using functional scales instead of instrumental testing (computer or systems based) (Level 1-3 Evidence).[3, 7, 8] Testing may also be useful to determine cardiopulmonary function and endurance.[4] Skilled care is expected to result in improvement in the functioning of the patient. Functional assessments better demonstrate significant and measureable improvement (or decline). There are many standardized measures readily available to any skilled care provider. The following are supported due to their ease of use and reliability:

- Function Specific
  - Six Minute Walk Test[9, 10]
  - Berg Balance Scale[11]
  - Timed Up and Go (TUG)[11]
  - Tinetti Performance-Oriented Mobility Assessment[11]
  - Patient Specific Function Scale (PSFS)[5]
  - Short Form-36[12]
  - Gait Velocity[11]
  - Sit to Stand – 5 time, 10 time, 30 sec[11]
- Body Region Specific – As most cases of debility or frailty involve functioning of the entire body, body region specific measures may not be the most appropriate tool to represent the patient's ability to function. There may be some utility in rare cases. The scales below have been recommended for use in body area specific guidelines:
  - Disability of Arm, Shoulder and Hand Score (DASH)
  - Lower Extremity Functional Scale (LEFS)
  - Hip Disability and Osteoarthritis Outcome Score (HOOS)
  - Knee Disability and Osteoarthritis Outcome Score (KOOS)
  - Back Oswestry Disability Index (ODI)
  - Neck Disability Index (NDI)

## PTOT-6.2.7: Section intentionally left blank



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## PTOT-6.2.8: Physical/Occupational Therapy Management

Evidence-based literature regarding management of generalized debility, immobility, frailty and deconditioning can be used to guide decision making on treatment and intervention in skilled care. Most applicable research focuses on addressing function as opposed to direct treatment of a cause or specific pathology. The following recommendations are taken from available current best evidence:

Goals of Intervention: Rehabilitation goals should be established and agreed upon as quickly as possible. Starting rehabilitation as early as possible is also recommended. The needs of patients in critical situations of health can change rapidly, goals should be continually monitored and updated to allow for the most appropriate care. (Level 1 Evidence)[13]

- Education on current functional status, associated risks and expectations for function and quality of life
- Achieve as close to age-appropriate functional strength and ability possible as shown through regular progress in standardized scores
- Maximize functional independence with gross and fine motor skills
- Establish a home exercise program (HEP) to address continued progress or maintenance of progress gained and help patient to transition from skilled care to self-care with said program.
- Train family and/or caregivers as appropriate to assist with ADL and home program recommendations.

**Recommendations based on strong evidence**

- Exercise
- General Frailty/Debility
  - Preventing the progression of frailty and pre-frailty can be effectively managed with multi-component exercise programs including resistance, balance, gait and endurance training. Improvements may be seen in weakness, body weight, speed, endurance, balance, fatigue, ADLs and falls. Programs could be part of a class or class with home practice. Programs should be function based and multicomponent (Level 1 Evidence).[14, 15] High-Intensity may be more effective than low-intensity.[16]
- Debility in Chronic Illness
  - Pulmonary rehabilitation exercise has been recommended in the literature ranging from 4 weeks to 18 months. Most programs last 8 weeks of duration and should be supplemented with home exercise programs. Exercise recommendations in COPD are similar to general recommendations (> 150 min a week of moderate activity) however frequent rests may be needed. Whole body training is recommended (Level 1 Evidence).[4]



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- Once discharged from the cardiac unit, continued cardiac rehabilitation treatment should last for 8-12 weeks. More clinical supervision the first 2-4 weeks to monitor the patient's responses (Level 1 Evidence). Higher intensity intervals may cause greater aerobic improvements than moderate, however, more severe cases may not be appropriate for high intensity (Level 2 Evidence).[6]
- Patients with diagnosed lower extremity venous embolism should begin mobility activity once anticoagulant therapy has reached therapeutic levels (Level 1 Evidence).[17]
- Exercise should be advised for patients living with cancer and cancer treatments. Programs should be consistent with recommendations from the American College of Sport Medicine. High-intensity has been show safe in appropriate populations. Pre-exercise assessments are recommended prior to starting a program to determine comorbidities that may affect someone's ability to exercise (Level 1 Evidence).[2, 18]

- Fall Management
  - Evidence based exercise programs should be used to help prevent fall-related injuries in the elderly. Most likely to benefit are the elderly living in the community. Programs should be individualized and may require some monitoring. Two hours per week for about 6 months has been shown as effective. Indication of setting for all hours of exercise has not been established. (Level 1 Evidence). Group settings can be effective and transition to group-community resources is recommended.[3, 7, 19, 20]
  - Components of individualized intervention for fall management should include strength, balance and gait training (Level 1 Evidence ).[7]
  - Exercise for those at risk of falling within extended care facilities is recommended as part of multifactorial care (Level 1 Evidence).[3]

- Limited Care with Home Program:
  - Transition to management within the home should include a hazard and safety assessment as part of discharge planning from other health facilities and should be part of follow-up and appropriate intervention (Level 1 Evidence).[3]

**Recommendations based on Moderate or emerging evidence**

- Exercise:
  - Frailty prevention services should be personalized and address multiple domains of health and function. Mobility and socializing appear most important. Programs can be delivered by trained non-specialists. Evidence is emerging (Level 3 Evidence).[21]
  - Exercise along with diet monitoring are recommended as the primary method to stabilize progression into frailty and improve muscular strength and bodyweight (Level 3 evidence).[1]
  - Training of daily activity tasks has been recommended for those with difficulty performing ADL. (Level 2-3 Evidence)[7]
  - Activity training combined with exercise in those with moderate to severe COPD is recommended to help improve functional status more than exercise alone (Level 2 Evidence).[4]



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- Hip Protectors: There is some limited evidence that hip protectors are effective in prevention of hip fracture when used with at risk patients in extended care settings (Level 2 Evidence).[3]
- Rehabilitation in Long Term Care:
  - Best evidence indicates that "active" rehabilitation is supported over more "passive" care with elderly in long term care. Active rehabilitation may involve many different activity methods from supervised exercise to group sessions and social recreation. Significant improvements in measures of physical function should be expected. The evidence is not clear on the optimum type or programming of active rehabilitation (Level 1-4 Evidence).[22]

**Interventions with low quality evidence or not supported**

- Fall Management
  - There is no evidence to support the use of computerized balance training in prevention of frailty, supervised or individual use.[14] There is also some evidence to show computerized balance training is not superior to land based active exercise or group balance programs. Use of computerized balance training systems (platform, monitoring, smartphone, etc based) are not able to be recommended.[8]
  - There is no evidence to show that low intensity exercise interventions reduce falls in the elderly and it cannot be recommended over other intensities when appropriate.[3]
  - Programs of just brisk walking have not been shown to reduce the risk of falling and cannot be recommended in isolation for fall prevention only. One trial has shown an increased risk of falling in postmenopausal women (Level 3 Evidence).[3, 7]
- Debility in Chronic Illness
  - Inspiratory muscle training does not appear to have additional benefit when an exercises program is already in place. It is not recommended as a routine component of pulmonary rehab (Level 1 evidence).[4]
  - There is not sufficient evidence to support any recommendation on the use of passive movements for joint mobility, spasticity or pain reduction in those with contracture or at risk of developing a contracture. There is some limited low-quality evidence for short term joint mobility increases, but no long term conclusions.[23]
  - There is not sufficient evidence to support whole body vibration training over more standardized evidence-based care in the rehabilitation of those with chronic disease.[24]
- Electrotherapies:
  - There is not significant evidence to support the use of neuromuscular electrical stimulation or low-level laser over other evidence-based treatments in the care of elderly, debilitated or frail individuals. There is some evidence that NMES may improve muscle on a physiological level, but positive effects on function or fall reduction have not been established.[25, 26]



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- Manual therapy: There does not appear to be sufficient evidence to support the regular use of manual therapy techniques in the elderly.

## PTOT-6.2.9: Section intentionally left blank

## PTOT-6.2.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment, assistive devices and administer self-care at his or her residence. There is evidence to support patients can experience increases in ability and reduction of symptoms through home exercise and other types of group programs

- Moderate recommendation that patients should be transitioned to Multi-factorial home or group-based intervention with strength and balance training may reduce risk of falls equally and improve other measures of strength and ability. Some indications that group settings may result in better outcomes (Limited Level 2 Evidence).[7, 27]
- Providers should emphasize the importance of ongoing physical activity and exercise and empower patients to self-manage their fall risk through transition to community based programs to maintain gains from skilled care.[7]
- Integration of functional exercise programs into daily activities may be a promising alternative to structure sessions. Positive trends have been shown in institutional settings, application for individual home use is not clearly evaluated (Level 1 Evidence).[28]
- Similarly, after formal cardiac rehabilitation, patients should be advised to continue with exercise and active lifestyle choices for the rest of their lives. This can be successful with or without supervision (Level 1-2 Evidence).[6]
- People with cancer or undergoing cancer treatment may benefit more from group or other supervised exercise programs. (Level 1 Evidence) Evidence does not indicate that supervision must be a clinical setting only.[2]
- Family, friends and caregivers should be actively involved as a support team and it is recommended they be in partnership with the health care provider(s) when advanced disease is present (Level 1 evidence strong recommendation).[4]



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# PTOT-6.3: Musculoskeletal Disorders

## PTOT-6.3.1: Definition

Musculoskeletal disorders affect the bones, muscles, ligaments, tendons, and nerves. Onset may be acute (having a rapid onset of symptoms) or insidious. Duration of a musculoskeletal condition may be short term (days or weeks) or chronic (long-lasting). Musculoskeletal pain can be localized in one area, or widespread. Musculoskeletal conditions may be caused by an injury to the bones, joints, muscles, tendons, ligaments, and/or nerves. Direct trauma, e.g. motor vehicle accidents, falls, fractures, collisions, or indirect trauma, e.g. poor posture, repetitive strain, prolonged immobilization or loss of mobility, or overuse, generally underlies development of musculoskeletal complaints.

## PTOT-6.3.2: Symptoms and Causes

- Bone pain: This is usually deep, penetrating, or dull. It most commonly results from injury such as contusions. It is important to be sure that the pain is not related to a fracture or tumor.
- Muscle pain: Muscle pain can be caused by an injury, an autoimmune reaction, loss of blood flow to the muscle, infection, or a tumor. The pain can also be caused by muscle spasms and trigger points.
- Tendon and ligament pain: Tendon and ligament injuries are strain injuries that result in damage to the connective tissue fibers of the tendon or ligament. Tendon injuries range from tendinitis (micro trauma) to rupture (macro trauma). Ligamentous injuries occur when ligament tears either partially or completely. This type of musculoskeletal pain often becomes worse when the affected area is stretched or moved.
- Joint pain: Joint injuries and diseases usually produce a stiff, aching, "arthritic" pain. The pain may range from mild to severe and worsens when moving the joint. The joints may also swell. Joint inflammation (arthritis) is a common cause of pain.
- Fibromyalgia: This is a condition that may cause pain in the muscles, tendons, joints, and other soft tissue. The pain is usually in multiple locations and can be difficult to describe. Fibromyalgia is usually accompanied by other symptoms.
- "Tunnel" syndromes:
  - This refers to musculoskeletal disorders that cause pain due to nerve and/or tendon compression/inflammation. The disorders include carpal tunnel syndrome, cubital tunnel syndrome, and tarsal tunnel syndrome. The pain tends to spread along the path supplied by the nerve and may feel like burning. These disorders are often caused by overuse.
  - Aching or stiffness of the entire body.
  - The feeling that your muscles have been pulled or overworked
  - Fatigue
  - Sleep disturbances
  - Swelling or effusion



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- Decreased range of motion
- Joint instability
- Muscle guarding or weakness
- Loss of strength, power, endurance
- Inability to perform purposeful, functional, intentional movements

### Functional Limitations and Impairments

- Inability to ambulate
- Decreased functional work capacity
- Inability to climb stairs
- Inability to perform repetitive tasks
- Inability to perform self-care tasks
- Inability to reach
- Inability to access the community
- Inability to access transportation
- Limited independence in activities of daily living

## PTOT-6.3.3: Clinical Presentation

### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Fever, severe pain | Possible infection |
| Edema, redness, pain | Lower extremity deep vein thrombosis |
| Immune-compromised state | Infection |
| Cancer history | Cause of symptoms (metastatic or primary) |
| Discoloration of the affected area (s) | Vascular occlusion; vascular insufficiency |
| Homans Sign | Deep vein thrombosis |
| Axial compression | Compression fracture |
| Positive vertebral artery test | Vertebrobasilar ischaemia, TIA |
| Widespread neurological symptoms | Neurological disease |
| Positive Lhermitte Sign | Spinal cord pathology |
| Dyspnea | Lung disease/diaphragmatic paralysis |



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**Outcome Measures by Condition/Diagnosis**

There are several validated functional outcome tools that could be used. The therapist should choose an instrument appropriate for the area(s) being treated. The following standardized tools are recommended for use to assess functional limitations initially and throughout an episode of care. Only tools that are well established, easily accessible and do not require memberships or fees are recommended.

| Condition/ Diagnosis | Test | Definition | Author |
|---|---|---|---|
| Elderly > 65 y.o. | Berg Balance Test | Measures both statis and dynamic balance using a 14-item scale | Donoghue and Stokes, 2009 |
| | Gait speed | Measures overall walking performance | Mangione, et al., 2010 |
| | Six Minute Walk test | Tests endurance by measuring the maximum distance that a person can walk in six minutes | Mangione, et al., 2010 |
| | Timed Up and GO (TUG) | Functional mobility test generally used for the geriatric population | Mangione, et al., 2010 |
| | Performance Oriented Mobility Assessment, Tinetti | Evaluates balance and gait | Faber, et. al., 2006 Tinetti, 1986 |
| | Lower Extremity Functional Scale (LEFS) | 20-itemcondition specific questionnaire designed for use for musculoskeletal conditions of the lower extremity | Binkley, et al, 1999 |
| LE Musculoskeletal Disorder | Patient Specific Functional Scale (PSFS) | Patient self-report measure used to quantify activity limitation and measure functional outcome | Chatman, et al, 1997 |
| | Oswestry Disability Index | Self-report questionnaire that measures the degree to which back or leg pain impacts functional activities | Davidson and Keating, 2002 Maughan and Lewis, 2010 |
| Low Back Pain, Chronic or Acute | Patient Specific Functional Scale (PSFS) | Patient self-report measure used to quantify activity limitation and measure functional outcome | Cleland, et al, 2006 |
| | Neck Disability Index (NDI) | 10 item questionnaire, 7 items related to ADLs, 2 items related to pain, and 1 item related to concentration | Cleland, et al, 2006 Young, et al, 2009 |
| | Patient Specific Functional Scale (PSFS) | Patient self-report measure used to quantify activity limitation and measure functional outcome | Cleland, et al., 2006 |
| Neck Pain/Cervical Radiculopathy Pain | Numeric Pain Rating Scale (NPRS) | 11-pont numerical rating scale for determining pain intensity | Spadoni et al, 2004 |
| | Disabilities of Arm, Shoulder, Hand (DASH) | 30 item questionnaire, region specific and allow comparisons across diagnosis of the upper extremity | Schmitt and Di Fabio, 2004 |



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| Condition/ Diagnosis | Test | Definition | Author |
|---|---|---|---|
| UE Dysfunction/Musculoskeletal Disorder | Shoulder Pain and Disability Index (SPADI) | 13-item self-administered questionnaire relating to pain and functional status of the shoulder region | Schmitt and Di Fabio, 2004 |
| | Patient Specific Functional Scale (PSFS) | Patient self-report measure used to quantify activity limitation and measure functional outcome | Hefford, et al, 2012 |

## PTOT-6.3.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Significant Functional Limitations (i.e. Activities of daily living, vocational activities) - Practitioners are strongly encouraged to utilize peer reviewed, standardized tools to quantify Functional Limitations.
  - Strength: <4/good (5 = normal; 4 = good; 3 = fair; 2 = poor; 1 = trace)
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10
  - Neurological signs: altered reflexes and/or sensations
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
  - The patient's ability to understand and follow a regular home program between skilled care visits and assessments
  - Available assistance from any care-givers
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently



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## PTOT-6.3.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.

## PTOT-6.3.6: Referral Guidelines

- Refer patient to their primary care provider for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines, or improvement has reached a plateau
  - Atrophy of the extremity occurs
  - Neurological deficits appear/progress

## PTOT-6.3.7: Section intentionally left blank

## PTOT-6.3.8: Management/Intervention

Use of modalities and/or passive treatments should be limited. The goal is to transition the patient as quickly as possible to active care, self-management and functional independence.

For post-surgical cases, progression of the rehabilitation program is primarily time based to allow tissue healing; individual surgeons may have their own performance criteria for advancing. Both criteria may vary based on the type of surgery and specific technique used. Consult with referring surgeon.



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| Problem/Expected Outcome | Procedures/Modalities Such As |
|---|---|
| Decrease pain/spasms/inflammation/ Swelling/effusion | ◆ Modalities i.e. phonophoresis, ultrasound, interferential current, electrical muscle stimulation, functional electrical stimulation, transcutaneous electrical nerve stimulation<br>◆ Cryotherapy<br>◆ Thermotherapy<br>◆ EMG Biofeedback<br>◆ Trigger point therapy<br>◆ Paraffin baths<br>◆ Compression therapies<br>◆ Massage<br>◆ Mobilization/manipulation<br>◆ Manual traction<br>◆ Home program |
| Restore flexibility of the affected musculature and joints | ◆ Segmental joint mobilization<br>◆ Passive exercises<br>◆ Range of motion within pain-free range<br>◆ Sustained stretching exercises<br>◆ Soft tissue mobilization<br>◆ Home program |
| Increase strength and endurance of the spine and extremities | ◆ Active assisted exercises, active, and resistive exercises (concentric, isotonic, eccentric, isokinetic, isometric, and plyometric<br>◆ Aquatic programs<br>◆ Home program |
| Improvement in body mechanics and postural stabilization | ◆ Body mechanics training<br>◆ Postural stabilization activities<br>◆ Postural Control<br>◆ Home program |
| Increase balance, coordination, and agility | ◆ Motor function retraining<br>◆ Neuromuscular re-education<br>◆ Perceptual training<br>◆ Home program |
| Improvement in gait and locomotion | ◆ Gait training<br>◆ Training in use of assistive devices<br>◆ Wheelchair training<br>◆ Home program |
| Ability to perform physical actions, tasks or activities related to self-care, home management, work, community and leisure | ◆ ADL training<br>◆ Device and equipment use and training<br>◆ IADL training<br>◆ Home program |
| Preparation for Discharge | ◆ Teach a self-management program<br>◆ Instruction and education of patient and care-givers on current condition and functional limitations |

## PTOT-6.3.9: Section intentionally left blank



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## PTOT-6.3.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self-care at his residence.

### Home Medical Equipment

- Hot packs/cold packs
- Theraband for therapeutic exercises
- Gym ball for therapeutic exercises
- Home electrical stimulation unit
- Home traction
- Soft tissue mobilization devices - tennis balls, knobblers, etc.
- Exercise equipment – bike, treadmill, weights

### Self-Care Techniques

- Postural advice, instruction in proper body mechanics
- Instruction in activity modification
- Stretching exercises
- Aerobic conditioning exercises to increase strength and endurance
- Heat/cold applications, if needed, to relieve discomfort/stiffness
- Self-mobilization, soft tissue mobilization
- Ergonomics
- Strengthening exercises

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# PTOT-6.4: Myofascial Pain Syndromes

## PTOT-6.4.1: Synonyms

- Myalgia
- Myositis
- Fibromyositis

## PTOT-6.4.2: Definition

- Myofascial Pain refers to a specific syndrome caused by the presence of trigger points (TrPs) within muscles or their fascia (Giamberardino, M. A, et al 2011). Other chronic pain syndromes may have neuromuscular and/or other musculoskeletal origins. It is generally accepted that diagnosis of MPS should include the presence of a taut band and reproduction of the symptomatic pain with direct pressure to and area within the identified taut band. [11] More study is needed in the diagnostic area of research. [23]

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Ligament tear, fracture |
| Fever, severe pain | Infection |
| Loss of distal pulse | Arterial occlusion |
| Progressive weakness | Muscular dystrophies; Guillain-Barre; dermatomyositis, MS, entrapment neuropathies |
| Palpable mass | Hemangioma; soft tissue tumor; foreign body |
| Diabetes; paresthesias | Neuropathy; other metabolic causes (e.g., B12 deficiency, hypothyroidism) |
| Multiple joint involvement | Rheumatologic diseases |
| Unilateral edema | Deep vein thrombosis, infection |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of extremity, exertional extremity pain | Arterial occlusion |
| Exertional symptoms in chest or upper extremities | CAD |
| Pleuritic pain, SOB, unrelenting cough | Pulmonary diseases |
| Constipation, symptoms worse or better with meals, bloody stools | GI conditions |
| Pain with urination, hematuria | UTI, renal stone |
| Immune-compromised state | Infection |

## PTOT-6.4.3: Clinical Presentation

- This condition often occurs in areas of muscles that previously experienced cumulative or sudden onset trauma. Typically, subsequent acute manifestations are precipitated by exposure to cold, or by overstretching/overloading the same region of muscle frequently seen in people with poor posture. Symptoms are suggestive of neurologic disorders including: diffuse pain and tenderness, headache, vertigo, visual disturbances, paresthesias, incoordination, and referred pain and are characterized by the presence of myofascial trigger points.



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## PTOT-6.4.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements (FOM) showing significant functional limitations using the **Patient Specific Functional Scale (PSFS)**– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score =1.2 points [17] ) OR **The Oswestry Disability Index (ODI)** with a score of 20% or higher (Minimally Clinically Important Difference of 12.8% or 6.4 raw points [4]) )) OR **The Neck Disability Index (ODI)** with a score of 16% or higher (Minimum Clinically important difference 10 points [29] ) OR **other body part specific FOM or Patient Reported Outcome (PRO) tool**
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently



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## PTOT-6.4.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.

## PTOT-6.4.6: Referral Guidelines

- Refer patient to their primary care provider, for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines or improvement reaches a plateau;
  - Atrophy of lower extremity occurs
  - Neurological deficits appear/progress

## PTOT-6.4.7: Section intentionally left blank

## PTOT-6.4.8: Physical/Occupational Therapy Management

- Use of modalities and/or passive treatments should be limited. The goal is to transition the patient as quickly as possible to active care, self-management and functional independence. Physical inactivity was associated with a higher prevalence of chronic musculoskeletal problems, regular exercise should be encouraged (Holth, H. S., et al 2008). Multiple studies of chronic pain syndromes confirm the importance psychosocial factors including but not limited to distress, depression, or pain-related fear needs to be addressed in treatment. [7]



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**Recommendations based on Strong evidence**

- Dry needling can be recommended (Level 1-2 evidence)
  - For relieving myofascial trigger point pain in neck and shoulders in the short and medium term. [22]
  - Relief for pain and in improving the quality of life. [28]
  - May be helpful with MPS in the low back. [8]
  - Low–quality to moderate-quality evidence suggests that dry needling performed by physical therapists is more effective than no treatment. No long term efficacy has been found yet. [10]
  - For decreasing pain immediately after treatment and at 4 weeks in patients with upper-quarter MPS. [20]

**Recommendations based on Moderate and/or Weak evidence**

- Pain neuroscience education (PNE) should not be used as the sole treatment modality but should be combined with other treatment strategies based on Level 1 evidence. [24]
- The available evidence suggests physical activity and exercise is an intervention with few adverse events that may improve pain severity and physical function, and consequent quality of life for chronic pain syndromes. [12]
- Ischemic rigger point release with stretching/ROM (Level 1-3). [3, 19]
- Weak Recommendation for:
  - High Intensity Ultrasound (Level 2-3 evidence). [24]
  - Therapeutic Ultrasound for TrPs (Level 2 evidence). [27]
  - Home program of ischemic pressure and stretching [15]

**Interventions Not Supported by evidence**

- Myofascial release. [21]
- Spray and Stretch

## PTOT-6.4.9: Section intentionally left blank

## PTOT-6.4.10: Home and Self-Care Techniques

- The patient can be taught to use medical equipment and administer self-care at his residence.
  - Postural advice, instruction in proper body mechanics
  - Instruction in energy conservation techniques
  - Stretching exercises
  - Aerobic conditioning exercises to increase strength and endurance
  - Heat applications, if needed, to relieve discomfort/stiffness
- Clinicians should encourage shared decision making and guided treatment for self – management. This may include intermittent treatment sessions to progress and promote adherence the patient-centered program. [5]



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## Home Medical Equipment

- Hot packs/cold packs
- Resistance band for therapeutic exercises
- Gym ball for therapeutic exercises
- Home electrical stimulation unit

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# PTOT-6.5: Temporomandibular Joint Disorders

## PTOT-6.5.1: Synonyms

- Temporomandibular Disorder (TMD)
- Temporomandibular Joint Syndrome (TMJ)
- Craniomandibular disorders

## PTOT-6.5.2: Definition

- Temporomandibular Joint Disorders affect 5-10% of the population.[25] They are characterized by TMJ, pain, swelling, possible headaches and neck pain occurring concurrently. TMD symptoms can be acute and/or chronic, unilateral or rarely bilateral. Less than 5% of these cases become surgical. Underlying cause may be of muscular, articular, or disease process origin.
- Onset is usually insidious attributed to trauma, dental procedures, posture, stress or degenerative processes.[26]

## PTOT-6.5.3: Clinical Presentation

Presents with pain associated with chewing, clicking, popping, and snapping sounds in the jaw, limited opening and locking episodes and headaches, other associated symptoms may be neck pain and stiffness, shoulder pain and dizziness.

### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Fever, severe pain | Possible infection |
| Immune-compromised state | Infection |
| Cancer history | Cause of symptoms (metastatic or primary) |



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## PTOT-6.5.4: Requirements for Physical/Occupational Therapy Visits

Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:

- Functional Outcome Measurements showing significant functional limitations using the **Patient Specific Functional Scale (PSFS)**– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points)
- ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
- Pain: limiting function and at least 3/10 for >50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition, and
  - Expectation for functional improvement with skilled intervention
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure or Patient Reported Outcome and the score meets medically necessary threshold
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently

## PTOT-6.5.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.



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- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.

## PTOT-6.5.6: Referral Guidelines

- Refer patient to their primary care provider for evaluation of alternative treatment options if:
  - Further deterioration such as increasing pain, further limitation of movement and increased joint sounds
  - Dental and otic infections occur
  - Paratrigeminal syndrome occur

## PTOT-6.5.7: Section intentionally left blank

## PTOT-6.5.8: Physical/Occupational Therapy Management/Intervention

- Therapy must show measurable functional progress. There is good evidence to support the use of physical therapy in the treatment of TMD[12]. However, the specific combination or most effective treatment technique has not been established by the literature
- Interventions with Strong Recommendation
  - None
- Interventions with Moderate Recommendation
  A mix of mobility and exercise therapy approach may be effective for pain outcomes but not for function.
  - A systematic review indicates exercise therapy had moderate, short-term treatment effects and difficult to establish long term outcomes.[7] (Level 1a evidence).
- Interventions with Weak Recommendation
  - There are no studies that verify the isolated usage of joint mobilizations for the management of temporomandibular joint (TMJ) restrictions[27]
  - Manual therapies such as joint mobilization and soft tissue mobilization may be beneficial[4]
  - Trigger point dry needling[9]
  - Relaxation training, biofeedback, and proprioceptive training
  - Postural training in combination with other techniques
  - Active exercise, manual mobilizations, postural correction, and relaxation techniques[21]
  - Ultrasound therapy may be more effective than TENS for pain relief[13]

## PTOT-6.5.9: Section intentionally left blank



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## PTOT-6.5.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self-care at his residence.

### Home Medical Equipment

- Hot packs/cold packs
- TENS
- Orthotic appliances

### Self-Care Techniques

- Relaxation training
- Home ROM exercises, stretching
- Progression to therapeutic exercise—stretching and strengthening exercises, postural exercises
- Hot packs/cold packs, if needed, to relieve discomfort
- Instruction in use of orthotic appliances

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# PTOT-6.6: Joint Hypermobility Syndrome / Hypermobile EDS (hEDS)

## PTOT-6.6.1: Section intentionally left blank

## PTOT-6.6.2: Definition

Heritable connective tissue disorders resulting in increased joint range of motion, pain, and fatigue.[1-8]

### Inclusions

- Generalized joint hypermobility[4,7]
- Joint Hypermobility Syndrome[1-3,5]
- Ehlers-Danlos Syndrome-hypermobility type (hEDS)1,2,6 formerly known as EDS-HT[3,7,8]
- Benign joint hypermobility syndrome (BJHS)[3,7,8]
- Hypermobility Spectrum Disorder[6]
- Ehlers-Danlos Syndromes (EDS) subtypes [1]
  - Classical
  - Classical-like
  - Cardiac-valvular
  - Vascular
  - Hypermobile (hEDS)
  - Arthorclasia
  - Dermatosparaxis
  - Kyphoscoliotic
  - Brittle Cornea syndrome
  - Spondylodysplastic
  - Musculocontractural
  - Myopathic
  - Periodontal
- Most common type of EDS is the hypermobile type (hEDS).
  - Characteristics of hEDS include extreme joint mobility associated with instability in small and large joints, complaints of pain, decreased proprioception, decreased muscle strength, balance deficits, fatigue, coordination disorders, urinary incontinence, and abnormal collagen resulting in velvety, elastic skin, affecting bone and blood vessels, and dysfunction in the gastrointestinal system[1-8]

### Exclusions[6-8]

- Marfan syndrome
- Osteogenesis Imperfecta



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## PTOT-6.6.3: Clinical Presentation

**Overview of hypermobility related disorders**
Classifications of EDS were changed in 2017. Joint hypermobility syndrome and hEDS should not be considered the same, although there are similarities.[2] Benign joint hypermobility syndrome is joint hypermobility syndrome, and joint hypermobility syndrome may be termed hypermobility spectrum disorder.[3, 6] hEDS is formerly known as EDS-HT (EDS- hypermobility type).[2,3,7,8]

**Clinical diagnosis**

- Beighton score (only documents the degree of hypermobility)[1-4,6-8]
- Brighton Criteria[3,5,6,8]

**Purpose of Guideline**

- Dosing of interventions in physical and occupational therapy has been identified as a national priority. Dosing includes frequency of sessions (number of sessions a week), intensity (number of exercise repetitions or how hard the patient works), time (minutes per session), and type of intervention (therapeutic exercise, gait training, education, etc.). Physical and Occupational therapy may be delivered at different frequencies and durations, which creates challenges for providers and clinical reviewers. The purpose of this guideline is to provide an overview of joint hypermobility conditions and convey current evidence in order to guide consistent utilization management decisions.

## PTOT-6.6.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Significant Functional Limitations (i.e. Activities of daily living, vocational activities) - Practitioners are strongly encouraged to utilize peer reviewed, standardized tools to quantify
  - Functional Limitations
  - Strength: <4/good (5 = normal; 4 = good; 3 = fair; 2 = poor; 1 = trace)
  - ROM: < than functional motion (refer to Maximal Complex Motion Necessary for Functional Activities)
  - Pain: limiting function and at least 3/10
- Treatment frequency and duration must be based on:
  - Severity of clinical findings
  - Presence of complicating factors
  - Natural history of condition, and
  - Expectation for functional improvement.
- Identified deficit can be measured and progress demonstrated throughout the treatment plan.



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- Need for home program development, education and training.
- Need for patient or caregiver training in medical, functional or adaptive equipment.

## PTOT-6.6.5: Discharge Criteria

- The patient is discharged when the patient/caregiver can continue management of symptoms with an independent home program.
- Discharge occurs when reasonable functional goals and expected outcomes have been achieved.
- Therapy is discontinued when the patient is unable to progress towards outcomes because of medical complications, psychosocial factors or other personal circumstances.
- Repetitive exercise for range of motion, flexibility, or strengthening does not generally require the skills of a therapist beyond establishing the program and/or periodic reassessment related to significant change in the patient's condition. Therapy is discontinued when services become routine or repetitive in nature, indicating they are not of a skilled nature.
- Therapy is discontinued when the patient is no longer objectively demonstrating benefit from therapy.
- If the member has been non-compliant with therapy as is evidenced by the clinical documentation, and/or the lack of demonstrated progress, therapy will be deemed to be not medically necessary and the member should be discharged from therapy.
- Therapy services are not considered medically necessary for pain mediation alone. The goals of therapy are for improvement in restoration of function, motor ability, and range of motion.

### Management/Intervention

- Use of modalities and/or passive treatments should be limited. The goal is to transition the patient as quickly as possible to active care, self-management and functional independence.

## PTOT-6.6.6: Section intentionally left blank

## PTOT-6.6.7: Section intentionally left blank



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## PTOT-6.6.8: Physical and Occupational Therapy Intervention

- Currently, rehabilitation in hEDS has no scientific evidence.[1]
- The overall results of the studies included indicate a strong need for additional randomized control studies with specific exercises noted. The systematic reviews and meta-analyses that have been conducted do not provide any strong protocols. Physical therapy was generally 1-3 times per week for 6-12 weeks. The basis of the therapy sessions was often based on the presenting problem.
- An additional concern is not all practitioners/providers are aware of the diagnosis of joint hypermobility syndrome/hEDS and may cause harm to the joint(s). One concern is early onset arthritis in the joints.
- Chronic pain, fatigue, anxiety and depression are common with JHS and hEDS and have a strong influence on disability. Cognitive oriented approaches along with/instead of physical rehabilitation may be beneficial.[2,7]
- Guidelines have been written and are noted in the Engelbert et al article. These guidelines are based on review of the literature and expert opinions/consensus based.
- Mechanical therapies such as splints and orthoses to treat lower limb pain may be beneficial. However, the use of splints to assist with handwriting is most likely not beneficial.[8]
- Generalized exercise and joint specific exercise do not show one is better than the other. [8] It is noted that ankle injuries are less common than knee injuries in those participating in sport activities. [4] Limitations in dorsiflexion may cause more injuries in those with hypermobile joints than those without.

### Literature Summary of Hypermobility in Physical and Occupational Therapy

| Reference and Study Design | Oxford Level of Evidence | Summary and Recommendation |
|---|---|---|
| Scheper, et al | 1 | Objectives of the article:<br>1. Most common disability symptoms resulting in activity limitations and participation restrictions<br>2. Treatment modality effectiveness on disability in people with Generalized Joint Hypermobility (GJH), Hypermobility Syndrome (HMS), and hypermobile type Ehlers Danlos Syndrome (hEDS).<br>Subjects in the studies had to be older than 16 years of age.<br>The following symptoms were included in the analysis: pain, fatigue, and psychological distress (anxiety and depression).<br>Analysis results:<br>Disability: higher in all the groups compared to their control groups. hEDS was higher than GJH; differences between GJH and HMS, although this difference was insignificant. In addition, there was not a statistical difference between those with HMS and those with hEDS.<br>Absence of statistical heterogeneity. |



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| Reference and Study Design | Oxford Level of Evidence | Summary and Recommendation |
|---|---|---|
| | | Pain: more pain was experienced in all the groups compared to the control subjects. Subjects with HMS had more pain compared to GJH. hEDS had higher pain intensity than GJH, however this was insignificant. HMS and hEDS did not show a statistical difference.<br>The higher the level of pain, the higher the level of disability.<br>Absence of statistical heterogeneity.<br>Fatigue: All groups had higher levels of fatigue compared to their control groups.<br>No comparison between the groups was performed due to low number of participants.<br>Higher the level of fatigue, the higher the level of disability.<br>Moderate statistical heterogeneity<br>Psychological concerns (anxiety and depression): All groups had higher levels of psychological distress compared to their controls.<br>hEDS had higher levels of psychological distress than those with HMS and GJH.<br>Higher the level of psychological distress, the higher the level of disability.<br>Treatment effectiveness: HMS is the only diagnosis included in the analysis. All studies included outcomes of level of activities and participation based on the International Classification of Functioning, Disability and Health (ICF) and intensity of pain.<br>Pain is improved with variable results by use of a combination of physical and cognitive approaches. However, the treatment effectiveness on disability was lacking.<br>Five studies were included in analysis of treatment effectiveness. The duration and frequency of treatment were different in each study. Two studies were 6 weeks long, two were 8 weeks, and one was 13.5 weeks in total duration (with clinical admission of 2.5 weeks and home exercise for 12 weeks. Frequency ranged from 4 sessions per week to 1-2 times a week. Two studies had follow ups. No exact description of treatment interventions was provided. The studies included a combination of physical fitness enhancement through physical treatment and pain management through cognitive interventions; open and closed chain activities at home with a goal of improving proprioception, muscle strength and balance; cognitive intervention only; proprioceptive and balance exercises in the clinic; and joint stabilization exercises in the clinic. |



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| Reference and Study Design | Oxford Level of Evidence | Summary and Recommendation |
|---|---|---|
| Engelbert | 5 | Discusses evidenced based reasoning for PT treatment in people with JHS/hEDS. Identifies the need for further research to identify and validate appropriate outcome measures.<br>Suggests treatments should be tailored to the individual.<br>Article has a proposed ICF model by Pacey (2014)<br>Pain: often present; knee and shoulder are most common sites in children with JHS/hEDS; recent studies show children and adults have GJH, chronic pain and presence of a generalized hyperalgesia (GHA). GHA may indicate the central nervous system is involved with increasing chronic pain.<br>Proprioception, muscle strength, and balance are discussed and the impact they have. Proprioception is suggested to be related to gait abnormalities and pain. Decreased proprioception and strength limit activities, which impact balance.<br>The knee, ankle and shoulder are the most affected joints in regard to instability.<br>High levels of urinary incontinence is possible.<br>Coordination difficulties are rising.<br>Psychological symptoms are reported via the Pediatric Quality Of Life Inventory.<br>In adulthood, pain varies from localized to widespread. Fatigue varies from mild to sever, but is the most disabling complaint.<br>A randomized control trial (RCT) by Pacey et al. (2013) has been conducted with one group of children with JHS/hEDS performing knee exercises into the hypermobile range of motion (ROM) compared with a group of children with JHS/hEDS performing knee exercises to neutral ROM. Both groups had improvement in knee strength and decreased knee pain.<br>Use of orthotics and/or sensible footwear is appropriate for children with flexible flat foot.<br>A RCT by Sahin et al (2018) on adults, shows decreased knee pain and improved proprioception in a group performing proprioception, balance and plyometric exercises compared to a matched control group performing no exercises.<br>There are guidelines developed by Cincinnati Children's Hospital Medical Center, 2014 and The British Society for Pediatric and Adolescent Rheumatology, 2013 which may be helpful.<br>Some evidence for improvement of JHS/hEDS with exercise, but no strong evidence for what specific types of exercise or that exercise is better than in controls.<br>Individualization of treatment is recommended. Care should be taken to avoid exacerbation of pain. |



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| Reference and Study Design | Oxford Level of Evidence | Summary and Recommendation |
|---|---|---|
| Corrado B and Ciardi G (2018) | 1 | No evidence on hEDS in regards to rehabilitation.<br>Only article which is included in this systematic review is an article from Bathen et al. (2013). This study is referenced in the meta-analysis article by Scheper et al (2016). It is a cohort study with 12 participants. Intervention included strength training, body awareness exercises, core stability exercises and cognitive behavioral therapy (CBT).<br>Outcome measures used:<br>Tampa Scale of kinesiophobia (TSK) scale for kinesiophobia<br>Stair walking up test<br>Stair walking down test<br>Numeric Rating Scale (NRS)<br>Treatment program:<br>2.5 weeks on a rehabilitation unit for evaluation, physical exercise, group discussions, and lectures<br>3 months of individual home exercises with weekly guidance by a local physical therapist<br>Exercises included strength and resistance training, body awareness and core stability exercises.<br>Randomized trials are needed to validate conventional methods. |
| Peterson | 1 | Systematic review evaluating 2 articles to determine best management of lower limb symptoms in children with JHS or hEDS. One article is by Kemp et al (2010) and another article is a trial by Pacey et al (2013). The first article evaluated generalized vs targeted physical therapy to improve pain reports, health related quality of life and functional ability. In this study, thirty minute sessions of physical therapy treatment were provided weekly for 6 consecutive weeks. Generalized therapy sessions included specific exercises to improve muscle strength and fitness and were supervised by a physical therapist. The study subjects were also given a home program to perform daily. They were supposed to continue with their usual activities. The targeted group was given a step by step exercise program which to re-train the symptomatic joints. They were also given a home program to work on their postural control.<br>The other article was by Pacey et al (2013) comparing 2 eight week programs to evaluate muscle strength and joint control. One group performed knee extension exercises within the neutral range and the other group performed knee extension in the full hypermobile range.<br>These studies had no statistically significant differences between their groups.<br>The evidence for physical therapy is very limited for children with JHS/hEDS. |
| Palmer et al (2014) | 1 | Systematic review to study the effectiveness of therapeutic exercise for people diagnosed with JHS.<br>This article includes four studies. The results of the systematic review indicate no strong evidence for specific exercises or that exercise is better than the control in people with JHS.<br>The authors suggest the need for high quality research to determine the value of exercise for JHS. |



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| Reference and Study Design | Oxford Level of Evidence | Summary and Recommendation |
|---|---|---|
| Pacey et al (2009) | 1 | Systematic review with meta-analysis. Eighteen studies were reviewed for lower limb injuries to determine if there is an increased risk of injury for those with generalized joint hypermobility in sporting activities.<br>In this review it was noted that those with GJH have a higher risk of injury to the knee joint than the ankle joint during any sporting activity. Hyperextension at the knee increases the risk for an anterior cruciate ligament injury.<br>Ankle sprains are more common in those with decreased ankle dorsiflexion range of motion. |
| Smith et al (2014) | 1 | Systematic review of clinical trials. Inclusion of 3 studies. One of which is Kemp et al which looked at the effectiveness of generalized vs targeted physical therapy. Another is Frohlich et al which looked at the wearing of hand and wrist splints. The other article is Sahin et al which looked at proprioceptive based exercises.<br>In Frohlich's trial 4 school aged participants were to wear a custom made wrist/hand splint to wear while performing writing tasks at home and/or at school. Splint wear adversely affected the handwriting speed of 3 out of the 4 subjects in 4 weeks. Pain was decreased significantly in 3 of the subjects following removal of the splint. Two of the subjects did not wear the splints consistently. At the end of the trial, all of the subjects were not sure if they would use the splint if it was offered to them. This evidence is not conclusive and no recommendations can be made.<br>In Sahin's trial, subjects and controls were randomly placed in groups of those who received proprioceptive exercises or in a group that did not receive exercise for eight weeks. The results we not statistically significant in regard to the improvement in proprioception. Pain was improved in both resting and motion. A statistically significant difference was not reported between the group outcomes, therefore, how effective the proprioceptive exercises are was not able to be determined.<br>Kemp et al's trial has been discussed previously. The trial is based on the effectiveness of a generalized versus a targeted physical therapy exercise program.<br>Additional randomized controlled studies with longer term follow up are recommended in the future.<br>There is not enough evidence to establish the type of exercise/intervention or the frequency or dosage of exercise is the best. Additional studies on specific treatments currently in use in clinics need to be investigated.<br>Long term, multi-center trials need to be completed to determine the clinical and cost-effectiveness of specific interventions for those with hypermobility syndrome. |
| Kumar et al (2017) | 5 | Review of information on joint hypermobility. Identifies importance of modification in lifestyle for those who have joint hypermobility. Recognizes exercise is important, however too much training, stretching and increasing of range of motion in joints may be harmful. Balance and control may be impacted. Psychological impact is a risk. Chronic pain and fatigue are common. No specifics on how much is too much is noted. Joint hypermobility syndrome can be overlooked by healthcare providers because of the need for a high level clinical suspicion and specific testing needing to be performed. Beighton scores are one part of this puzzle.<br>Article has a good description of the Beighton score and Brighton criteria. |



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## PTOT-6.6.9: Section intentionally left blank

## PTOT-6.6.10: Home and Self-Care Techniques

- Postural advice, instruction in proper body mechanics
- Instruction in activity modification
- Stretching exercises
- Aerobic conditioning exercises to increase strength and endurance
- Ergonomics
- Strengthening exercises

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# PTOT-7.0: Orthopedic – Knee


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# PTOT-7.1: Anterior Cruciate Ligament (ACL) Reconstruction, Knee

## PTOT-7.1.1: Synonyms

- ACL repair (a misnomer, implying direct primary repair)
- ACL reconstruction (ACLR) with meniscal repair
- ACL reconstruction (ACLR) with additional ligament repair (MCL, LCL or PCL)
- ACL reconstruction (ACLR) with posterior lateral corner (PLC) repair

## PTOT-7.1.2: Definition

- Reconstructive surgery after ACL injury is performed to provide stability and long-term normal function. Procedure usually involves an intra-articular autograft of the middle third of patellar tendon, or tendons of semitendinosus/gracilis. Occasionally an allograft is used from a donor.
- Injury to the ACL is a common type of knee injury. The frequency of this type of injury is approximately 1 in 3000 per year in the U.S. population. This type of injury is more common with females. A majority of individuals that require surgical repair to the ACL are able to return to strenuous activities with proper rehabilitation.
- Based on available literature, there appears to be an improved rate of return to athletic activity after ACLR when compared with non-operative treatment. [27]
- Patients who had had revision surgery reported inferior function scores, had inferior clinician-reported knee function and more radiographic signs of tibiofemoral osteoarthritis compared with patients with primary ACL reconstruction. [33]
- A high pre-injury activity level, the desire of the patient to continue pivoting sports and fear of future give-way episodes are considered the most significant factors affecting the decision to perform anterior cruciate ligament reconstruction. [24]

## PTOT-7.1.3: Clinical Presentation

### Combined Injuries

- The prevalence of knee osteoarthritis for individuals with isolated anterior cruciate ligament injury is 0%-13% with a higher prevalence of knee osteoarthritis for subjects with combined injuries of 21%-48%. [59]
- Grade 3 or 4 femoral or tibial articular cartilage injury and meniscus tears/treatment at the time of ACLR were significant predictors of worse functional outcomes. [18] Medial meniscus repair predicted worse functional outcomes, whereas lateral meniscal repair is associated with better outcomes. [18]
- Concurrent meniscal repair with ACLR is show sustained improvements in patient-oriented outcome scores at 6-year follow-up. Medial mesical repairs had a slightly higher failure rate than lateral meniscal repairs. [76]



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- Short term follow up at 2 years revealed lower outcome scores for medial meniscus repairs with ACLR, while Medial, Lateral Meniscectomies and Lateral meniscal repairs showed higher, similar functional outcomes. [47]
- Evidence specific to rehabilitation considerations for combined injuries with ACL reconstruction is scarce. Clinicians should consider all factors and modify treatment according to any additional precautions provided by the referring surgeon.

### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.

| Red Flag | Consequence or Cause |
|---|---|
| Severe trauma, post operatively | Fracture |
| Fever, severe pain | Infection |
| Popliteal fossa pain, sudden onset | Popliteal aneurysm |
| Diabetes | Neuropathy |
| Multiple joint involvement | Rheumatologic diseases, gout |
| Unilateral edema | Deep Vein Thrombosis (DVT) |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of foot, or leg, exertional leg, or foot pain | Arterial occlusion; vascular insufficiency; Compartment syndrome |
| Immune-compromised state | Infection |

### Risk factors of poor outcome

- Higher BMI
- Lower education level
- Smoking
- Revision ACL surgery

## PTOT-7.1.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score = 1.2 points [42]) OR Lower Extremity Functional Scale (LEFS) with a score of 64 or less (Minimum clinically important difference 9 points[1, 9] OR International Knee Documentation Committee (IKDC) Subjective Form with a score of 71 or less (Minimum Clinically Important Difference 11.5 points[69]). Additional functional tests include: KOOS (Wright, 2009)**;** Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC).[64]



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- Six Minute Walk Test (6MWT)[35, 56]
- Range of Motion: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
- Pain Rating Scale: limiting function and at least 3/10 for 50% of the time
- Surgery within the past 6 months

- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings
  - Presence of and number of complicating factors and comorbidities
  - Natural history and chronicity of condition
  - Expectation for functional improvement with skilled intervention
  - Response to treatment provided
  - Patient's level of independence
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinically Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently

## PTOT-7.1.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.



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- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-7.1.6: Referral Guidelines

- Refer patient to their surgeon for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines, or improvement has reached a plateau
  - Atrophy of lower extremity occurs
  - Range of motion plateaus or decreases
  - Re-injury occurs
  - Signs of infection

## PTOT-7.1.7: Section intentionally left blank

## PTOT-7.1.8: Physical/Occupational Therapy Management

- A number of different programs are used by different physical therapists. The therapy program chosen depends on the activity level of the patient and the type of surgery performed, coexistent injuries (meniscal or other ligamentous injury), and the surgeon.
- There is evidence that rehabilitation protocols should have long term focus on restoring normal sagittal plane gait mechanics, rather than frontal or transverse plane, to reduce the chance for progression of osteoarthritis. [37]
- There is no consensus or strong evidence to support one treatment protocol over another (Makhni, E. C., et al 2016). Generally the rehabilitation process begins immediately following ACL injury, with emphasis on reducing swelling and inflammation, regaining quadriceps control, allowing immediate weight bearing, restoring full passive knee extension, and gradually restoring flexion.[77]

### Pre-operative treatment or Prehabilitation

- There is some evidence that pre-operative physical therapy should be introduced to healthcare management of ACL injury. [2] Twenty one days prior to surgery is considered adequate (Wilk, K., et al 2012). Prehabilitation programs may be performed with the following goals:[66]
  - Clarify expectations and goals
  - Shared decision making for treatment
  - Improve adherence to recommendations
  - Include information on risk factors for reinjury: return to high-level pivoting sports and muscle dysfunction
  - Include information on long-term outcome: make sure knee function is normalized and maintain normal body mass index
  - Resolve range of motion and address swelling
  - Improve coordination and proprioception with Neuromuscular exercises
  - Optimize muscle strength and performance



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### Recommended Interventions[81]

- Early Weight bearing
  - Immediate full weight bearing is recommended.
- Range of Motion
  - Immediate passive and active range of motion activities is recommended.
- Strengthening Exercises
  - Closed chain exercises can be performed immediately.
  - Open chain exercises should be limited in the first 6 weeks post operatively to limit the amount of strain on the graft.
- Neuromuscular Training
  - Exercises including perturbation, balance and proprioception are supported by evidence. Discontinue use once patient is able to perform 20 repetitions of SLR with no lag.
- Home-Based Rehabilitation
  - Home-based rehabilitation programs may be used with motivated patients. There is moderate evidence that structured home programs with periodic contact by a physical therapist, result in the same outcomes as supervised, clinic based rehabilitation.[6, 31, 32, 41, 62, 72]

### Interventions with Neutral Recommendation

- Neuromuscular Electrical Stimulation (NMES)
  - Evidence is unclear as to the value of NMES.
- Accelerated Rehabilitation
  - There is no clear evidence to fully support rehabilitation aimed at early return to sport or recreational activities. Please see Discharge Considerations for evidence regarding recovery data.

### Interventions Not Recommended

- Continuous Passive Motion (CPM)
  - CPM is not supported for ACL surgery.
- Postoperative Bracing
  - Bracing immediately following surgery is not supported by evidence.
- Kinesiotaping
  - No evidence to support the use of kinesiotaping post ACLR[60]

### Criteria Oriented Protocol[81]

- Minimum number of visits recommended: 6 visits
- Recommended number of visits 16-24 visits total
- Time frames provided are estimates, and will vary according to the patient and concomitant knee injury such as meniscal repair, chondral repair, and/or secondary ligament repair.



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- Phase 1 (0 to 2 weeks)
  - Goals:
    - Full knee extension Range of Motion (ROM)
    - Good quadriceps control (20 repetitions of SLR with no lag)
    - Minimize pain
    - Minimize swelling
    - Normal gait pattern
  - Weight Bearing As Tolerated (WBAT) with crutches until patient demonstrates normal gait pattern and able to ascend/descend stairs safely and pain free.
  - Exercises for ROM and strengthening
  - Aerobic exercise
  - Cryotherapy for pain and swelling
  - Scar massage after incision is healed/closed
- Criteria to move to Phase 2:
  - 20 reps of SLR with no lag
  - Normal gait
  - Crutch use is discharged
  - No greater than 5 degree extension lag
  - 110 degrees of active knee flexion
- Phase 2 (2 to 6 weeks)
  - Goals:
    - Full ROM
    - Increased muscle strength
    - Progress to neuromuscular training
  - Exercises for ROM and strengthening including the hip and ankle
  - Neuromuscular training
  - Aerobic training
- Criteria to move to Phase 3:
  - Full ROM
  - Minimal pain and swelling
  - Functional strength and control with Activities of Daily Living (ADLs)
  - International Knee Documentation Committee Subjective form (IKDC) question #10 score of 7 or greater
- Phase 3 (7 to 12 weeks)
  - Goals:
    - Maintain full ROM
    - Demonstrate ability to descend 8 inch step without pain or compensation
    - Running without pain or swelling
    - Hopping without pain, swelling, or giving way
    - Strengthening
    - Neuromuscular training
    - Aerobic training
- Criteria to move to Phase 4:
  - Running (straight line) without pain or swelling



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- Hopping without pain or swelling (bilateral and unilateral)
- No difficulty with neuromuscular or strength exercises

- Phase 4 (13 to 16 weeks)
  - Goals:
    - Running and agility at 75% speed without difficulty
    - Jumping without difficulty
    - Hop tests at 75% contralateral values (Single leg for distance, Triple hop for distance, Cross over hop for distance, 6 meter timed hop)
  - More aggressive strengthening
  - Agility drills
  - Neuromuscular training
  - Aerobic training
- Criteria to move to Phase 5:
  - Maximum vertical jump without pain or instability
  - 75% of contralateral on hop tests
  - Figure 8 run at 75% speed without difficulty
  - IKDC Subjective Form question #10 score of 8 or greater
- Phase 5 (17 to 20 weeks)
  - Goals:
    - 85% contralateral strength
    - 85% contralateral on hop tests
    - Sport specific exercises without pain, swelling or difficulty
  - Aggressive strengthening
  - Sport specific activities
- Suggested Return to Sport evaluation tests:
  - Hop tests (single leg hop, triple hop, crossover hop, 6 meter timed hop)
  - Isokinetic strength test (60 degrees/second; peak torque) (Protocols vary and lack consensus (Undheim, M. B., et al 2015))
  - Vertical jump
  - Deceleration Shuttle test
- Recommended criteria to allow return to sport/activity:
  - No functional complaint
  - Confidence when running, jumping, cutting at full speed
  - 85% contralateral values on hop tests
  - IKDC Subjective Form question #10 score of 9 or greater
- The inability of the patient to develop dynamic muscular joint stabilization through neuromuscular control during walking and activities of daily living (ADL) should exclude the patient from progression into an aggressive return-to-sport rehabilitation phase (Myer, G. et al 2006).



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### Discharge Considerations

- Return to sport 9 months or later after surgery and more symmetrical quadriceps strength prior to return substantially reduces the reinjury rate. [34]
- Many patients are most likely are not ready for a safe return to sports, even 8 months post-operatively. [39]
- Criteria for discharging patients should be based on best available evidence for returning to normal activities. The optimal method to do this remains unclear. It has been suggested that both performance-based measures and patient reported functional outcome measures are needed to fully characterize knee function. [50] Quadriceps strength has been identified as the most telling physical marker for full recovery. [61, 67] Specific tests may include: [66]
  - Muscle strength tests greater than 90% compared to the strength of the contralateral limb
  - Single-leg hop tests greater than 90% compared to the strength of the contralateral limb
  - Patient-reported outcome within normative values for that specific questionnaire
  - Sport-specific tests if applicable

### Female Considerations

- Women with a history of ACL injury are at greater risk of a second ACL injury with 16-fold greater risk of injury compared to healthy controls and four times greater risk than men with a history of ACLR. Women are also six times more likely to suffer a contralateral injury.[63]
- Altered gait and task specific asymmetries are more prevalent in women than in men post ACLR. The reasons, and thus treatment for, these differences remain unclear and need further examination.[23]
- According to a systematic review, plyometric power, biomechanics and technique, strength, balance, and core stability training can induce neuromuscular changes and potential injury prevention effects in female athletes.[40]

## PTOT-7.1.9: Pediatric and Adolescent Considerations

- ACL Related
  - The majority of young athletes make a return too early to knee strenuous sport after a primary ACL reconstruction, without recovering their muscle function.[7]
  - For some pediatric patients, significant strength and functional deficits may be present at greater than 1 year after ACLR.[39]
  - Altered landing mechanics, which may be a predictor for future injury, are tied to asymmetric quadriceps strength in youth populations.[45]



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### Associated injuries in Younger Populations

- *Meniscal repair*- Young patients who undergo ACLR with meniscal repairs show slower healing rates and higher failure rates, but the cause is unknown. Medial meniscal repairs fail at a higher rate than lateral repairs.[26]
- *Ligamentous tears*- Studies suggest delayed ACLR when Grade II or III Medial Collateral Ligament tears are present.[26]
- *Chondral lesions*- Articular cartilage lesions related with ACL tears are common. Procedures such as microfracture or osteochondral autograft transfer (OAT) may be performed at the time of ACLR. Surgeon's precautions should be followed regarding weight bearing and exercise progression. However, there is little research regarding the treatment and success of rehabilitation with these combined injuries.[26]

**Pediatric and Adolescent Considerations – General Orthopedic/Musculoskeletal**
There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[44]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[20,29]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[48]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[21]



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### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[16, 75]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[55]

### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[5]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[75]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[68]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[74]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility.[15]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-7.1.10: Home and Self-Care Techniques

- The patient can be taught to use medical equipment and administer self-care at his or her residence.

### Home Medical Equipment

- Cold packs
- Resistance band for therapeutic exercises
- Functional Knee bracing for sports
- Assistive gait device
- Home electrical stimulation unit for pain control
- Neuromuscular re-education (NMES) of the quadriceps muscles

### Self-Care Techniques

- Instruction in home exercise program for Range Of Motion and strengthening
- Cold packs, if needed, to relieve discomfort

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## PTOT-7.2: Knee Pain and Dysfunction

### PTOT-7.2.1: Diagnoses Included:

- Anterior Knee pain
- Patellofemoral pain
- Chondromalacia Patella
- Knee pain
- Knee sprain/strain
- Patellar subluxation or dislocation
- Patellar apophysitis (Singing-Larsen-Johansson lesion)
- Tibial apophysitis (Osgood-Schlatter lesion)
- Patellar tendinitis (Jumper's knee)
- Tibial (Medial) collateral ligament sprain
- Pes anserine bursitis
- Medial plica syndrome
- Fibular (Lateral) collateral ligament sprain
- Iliotibial band syndrome
- Popliteal cyst (Baker's cyst)
- Posterior cruciate ligament injury
- Posterolateral corner injury - Distal hamstrings injury
- Proximal gastrocnemius injury

### PTOT-7.2.2: Definition

Knee pain is defined as pain that consists of soreness, tension, instability, pain, and/or stiffness in the knee region that may extend from the mid-thigh to upper portion of the lower leg. Joints involved may include the tibio-femoral articulation, the articulation of the patella within the trochlear groove of the femur, as well as the proximal articulation of the fibula with the tibia. Pathology may be related to trauma or repetitive strain of the musculotendinous structures or ligaments such as the cruciate or collateral ligaments. Other structures such as the menisci, bursae, or patellar fat pad can also be generators of pain or disability.

Knee pain may be described in terms of how long the individual has been dealing with the condition. Acute knee pain' is defined as pain that has been present for less than 3 months, and 'chronic knee pain' as pain that has persisted for longer than 3 months.

Some subsets of knee pain describe a significant portion of patient's seeking medical care. Patellofemoral pain is more prevalent in younger, more active patient populations, affecting 26% of young athletes [27] and 7% of young active adults.[27, 121]



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Knee pain and dysfunction can be categorized according to the International Classification of Functioning, Disability and Health (ICF) (World Health Organization [WHO],) in the following ways:

- Knee pain( b28016 pain in joints)
- Knee stiffness, loss of ROM, or locking( b7100 mobility of a single joint)
- Difficulty walking, antalgic gait( b770 gait pattern functions)
- Knee instability (b7150 stability of a single joint)
- Knee pain with movement coordination impairments (b7601 control of complex voluntary movements)

## PTOT-7.2.3: Clinical Presentation

### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture, ligament/meniscal tear |
| Fever, severe pain | Infection |
| Popliteal fossa pain, sudden onset | Popliteal aneurysm |
| Diabetes | Neuropathy |
| Multiple joint involvement | Rheumatologic diseases |
| Unilateral edema or positive Homan's sign | Deep vein thrombosis |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of foot or leg, exertional pain | Arterial occlusion, vascular insufficiency |
| Immune-compromised state | Infection |

## PTOT-7.2.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS) – with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score = 1.2 points[46]) OR Lower Extremity Functional Scale (LEFS) with a score of 64 or less (Minimally Clinically Important Difference 9 points[10, 109]). Other outcome tools to consider are: IKDC 2000 Subjective Knee Form[123]
  - KOS-ADLS[49] KOOS[123] and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)



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- Range of Motion: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
- Numeric Pain Rating Scale: limiting function and at least 3/10 for 50% of the time

- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services is considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure
  - The Numeric Pain Rating Scale is reduced by 2 points
  - Range of Motion remains below what is required for personal care or essential employment requirements

## PTOT-7.2.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.



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## PTOT-7.2.6: Referral Guidelines

- Refer patient to their primary care provider for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines, or improvement has reached a plateau
  - Atrophy of the extremity occurs
  - Neurological deficits appear/progress

## PTOT-7.2.7: Section intentionally left blank

## PTOT-7.2.8: Management/Intervention

### Clinical Interventions Recommended

- Education and Self-Management: (high level of evidence)
  - Patients should be educated on the diagnosis and prognosis of their condition, healthy lifestyle choices, use of a walking aid if indicated, and the importance of maintaining a healthy weight.[31,47, 96]
- Strengthening Exercise:( high level of evidence)
  - Quadriceps strengthening in particular has been consistently shown to be beneficial for various types of knee pathology.[12, 53, 89, 113]
  - Hip strengthening, particularly the gluteus medius and maximus, has also been shown to be beneficial for patients dealing with patellofemoral pain.[12, 22, 43, 77]
  - Exercise-therapy is recommended to reduce pain in the short, medium and long term, and improve function in the medium and long term.[18, 29]
  - Combining hip and knee exercises is recommended to reduce pain and improve function in the short, medium and long term, and this combination should be used in preference to knee exercises alone.[29, 42]
  - Combined interventions are recommended to reduce pain in adults with patellofemoral pain in the short and medium term.[22, 29, 58]
  - Adding transverse abdominis, hip abductor, and lateral rotator muscles may improve pain outcomes in PFPS patients.[41]
  - Foot Orthoses (moderate level of evidence)
    - Foot orthoses are recommended to reduce pain in the short term.[29]

### Clinical Interventions with Favorable Recommendation

- Patella Taping:( weak or inconclusive evidence)
  - Some evidence supports the use of taping for the patella when added to strength programs.[8, 12, 89, 116, 117]
  - The most recent Cochrane review concluded that the currently available evidence from trials reporting clinically relevant outcomes is low quality and insufficient to draw conclusions on the effects of taping.[16]



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- Stretching/ Flexibility Training:( limited evidence)
  - Although stretching is included in multiple studies reporting positive outcomes, there are few studies that look at stretching alone. There has been some evidence to indicate that improved length of the iliopsoas, quadriceps, and iliotibial band is related to positive outcomes.[90, 112]
  - Stretching combined with a strengthening reduces pain associated with PFP [42]
  - Restoring flexibility to quadriceps and hamstrings may lead to better outcomes in patellar tendinopathy.[113]
- Knee Bracing:( inconclusive evidence)
  - Based on the current evidence available it is not possible to make a recommendation for or against the consistent use of knee bracing. Sound clinical reasoning should be applied by the therapist on a case by case basis, and these interventions may be considered for patients who do not respond to a strengthening and/or manual therapy based program.[13, 95]
- Foot orthoses are recommended to reduce pain in the short term for PFP[22]
- Addressing pain catastrophizing and fear avoidance beliefs (moderate to weak evidence)
  - Fear-avoidance beliefs should be targeted during the treatment of patients with patellofemoral pain syndrome.[92]
  - Findings suggest that co-interventions to reduce maladaptive beliefs and attitudes about pain may improve the results in anterior knee pain.[37]

**Clinical Interventions Not Recommended**

- Joint Mobilization for Patellofemoral pain
  - Patellofemoral, knee and lumbar mobilisations are not recommended.[22]
- Thermal Modalities- hot packs, cold packs, ice massage:( moderate level of evidence)
  - Electrophysical agents are not recommended.[29]
  - Based on current evidence, it is not recommended that thermal modalities be routinely used in patients with knee pain (Jamtvedt, et al., 2008). Ice massage may have some potential benefit on ROM, function, and knee strength in patients with knee OA, but further research is needed.[15]
- Therapeutic Modalities for the Treatment of Patellofemoral Pain: (moderate level of evidence)
  - Evidence for the use of therapeutic modalities such as ultrasound, estim, laser, iontophoresis, and biofeedback for the treatment of patellofemoral pain is generally lacking and cannot be recommended at this time as a stand-alone treatment. Further studies are needed to confirm a benefit of their addition to a program of conventional physical therapy interventions.[20, 59]
  - Electrophysical agents are not recommended for patellofemoral pain.[29]
  - Ultrasound is not recommended for patellar tendinopathy.[60]



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- Kinesio Taping:(limited evidence)
  - Despite the amount of positive anecdotal evidence and case studies available, high quality studies to confirm these findings are still needed. Two recent reviews found limited quality evidence to support the use of kinesio taping.[72, 118] In the clinic, kinesiotaping is often used as a complimentary treatment along with therapeutic exercise or manual therapy, or for neuromuscular re-education to facilitate or inhibit certain muscle groups.
  - There currently exists insufficient evidence to support the use of kinesiotaping over other modalities in clinical practice.[75]
  - Current evidence does not support the use of kinesiotaping.[84]

**Patellofemoral Pain Syndrome (PFP) Considerations**

- Hip strength should be examined[97]
- The hip should be examined for limitations in rotation and extension[30]
- Weaker knee extension strength, expressed by peak torque, appears to be a risk factor for PFPS [61]
- Examination of hip internal rotation, adduction, and knee external rotation may be considered significant. (Panken A, 2015)
- Evaluation of Q Angle is not supported as significant indicator of dysfunction[3, 5]
- The core criterion required to define PFPS is pain around or behind the patella, which is aggravated by at least one activity that loads the patellofemoral joint during weight bearing on a flexed knee (eg, squatting, stair ambulation, jogging/running, hopping/jumping).[28]
- While patellofemoral pain may present in a similar fashion in adolescence and adults, it may not be the same underlying condition or stage, and different treatments may be required.[6]
- PFPS of greater than 2 months duration at baseline is the most consistent predictor of poor outcome and early intervention and use of evidence based interventions may enhance prognosis.[21]

**Tendinopathies Considerations**

- There is insufficient evidence from randomised controlled trials to draw conclusions on the effectiveness of interventions used to prevent hamstring injuries.[44]
- Strong evidence was found for the use of eccentric training to treat patellar tendinopathy (Larsson, M. E., et al 2012). However there is conflicting evidence as to its superiority to other strengthening approaches.[68]
- Ultrasound is not recommended for patellar tendinopathy.[60]
- Until further evidence is available, current practice and widely published rehabilitation protocols cannot either be supported or refuted.[70]
- Limited evidence was found that agility and trunk stabilization may reduce re-injury rates.[85]



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## PTOT-7.2.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[50]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[33, 39]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[62]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[35, 36]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[19, 115]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[71]



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### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[7]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[115]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[105]
  - Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[114]
  - There does not appear to be evidence that patients with hypermobility require more intensive treatment.
  - Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[17]
    - Focus on return to function with management vs. resolution of pain
    - Provide a more targeted approach on self-management.
    - Select activity that does not exacerbate symptoms.
    - Home programs are continuous, progressive and part of daily routine.
    - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
    - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
    - More therapy may be recommended during pubertal changes if decline in function is shown.

## PTOT-7.2.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self-care at his residence.

### Home Medical Equipment

- Theraband for therapeutic exercises
- Knee brace Orthotics as needed
- Home electrical stimulation unit for pain control or muscle re-education



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## Self-Care Techniques

- Therapeutic exercises, with emphasis on quadriceps (VMO) in terminal knee extension
- Ice massage, if needed, to relieve discomfort
- Use of knee brace or orthotics as needed

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# PTOT-7.3: Knee Osteoarthritis and Meniscal Pathologies

## PTOT-7.3.1: Diagnoses included

- Knee osteoarthritis
- Patellofemoral osteoarthritis
- Tibiofemoral osteoarthritis
- Medial Meniscal tear
- Lateral Meniscal tear
- Knee Chondral lesion
- Medial articular cartilage lesion
- Lateral articular cartilage lesion

## PTOT-7.3.2: Definition

### Meniscal Injury

- A torn meniscus is the most common cause of mechanical symptoms in the knee. Knee injuries may result in isolated or combined meniscal lesions. They usually occur when a person attempts to turn, twist, or change direction when weight bearing, but can also occur from contact to the lateral or medial aspect of the knee while the lower extremity is planted.
- The meniscus has two types of tears: bucket handle meniscus tear, a longitudinal tear; and the transverse or peripheral tear. Tears are graded from I to III based on the completeness of tears (Grade III is a complete tear of the meniscus).
- Surgical options include partial meniscectomy, meniscal repair depending on grade and location, and allograft transplantation. In general, meniscectomy healing is more rapid than meniscal repair. Long term outcomes vary depending on the type, grade and surgical technique employed.
- Approximately one third of meniscal tears can be treated with conservative intervention that focuses on the resolution of impairments such as swelling, restricted range of motion, and strength using exercises, bracing, and oral medications.



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### Knee Osteoarthritis

- Osteoarthritis (OA) is a chronic, degenerative disorder associated with varying degrees of disability and functional limitations.
- Knee OA may be characterized by localized loss of hyaline cartilage and remodeling of subchondral bone accompanied by inflammation.
- Progressive signs and symptoms of pain, swelling, muscle weakness, limited range of motion (stiffness), and decreased functional ability are often present.
- Radiographic imaging may show the presence of osteophytes, joint space narrowing, and subchondral sclerosis.
- The progression of osteoarthritis is thought to be the result of mechanical and molecular changes in the affected joint that may be idiopathic or due to a previous history of trauma to the joint.

## PTOT-7.3.3: Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.
- Severe trauma Fracture, ligament tear
- Fever, severe pain Infection
- Popliteal fossa pain, sudden onset Popliteal aneurysm
- Diabetes Neuropathy
- Multiple joint involvement Rheumatologic diseases
- Unilateral edema Deep vein thrombosis
- Cancer Cause of symptoms (metastatic or primary)
- Discoloration of foot, or leg Arterial occlusion
- Immune-compromised state Infection

## PTOT-7.3.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the **Patient Specific Functional Scale (PSFS)** – with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (MCID) for average score = 1.2 points [33] ) OR **Lower Extremity Functional Scale (LEFS)** with a score of 64 or less (MCID 9 points. [9, 50] Additional outcome tools



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include: IKDC 2000 Subjective Knee Form [45, 68]; KOS-ADLS[36] KOOS[68] and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)
  - Range of Motion: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Numeric Pain Rating Scale: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
  - A request for continued services is considered reasonable and necessary when 1 or more of these conditions are met:
    - Minimally Clinical Important Difference has been met in the Functional Outcome Measure
    - The Numeric Pain Rating Scale is reduced by 2 points
    - Range of Motion remains below what is required for personal care or essential employment requirements

## PTOT-7.3.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.



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## PTOT-7.3.6: Referral Guidelines

- Refer patient to their primary care provider for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines, or improvement has reached a plateau
  - Atrophy of lower extremity occurs
  - Range of motion plateaus or decreases
  - Re-injury occurs

### Findings related to Meniscus Tear

- The ICD diagnosis of a meniscal tear and the associated ICF diagnosis of joint pain and mobility impairments are made with a fair level of certainty when the patient presents with the following clinical findings: [45]
  - Twisting injury
  - Tearing sensation at time of injury
  - History of delayed effusion (6-24 hours post injury)
  - Pain with forced hyperextension
  - Pain with maximum flexion
  - Pain or audible click with McMurray y impairment
  - Joint line tenderness
  - Discomfort or a sense of locking or catching in the knee over either the medial or lateral joint line during the Thessaly Test when performed at 5° or 20° of knee flexion

## PTOT-7.3.7: Section intentionally left blank

## PTOT-7.3.8: Physical/Occupational Therapy Management

- Therapy must show measurable functional progress. The goal is to transition the patient as quickly as possible to active care, self-management and functional independence.
- Treatment should be individualized but does not have to be provided individually to be effective. [28]

### Clinical Interventions Recommended

- Education and Self-Management: (high level of evidence)
  - Patients should be educated on the diagnosis and prognosis of their condition, healthy lifestyle choices, use of a walking aid if indicated, and the importance of maintaining a healthy weight. [22, 34, 47, 57]
  - Obesity, being overweight, and having a previous knee injury are risk factors for knee OA[59]



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- Strengthening Exercise:( high level of evidence)
  - Quadriceps strengthening in particular has been consistently shown to be beneficial for various types of knee pathology. [6, 38]
  - Both weight-bearing and non-weight-bearing interventions, as well as group and individual programs are appropriate. [47]
  - High-quality evidence shows that among people with knee OA, exercise moderately reduced pain immediately after cessation of treatment and improved quality of life.[31]
  - Optimal exercise programs for knee OA should have one aim and focus on improving aerobic capacity, quadriceps muscle strength, or lower extremity performance.[41]
  - Strengthening, aerobic exercise OR performance exercises for osteoarthritis should be performed on separate days for best effect.[41]
- Aerobic Exercise (moderate evidence)
  - Multiple studies support improvement in pain and disability with aerobic exercise for knee OA.[64]
  - Optimal exercise programs for knee OA should have one aim and focus on improving aerobic capacity, quadriceps muscle strength, or lower extremity performance.[41]
- Neuromuscular Electrical Stimulation (NMES):
  - Neuromuscular electrical stimulation can be used with patients following meniscal or chondral injuries to increase quadriceps muscle strength.[45]

**Clinical Interventions with Favorable Recommendation**
**Manual Therapy**

- Manual therapies including non-thrust joint mobilization and soft tissue manipulation are effective for reducing pain and disability.[1, 21, 39]
- Therapists should consider adding manual therapy to exercise in patients with knee osteoarthritis in cases of pain and reversible limitation in joint mobility- anterior / posterior mobilization of the tibio-femoral joint and patella mobilization.[21, 39, 55]
- Aerobic Exercise (moderate evidence)
  - Multiple studies support improvement in pain and disability with aerobic exercise for knee OA.[64]
- Patella Taping:( weak or inconclusive evidence)
  - Some evidence supports the use of taping for the patella when added to strength programs.[54, 65]
- Stretching/ Flexibility Training:( limited evidence)
  - Although stretching is included in multiple studies reporting positive outcomes, there are few studies that look at stretching alone. There has been some evidence to indicate that improved length of the iliopsoas, quadriceps, and iliotibial band is related to positive outcomes.[54]
- Water-based Strength Programs: (moderate to weak evidence)
  - Water based strengthening programs produce favorable results.[47]



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- Knee Bracing:( inconclusive evidence)
  - Based on the current evidence available it is not possible to make a recommendation for or against the consistent use of knee bracing. Sound clinical reasoning should be applied by the therapist on a case by case basis, and these interventions may be considered for patients who do not respond to a strengthening and/or manual therapy based program.[47, 56]
- Foot Orthoses (inconclusive evidence)
  - Foot orthoses may provide benefit to OA conditions.[47, 56]
- Addressing pain catastrophizing and fear avoidance beliefs (moderate to weak evidence)
  - Findings suggest that co-interventions to reduce maladaptive beliefs and attitudes about pain may improve the results in anterior knee pain.[27]
- Agility and Perturbation training (inconclusive evidence)
  - The addition of agility and perturbation training to exercise training provides no additional benefit.[29]
  - Adding kinesthesia and balance exercises to a strengthening program may help with improving function.[26]

**Clinical Interventions Not Recommended**

- Thermal Modalities- hot packs, cold packs, ice massage:( moderate level of evidence)
  - Based on current evidence, it is not recommended that thermal modalities be routinely used in patients with knee pain.[38] Ice massage may have some potential benefit on ROM, function, and knee strength in patients with knee OA, but further research is needed.[13, 56]
- Therapeutic Modalities:( moderate level of evidence)
  - Electrotherapy/Neuromuscular Electrical Stimulation (NMES) Not recommended[56]
- TENS / Electrical Stimulation: (inconclusive evidence)
  - There is some evidence for the use of TENS/electrical stimulation for the short term relief of knee pain from osteoarthritis [11, 54] but it is currently not recommended based on current evidence [56]
  - TENS may be most appropriate to use for patients with high pain levels in situations where medical management and exercise based intervention were not beneficial. [69]
- Ultrasound (inconclusive conflicting evidence)
  - In addition to conventional physical therapy programs seems to have no further significant effect in people with knee OA. [14, 61]
  - Other studies suggest it may be beneficial for reducing knee pain and improving physical functions in patients with knee osteoarthritis and could be a safe treatment. [70]



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- Low level laser therapy (inconclusive evidence)
  - Studies suggest that low level laser therapy when associated with exercises may be effective. [2]
- Kinesio Taping:( inconclusive conflicting evidence)
  - Despite the amount of positive anecdotal evidence and case studies available, high quality studies to confirm these findings are still needed. Two recent reviews found limited quality evidence to support the use of kinesio taping. [50, 66]
  - In the clinic, kinesiotaping is often used as a complimentary treatment along with therapeutic exercise or manual therapy, or for neuromuscular re-education to facilitate or inhibit certain muscle groups. [15]
  - There currently exists insufficient evidence to support the use of KTT over other modalities in clinical practice. [49]
  - Current evidence does not support the use of kinesiotaping. [52]

## PTOT-7.3.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents [37]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[23, 30]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques. [43]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues. [24, 25]



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### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation. [18, 63]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development. [48]

### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest [5]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation. [63]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without. [58]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers. [62]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
  - Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility: [17]
    - Focus on return to function with management vs. resolution of pain
    - Provide a more targeted approach on self-management.
    - Select activity that does not exacerbate symptoms.
    - Home programs are continuous, progressive and part of daily routine.
    - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
    - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
    - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-7.3.10: Home and Self-Care Techniques

- The patient can be taught a home exercise program and to use medical equipment and administer self- care both at the beginning of treatment and at discharge. Home Medical Equipment
  - Cold packs
  - Theraband for therapeutic exercises
  - Home electrical stimulation unit for pain control or muscle re-education
- Self-Care Techniques
  - Instruction in home exercise program for ROM and strengthening
  - Cold packs, if needed, to relieve discomfort

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# PTOT-7.4: Knee Surgery

## PTOT-7.4.1: Surgeries included

- Knee arthroscopy
- Knee surgery
- Posterior Cruciate Ligament Reconstruction
- Medial Collateral Ligament Repair or Reconstruction
- Lateral Collateral Ligament Repair or Reconstruction
- Lateral Release of patella
- Medial Patellofemoral Ligament Repair or Reconstruction
- Meniscal Repair
- Meniscectomy
- Osteochondral Allograft Transplantation (OAT)
- Autologous Chondrocyte Implantation (ACI)
- Microfracture
- Arthroscopic chondroplasty-lavage and debridement
- Other knee surgery

## PTOT-7.4.2: Definition

**Tibial plateau fractures**
Tibial plateau fractures are categorized into at least six types, using the Schatzker classification system. Patients referred for therapy post operatively, should have stabilized fractures by use of screws, bone grafting, buttress plates and other forms of fixation. The most common mechanism of injury involves axial loading, such as results from a fall. Other patterns of injury result from laterally directed forces or from a twisting injury. In all cases, force is directed from the femoral condyles onto the medial and lateral portions of the tibial plateau, resulting in fracture. In younger patients, the most common pattern of fracture is splitting, while in older, more osteoporotic patients, depression fractures typically are sustained.

**Meniscal and Chondral**
Meniscal and Chondral injuries can be the result of degenerative and traumatic forces. The decision on surgery depends on many factors including the nature and severity of the lesion, age of the patient, and activity level of the patient. Meniscal injuries are described on location- medial or lateral compartment- and by type such as bucket handle or horizontal tears.



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**Posterior Cruciate Ligament**
Posterior Cruciate Ligament tears occur due to anterior blows to the proximal tibia (such as with a dashboard), falls onto the knee with the foot in plantar flexion, or uncontrolled hyperextension of the knee joint. Symptoms consistent with the patient history below may require surgical repair.

**Medial Collateral Ligament**
Medial Collateral Ligament tears happen when an excessive valgus stress is applied to the knee. Symptoms consistent with the patient history below may require surgical repair.

**Lateral Collateral Ligament**
Lateral Collateral Ligament tears occur when excessive varus stress is applied to the knee causing tear to the ligament. Symptoms consistent with the patient history below may require surgical repair.

**Patella dislocation**
Patella dislocation injuries when the patellar either frequently subluxes due to pathoanatomical abnormalities or sustains dislocation from trauma. Surgery intervention may be required when the patella continues to sublux due to hypermobility of the patellofemoral joint.

## PTOT-7.4.3: Clinical Presentation

Patient usually presents after surgery having limited weight bearing, limited AROM, pain and swelling. There may be ecchymosis. Symptoms are usually localized. Range of motion may be restricted by a brace as directed by the physician/surgeon.

**Specific Considerations**

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma post op | Fracture |
| Fever, severe pain, drainage | Possible infection |
| Lower extremity angulation or instability | Fracture |
| Unilateral edema | Lower extremity deep vein thrombosis |
| Recent invasive procedures post op (dental work, urologic procedures) | Infection |
| Discoloration of foot or leg, exertional leg or foot pain | Arterial occlusion; vascular insufficiency; compartment syndrome |



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## PTOT-7.4.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score = 1.2 points [23]) OR Lower Extremity Functional Scale (LEFS) with a score of 64 or less (Minimum clinically important difference 9 points4,38 OR International Knee Documentation Committee (IKDC) Subjective Form with a score of 71 or less (Minimum Clinically Important Difference 11.5 points[37]); additional tests include: KOOS [31,42] Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC);
  - Six Minute Walk Test (6MWT)[18]
  - Range of Motion: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Numeric Pain Rating Scale: limiting function and at least 3/10 for 50% of the time
  - Surgery within the past 6 months
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
  - Patient's level of independence
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinically Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently



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## PTOT-7.4.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
  - The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
  - Achievable goals that are related to activities of daily living have been met.
  - Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
  - No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
  - A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
  - If, or when, the member has been non-compliant with the treatment plan.
  - Therapy services are for pain mediation alone.
  - Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
  - Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
  - Therapy services are for sports performance enhancement only.

## PTOT-7.4.6: Referral Guidelines

- Refer patient to their surgeon for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines, or improvement has reached a plateau
  - Atrophy of lower extremity occurs
  - Range of motion plateaus or decreases
  - Re-injury occurs
  - Signs of infection

## PTOT-7.4.7: Section intentionally left blank

## PTOT-7.4.8: Physical/Occupational Therapy Management

- Therapy must show measurable functional progress. Interventions should be determined based on patient presentation, surgical procedure, and current evidence. There is little evidence with respect to surgical procedure specific interventions and protocols.[6]
- Therapy program goals are to:
  - Modalities to minimize the inflammation,
  - Normalize gait,
  - Normalize pain-free range of motion,
  - Prevent muscular atrophy,
  - Maintain proprioception,
  - Relieve joint pain, and



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- Increase strength so that other objectives may be achieved.
- Home program, individually prescribed, is central to the care of all patients. The teaching for this program should be started on the first day of therapy and continue throughout the formal therapy program with a planned transition.

**Generally Recommended Interventions (moderate to weak evidence)**

- Continuous Passive Motion (CPM)
- Progressive passive and active range of motion (ROM)
- Post-operative bracing allowing or limiting ROM for complex meniscal repairs and transplants
- Early progressive return to activity for meniscal repairs
- Emphasis on Home Exercise Program (HEP)
- Strength Training/Therapeutic Exercise
- Neuromuscular Electrical Stimulation (NMES) for quadriceps strengthening

**Interventions with Neutral Recommendation (conflicting evidence)**

- Progressive early return to activity for OAT and ACI procedures.
- Early weight bearing post meniscal and cartilage surgeries
- Cryotherapy

**Interventions Not Recommended (lack of evidence)**

- Transcutaneus Electrical Nerve Stimulation (TENS)
- Kinesiotape
- Dry Needling

**OAT Considerations**

- No universal rehabilitation protocol for OAT procedures exists.
- Use of CPM up to 8 weeks may occur.
- Patient is likely braced and non-weight bearing for up to 6 weeks with progressive weight bearing as tolerated. Slow progressive ROM can achieved through CPM and home program.[39]
- Full weight bearing may be safely achieved by 8 weeks.[12]



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### ACI Considerations

- No universal rehabilitation protocol for ACI procedures exists.
- Use of CPM up to 8 weeks may occur.
- Patient is likely braced and non-weight bearing for the first 2 weeks following surgery (Tetteh, E. S., 2012).
- Progression of weight bearing to reach full bearing by 6 to 8 weeks after MACI for articular cartilage lesions is encouraged (level 2 evidence)[31]

### Microfracture Considerations

- Microfracture procedures show the best outcomes for competitive athletes under 40 years of age with femoral condyle lesions smaller than 2 cm and moderate symptoms of less than 1 year in duration.[29] Other research confirms that younger, competitive players with small defect size, with a short duration of symptoms, fewer prior surgical interventions, and better repair cartilage morphology have a higher rate of return to sports/activity after microfracture.[34]

**Factors to Consider During Individualized Cartilage Repair Rehabilitation** [35]

| Considerations/ Specific Factors | Implications |
|---|---|
| **Individual** | |
| Athlete's age | Slower cartilage repair with increased age |
| Body mass index | More gradual rehabilitation progression with body mass index greater than 30 kg/m$^2$ |
| Type of sport | Higher demand on repair tissue in impact sports |
| Competitive level | Competitive athletes have better outcomes |
| Psychological | Less fear of reinjury and higher self-efficacy are associated with better outcomes |
| **Lsion/defect** | |
| Defect size | Smaller defects frequently improve faster with rehabilitation |
| Repair technique | More rapid rehabilitation progression with restorative techniques |
| Defect location | Immediate weight bearing for patellofemoral defect (knee brace locked in full extension) |
| Duration of symptoms | Longer recovery if symptoms persist longer than 12 months (deconditioning) |
| Cartilage quality | Slower rehabilitation progression with generalized joint chondropenia |
| **Concomitant injuries** | |
| Concomitant procedures | Modified protocols for anterior cruciate ligament reconstruction, meniscal repair, osteotomy, etc |
| Meniscus status | Slower rehabilitation progression after meniscectomy (especially lateral meniscus) |



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**Suggested Weight-Bearing Guidelines and Criteria for Progression After Articular Cartilage Repair[34]**

**Phase 1. Weight-Bearing Guidelines (Protection and joint activation phase)**

- Femoral defects
  - Restorative techniques (OATS/allograft): touch-down loading for 2 wk,
  - then progress to full weight bearing by 4 to 6 wk
  - Reparative techniques (microfracture/ACI): touch-down loading for 2 wk,
  - then progress by 25% body weight per wk
- Patellar/trochlear defects
  - Immediate weight bearing with brace locked in 0° to 10° of knee flexion

**Progression Criteria to Go from Phase 1 to Phase 2 (Progressive joint loading and functional restoration phase)**

- Full passive ROM equal to the nonoperated knee
- Minimal or absent pain (VAS less than 3/10)
- Minimal or no effusion (grade 0 or 1+)
- Recovery of muscular activation
- Recovery of normal gait cycle (equal stride length and stance time between limbs, no limp)

**Progression Criteria to Go from Phase 2 to Phase 3 (Activity restoration phase)**

- Full and painless ROM
- No or minimal pain (VAS less than 3/10)
- No or minimal effusion (grade 0 or 1+)
- Maximum peak torque difference of less than 20% between limbs on isokinetic test
- Hop performance difference of less than 10% between limbs
- Self-report outcomes greater than 90%
- Ability to run on a treadmill at 8 km/h for more than 10 min
- MRI evaluation of the repaired cartilage to evaluate repair tissue

According to outcomes data, each of these procedures have a return to sport/activity rate around two thirds of cases. OAT and microfracture procedures have quicker return to activity rates than ACI. However ACI procedures have better long term outcomes and sustained participation, even at 5 years follow up.[33]



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### MCL Repair Considerations

- It is generally accepted that incomplete tears and isolated complete tears of the MCL can be treated non-operatively with early functional rehabilitation (Kovachevich, R., 2009). MCL repair or reconstruction is often done in conjunction with other repairs or reconstructions such as reconstruction of the ACL and/or posterolateral corner (PLC). Evidence regarding isolated MCL repair or reconstruction is lacking.

### Meniscectomy Considerations

- Early progressive active and passive range of motion is encouraged (Level 2 evidence)[31]
- There is no consensus on which treatment option is the best for patients following meniscectomy but usually lasts only 4 weeks.[2]
- Meniscectomies have fallen out of favor as an intervention as conservative approaches have shown to provide similar, if not better, outcomes. [27,28,44]
- Positive prognostic factors are: age < 40 years, one simple lesion (bucket handle, flap, radial), short time elapsed between trauma and surgery, minimal chondromalacia.[14]
- There is conflicting evidence as to the need for supervised rehabilitation.[16,17] However there is evidence that physical therapy in addition to a home program may improve outcomes.[9]
- Electromyographic (EMG) biofeedback training may be helpful for quadriceps strengthening.[1]
- Neuromuscular or gait correction training may be of no benefit.[19]

### Meniscal Repair Considerations

- No universal rehabilitation protocol for Meniscal repair exists.
- There are varied surgical and rehabilitation treatments and the timing of recovery from meniscal injuries after surgery is very different.[14]
- Patient is likely in hinged leg brace with ROM limitations, and may be non-weight bearing or partial weight bearing, according to complexity of repair.
- Early progressive active and passive range of motion is encouraged (Level 2 evidence)[31]
- Early progressive weight bearing is encouraged (Level 2 evidence)[31]
- Immediate knee motion the first postoperative day after meniscus repair (performed either alone or with anterior cruciate ligament reconstruction) is not deleterious to the healing meniscus tissue and prevents knee arthrofibrosis (Heckmann, T. P., et al 2006).
- It has been reported that 11 to 16 postoperative physical therapy visits are expected over the course of 9 to 12 months.[21]



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- Precautions are required in limiting high-loading activities, deep knee flexion, and full squatting for at least 4 to 6 months postoperatively.[21]

### Tibial Plateau Fracture ORIF Considerations

- CPM following operative fixation for a fracture of the tibial plateau may reduce the risk of the development of arthrofibrosis.[20]
- Having undergone an ORIF post tibial plateau fracture increases the risk for osteoarthritis and potential additional surgeries.[32,41]
- Weight bearing restrictions will be based on the extent and type of injury sustained, as well as the procedure performed. Once the weight bearing restrictions have been lifted, treatment should focus on restoring ROM, strength, and normalizing gait.

## PTOT-7.4.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers,
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[46]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[45,51]
  - There is some evidence that attention is still changing up to approximately 17 years of age
  - There may be more impulsivity in approach to tasks, especially up to about age 15
  - Adolescents can complete progressive home programs that include self-manual techniques.5[2]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[52,53]



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### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation[48,55]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[53]

### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury
  - The most effective treatment after an overuse injury was extended periods of rest[3]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[55]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[55]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[54]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
  - Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[47]
    - Focus on return to function with management vs. resolution of pain
    - Provide a more targeted approach on self-management.
    - Select activity that does not exacerbate symptoms.
    - Home programs are continuous, progressive and part of daily routine.
    - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
    - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
    - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-7.4.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self- care at his/her residence.

### Home Medical Equipment

- Hot packs/cold packs after incision heals
- Theraband, ankle weights, for home exercise
- Assistive gait devices
- Brace

### Self-Care Techniques

- Home ROM exercises
- Progression to therapeutic exercise—strengthening exercises
- Hot packs/cold packs, if needed, to relieve discomfort

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# PTOT-7.5: Total and Partial Knee Arthroplasty

## PTOT-7.5.1: Synonyms

- Total Knee Arthroplasty (TKA)
- Total knee replacement (TKR)
- Unicompartmental (UKA, or partial knee replacement)
- Biocompartmental TKA
- Tricompartmental TKA

## PTOT-7.5.2: Definition

- Total knee arthroplasty articular surfaces of the knee joint are replaced with artificial materials. Most commonly in response to disabling pain due to arthritic degeneration. While there are many types of prosthetics produced, most can be categorized by degree of constraint and type of fixation. Unconstrained prostheses are not common and rely on inherent joint stability.
- Most prostheses are semiconstrained; this type is frequently used in conjunction with the correction of contractures and varus/valgus deformity. Fully constrained prostheses limit motion and are reserved for severely unstable joints and severe deformity.
- Another distinguishing characteristic is method of fixation. More sedentary patients will receive a cemented prosthesis. Active patients will receive a porous ingrowth prosthesis.
- Due to difficulties encountered with loosening of tibial components, some surgeons prefer a hybrid fixation, with the femoral and patellar components press fit and the tibial component cemented.

## PTOT-7.5.3: Section intentionally left blank

## PTOT-7.5.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the **Patient Specific Functional Scale (PSFS)**– with combined average score of 7/10 or less for 3 items (Minimum clinically important difference for average score =1.2 points)[1]OR **Lower Extremity Functional Scale (LEFS)** with a score of 64 or less (Minimum clinically important difference 9 points[6,44]OR **Six Minute Walk Test (6MWT)** with a distance of less than 437 meters (Minimum clinically important difference 53.0 meters [32]) OR IKDC 2000 Subjective Knee Form[46] OR Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)



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- Range of Motion: < 110 degrees knee flexion
- Numeric Pain Rating Scale: limiting function and at least 3/10 for 50% of the time
- Surgery within the past 6 months

- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
  - Patient's level of independence
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinically Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Knee Range of Motion remains below 110 degrees knee flexion within 6 weeks post op
  - The patient is unable to maintain progress independently

## PTOT-7.5.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.



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## PTOT-7.5.6: Referral Guidelines

- Refer patient to their surgeon for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines, or improvement has reached a plateau
  - Atrophy of lower extremity occurs
  - Range of motion plateaus below what is required for personal care or essential employment requirements or decreases

## PTOT-7.5.7: Clinical Presentation

- Patient usually presents with a complaint of pain that limits both active and passive ROM, and function in activities of daily living. There is frequently swelling and ecchymosis about the joint. There will be incisional pain and wound care considerations to be addressed. Patient may have precautions against weight bearing, or initially be required to use an immobilizer for weight bearing activities as well as an assistive device.

### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management and those that affect therapy management including but not limited to:
  - Post op Fracture
  - Component loosening
  - Fever, severe pain, drainage Infection
  - Popliteal fossa pain, sudden onset Popliteal aneurysm
  - Diabetes Neuropathy
  - Unilateral edema Deep Vein Thrombosis (DVT)
  - Discoloration of foot, or leg, exertional leg or foot pain
  - Arterial occlusion, vascular insufficiency
  - Immune-compromised state and risk of infection

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture, ligament/meniscal tear |
| Fever, severe pain | Infection |
| Popliteal fossa pain, sudden onset | Popliteal aneurysm |
| Diabetes | Neuropathy |
| Multiple joint involvement | Rheumatologic diseases |
| Unilateral edema or positive Homan's sign | Deep vein thrombosis |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of foot or leg, exertional pain | Arterial occlusion, vascular insufficiency |
| Immune-compromised state | Infection |



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## PTOT-7.5.8: Physical/Occupational Therapy Management

- Most changes occur in the first 16 weeks after arthroplasty as measured by both the LEFS and 6MWT and, to assess the effect of interventions, it would be important to assess patients more frequently in the first 3 months.[23] Most of the recovery has occurred by 6 months. Therapy must show measurable functional progress.

### Pre-Operative Treatment or Prehabilitation

- At this time the preponderance of evidence shows that therapy provided before Total Knee Arthroplasty does not provide any benefit in pain or function post-operatively. [8,34,42]

- Pre-operative education
  - Preoperative education may not offer additional benefits over usual care. [28]

### Post-Operative Treatment Methods

- Treatment of patients after total knee arthroplasty is aimed at preventing post-operative complications, re-gaining functional independence, restoring pain-free ROM, and achieving adequate strength of the knee musculature. Evidence is scarce with respect to the optimal dose, frequency, and content of post arthroplasty rehabilitation. Despite current and growing prevalence of TKA surgery, little is known about the optimal amount and composition of rehabilitation services provided to patients following TKR.[33]Treatment should be individualized with heavy emphasis on promoting functional independence.

- Treatment typically may include:
  - Continuous Passive Motion (CPM) (not recommended)
    - CPM does not have clinically important effects on active knee flexion ROM, pain, function or quality of life to justify its routine use It may reduce the risk of manipulation under anesthesia and risk of developing adverse events although the quality of evidence supporting these findings are very low and low, respectively. The effects of CPM on other outcomes are unclear.[16,22]Strengthening and ROM Exercise (Recommended, moderate to weak evidence)
    - Exercises should include strengthening, range of motion (ROM), functional exercises to improve mobility and gait.[30,35]
    - Exercise for function may be appropriate three to four months postoperatively. Benefits of treatment were no longer evident at one year.[29]
    - Interventions including physiotherapy and exercise show short-term improvements in physical function only. [4]
  - Balance and Proprioception exercises (Recommended, moderate to weak evidence)
    - Balance training may aid in postoperative functional recovery.[21,30] Home Exercise Program (HEP) (Recommended, moderate evidence)
    - Six weeks after TKR surgery, there were no significant differences between the treatment groups of HEP vs. usual care. [15]



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    - A home-based program of functional exercises and management of kinesiophobia was useful in changing the course of disability, fear avoidance beliefs, pain, and the quality of life in patients with TKA.[24]
    - One-to-one therapy does not provide superior self-reported or performance-based outcomes compared with group-based therapy or a monitored home program, in the short term and the long term after total knee arthroplasty[24]
- Aquatic Therapy (neutral recommendation, inconclusive evidence)
    - Aquatic therapy unclear benefit. [30]
- Neuromuscular Electrical Stimulation (NMES) (neutral recommendation)
    - There is weak evidence suggesting benefit from NMES in the short term. [30] Use of modalities and/or passive treatments should be limited. The goal is to transition the patient as quickly as possible to active care, self-management and functional independence.

## PTOT-7.5.9: Section intentionally left blank

## PTOT-7.5.10: Home and Self-Care Techniques

- The patient can be taught to use medical equipment and administer self-care at his residence.

### Home Medical Equipment

- Raised toilet seat
- Resistance band for therapeutic exercises
- Proper assistive device

### Self-Care Techniques

- Instruction in home exercise program for ROM and strengthening

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# PTOT-8.1: Ankle and Foot Fracture

## PTOT-8.1.1: Diagnoses Included

- Ankle fracture
- Distal tibial fracture
- Multi-malleolar fracture – bi- or tri-malleolar
- Tarsal fracture
- Calcaneal fracture
- Pylon fracture
- Lisfranc fracture

## PTOT-8.1.2: Definition

Any of the osseous structures making up the ankle, mid-foot and foot have potential to crack or break given the proper traumatic force. Ankle fractures are a common lower extremity injury, with fractures of the ankle and/or foot being even more common. Fractures to the distal lower extremities are more common in younger, active, men and older women. Some fractures may be the result of falling from high locations such as a ladder or scaffolding. Ankle and foot fractures can be very disabling due to necessity for immobilization and weight baring restrictions during the initial healing stages. Rehabilitation may be helpful in reducing disability and in the return of daily function.

The purpose of this guideline is to give direction in the rehabilitation care of a patient that has had an ankle or foot fracture, but has not had surgical interventions. Unfortunately, there is limited current quality evidence to help with decision making processes. Despite the variety of facture possibilities, current scientific or clinical evidence is not obtainable for most types of fracture specific to physical therapy care [23] The majority of research focuses generally on “ankle fracture”. Please note specific recommendations below. Where applicable, decision making may need to be guided by a combination of guidelines and functional presentation.

## PTOT-8.1.3: Clinical Presentation

- May report traumatic accident during higher level activity
- Radiologic findings from doctor indicating fracture
- Inability to bear weight or increased pain and difficulty with weight bearing
- Pain and tenderness over area of fracture
- Pain with movement of foot and/or ankle



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| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Fever | Possible infection |
| Cancer history | Cause of symptoms (metastatic or primary) |
| Unilateral edema | Lower extremity deep vein thrombosis |
| Immune-compromised state | Infection |
| Multiple joint involvement | Rheumatologic diseases |
| Diabetes | Neuropathy |
| Discoloration of foot, exertional foot or calf pain | Vascular occlusion; vascular insufficiency |
| Severe pain, swelling, discoloration, cold to touch | Compartment syndrome |

## PTOT-8.1.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score = 1.2 points [11]) OR Lower Extremity Functional Scale (LEFS) with a score of 64 or less (Minimum detectable change 9 points [2,25])
  - Range of Motion: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Numeric Pain Rating Scale: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services are considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure
  - The Numeric Pain Rating Scale is reduced by 2 points
  - Range of Motion remains below what is required for personal care or essential employment requirements



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## PTOT-8.1.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-8.1.6: Section intentionally left blank

## PTOT-8.1.7: Section intentionally left blank

## PTOT-8.1.8: Physical and Occupational Therapy Management/Intervention (evidence based)

- Strong Recommendation – none currently available
- Moderate Recommendation
  - Supervised exercise and HEP versus HEP only –
    - Supervised therapeutic exercise and self-care advice did not improve activity limitation or quality of life when compared to self-care advice alone in participants with uncomplicated ankle fracture. Routine use of supervised exercise programs after removal of immobilization is not supported. Recommendation from one level II RCT. [20]
    - Manual therapy, stretching and exercise did not appear to cause increased function following immobilization for ankle fracture compared to usual care. Regular supervised manual therapy and exercise may not be needed following ankle fracture immobilization. Recommendation from level I review[14]



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- Physical therapy during immobilization –
  - There is very limited evidence that gentle exercise may begin during the immobilization period with removable type bracing however risk of adverse events may increase. Recommendation that therapy during the immobilization period for uncomplicated ankle fracture may not be necessary [14]
- Addition of manual therapy -
  - Addition of talar glides to exercise, gait training and advice did not result in any better outcomes after 4 weeks of treatment or after 24 weeks of follow up. Manual therapy was given 2x a week for 4 weeks. Control therapy attended 5 sessions. Manual therapy may not provide additional benefit over therapeutic exercise and advice following ankle fracture. Recommendation from 1 level II RCT[15]

- Weak Recommendation
  - Manual therapy and exercise –
    - Evidence suggests that patients with stable, uncomplicated, ankle fractures improve from manual therapy and home exercise after the immobilization period. Treatment targeted functional impairments and was provided 1-2x a week for 6-8 visits. Treatment time was 30-45 minutes. Recommendation from level IV case series only [23]
- Neutral Recommendation – none currently available
- Recommendation Against Use
  - Ultrasound for fracture –
    - Current available evidence is insufficient to support the routine use of ultrasound for acute fractures in adults. Based on level I review [10]
  - Kinesiotape for swelling –
    - Kinesiotape application for lymphatic stimulation does not appear to reduce swelling better than normal care in acute ankle sprains up 15 days post treatment. No indication application is beneficial or should be done. Grade B recommendation on moderate Level II evidence [22]
  - High-Volt Pulsed Current for Swelling –
    - Use of HVPC on lateral grade I-II ankle sprains had no effect on the time to return to play in injured athletes. Recommendation that HVPC is not necessary in the care of lateral ankle sprain rehabilitation. Moderate recommendation from level I RCT [18]



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## 8.1.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[12]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[6,9]
- There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[13]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[7,8]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[4,27]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[19]



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### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during port participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[1]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[27]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without. [24]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers. [26]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[3]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.

## PTOT-8.1.9: Section intentionally left blank

## PTOT-8.1.10: Home and Self-Care techniques

For rehabilitation of uncomplicated ankle fractures the current evidence recommends primary self-care. There is little evidence that routine physical therapy is needed during or after immobilization in general cases. The overall research is limited, so complications or significant restrictions may need further consideration. [14,20]

### Home Medical Equipment

- Gait assistive devices – walker, crutches, scooter, cane



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# PTOT-8.2: Ankle Instability and Sprain

## PTOT-8.2.1: Diagnoses Included

- Lateral ankle sprain – acute and chronic
- Chronic ankle instability

## PTOT-8.2.2: Definition

The ankle is made up of the distal tibiofibular syndesmosis, talocrural joint and subtalar joint. Stability of the joint is created through bony congruity of the articulations, ligamentous and non-contractile restraint, and surrounding muscular units. The lateral ligaments of the ankle are commonly injured through an excessive inversion or supination mechanism. Lateral ankle sprains are very common due to sport related injuries. Lateral ankle sprains also have a high reinjury rate as well as continued symptoms of pain and decreased stability over time. Those with long-term symptoms after an acute lateral ankle sprain are termed as having mechanical or functional ankle instability. Mechanical instability would classify those that have excessive joint motion; functional instability describes those who report instability symptoms but have normal motion. [25]

Acute Lateral Ankle Sprains may be classified based on clinical findings including function, laxity, tenderness, bruising, joint motion, swelling and pain. Traditional classification has been as follows; [25]

- Grade I – no loss of function or laxity. Negative drawer and tilt tests. Little to no pain or swelling
- Grade II – some loss of function. Positive anterior drawer, negative talar tilt tests. Observable bruising. Tenderness. Decreased total ankle motion less than 10 degrees. Swelling less than 2 cm.
- Grade III – near total loss of function, positive anterior drawer and talar tilt tests. Marked bruising. Extreme point tenderness. Total loss of motion greater than 10 degrees. Swelling greater than 2 cm. (May be further divided down to IIIA or IIIB based on radiographic stress testing).

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Fever | Possible infection |
| Cancer history | Cause of symptoms (metastatic or primary) |
| Unilateral edema | Lower extremity deep vein thrombosis |
| Immune-compromised state | Infection |
| Multiple joint involvement | Rheumatologic diseases |
| Diabetes | Neuropathy |
| Discoloration of foot, exertional foot or calf pain | Vascular occlusion; vascular insufficiency |
| Severe pain, swelling, discoloration, cold to touch | Compartment syndrome |



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## PTOT-8.2.3: Section intentionally left blank

## PTOT-8.2.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score = 1.2 points [18]) OR Lower Extremity Functional Scale (LEFS) with a score of 64 or less (Minimum detectable change 9 points [2,32])
  - Range of Motion: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Numeric Pain Rating Scale: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services are considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure
  - The Numeric Pain Rating Scale is reduced by 2 points
  - Range of Motion remains below what is required for personal care or essential employment requirements

## PTOT-8.2.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.



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- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-8.2.6: Section intentionally left blank

## PTOT-8.2.7: Section intentionally left blank

## PTOT-8.2.8: Physical and Occupational Therapy Management/Intervention (evidence based)

- Strong Recommendation
  - External Support –
    - Use of external support during the acute/protected phase of recovery is recommended for severe lateral ankle sprains. Level I evidence.[25]
    - Bracing may also be helpful in reducing recurrence of injury in cases of chronic instability. [13]
    - Proprioceptive neuromuscular training does not appear to be more effective at reducing rate of ankle sprain re-injury than bracing. Use of bracing can be effective method to reduce re-injury. Level I-II evidence from systematic review.[4]
  - Physical Agents –
    - There is good support to recommend the use of cryotherapy during the acute stage of an ankle sprain as it should reduce pain and use of pain medication as well as improve weigh baring tolerance. Level I-II evidence[25]Therapeutic Exercise and activity –
    - Balance and neuromuscular training appeared to have the most consistent improvement in function when compared with manual therapy, multimodal care, resistive training and orthotics. Multimodal care appears beneficial but with larger confidence intervals. Level I evidence[9,21] 4-8 weeks of supervised progressive balance activity (1-2 x a week) may be more effective than unsupervised home programs alone. Grade B recommendation[30]
    - Appropriate exercise even during the acute phase of recovery has been recommended to improve function on acute ankle sprains. Exercise should be graded to tolerance and progressed. Clinic attendance was higher for participants who relied more on home-programs. Strong Level I-II evidence[13,25]
    - Static stretching with a home program 2 weeks after an ankle sprain appears effective in improving dorsiflexion. Recommendation from level I evidence



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- Manual Therapy –
  - Joint mobilization appears to be helpful in improving medial dynamic balance immediately after treatment. No long term benefit was found. Level I evidence[37] Dosage of manual technique has not been established for acute sprain or chronic ankle instability. Most often treatment of 3 to 6 sessions over 2 to 3 weeks has been reported. Grade B recommendation[30]
  - During the progressive phase, manual therapy such as joint mobilization, manipulation and myofascial release may improve range of motion and weight baring tolerance during the short term. Improved outcomes have been found in as little as 3 visits. Level I-III evidence [23,25,33]

- Moderate Recommendation
  - Manual Therapy –
    - Manual therapy provided during the acute recovery phase is recommended to improve lymphatic drainage, joint mobility and pain free movement. Limited level II evidence[25] Evidence in unclear whether manual therapy during the acute phase of rehab improves function.[13]
    - Manual manipulation (6 treatments) in cases of chronic ankle instability may help with short-term pain reduction, joint restriction and dynamic balance. Limited level II evidence. [23,24] Functional improvements may be very short term (1 week). [19]
  - Therapeutic Exercise –
    - During the post-acute progressive phase exercises to continue to progress weight bearing, single leg balance and stability on varying surfaces is recommended to improve dynamic control. Level I-V evidence. [25]
    - Balance training of 4-6 weeks appears to improve static and dynamic control in participants with chronic ankle instability. Significant improvements were made with varied programs at 1 time a week up to 3 times a week and progressed regularly or every two weeks. There was insufficient evidence to indicate one frequency over the other for number of visits or progressions. Recommendation from level II-III evidence. [39]
  - Multimodal care vs. home program –
  - 8, 30 minute, sessions of manual therapy and therapeutic exercise over 4 weeks resulted in better outcomes than 4 sessions for home program progression alone in participants with grade I and II lateral ankle sprains. However both groups experienced improvements. Short term specialized care may be helpful in improving the function of patients with lateral ankle sprains up to 6 months after care. Recommendation based on one moderate level 1b RCT. [6]
  - Self-care vs. Supervised Care –
    - Supervised program of physical therapy did not add significant value to patients with grade I-II ankle sprains that received a written self-care program including rest, ice, elevation and graduated weight-bearing activities. At 6 months, there was no indication of improved function or recover from supervised physical therapy. Self-directed care maybe as beneficial as supervised physical therapy in general for acute grade I-II sprains. Level II evidence. [3]



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- Short-term supervised rehabilitation after an ankle sprain may result in reduced pain and improved stability and strength when compared to a written self-care program alone 6 weeks after the injury. There is evidence this may improve patient-rated function better at 3 months post-injury. Based on level II-III evidence. [14,17]

- Weak Recommendation
  - Kinesiotape for support – small, but good evidence that kinesiotape may increase proprioception and performance of activities in those with injured lateral ankles. This may provide some assistance during recovery on improved movement quality. Recommendation from level II-IV evidence. [38]
  - Home Program vs Twice weekly supervised visits – Weak evidence that daily HEP may be just as, or more, beneficial that twice weekly supervised visits in foot and ankle disorders. Frequent care may not be more beneficial. Systematic Review of level I-IV evidence.[40]
- Neutral Recommendation
  - Electrotherapy – there is moderate evidence both for and against the use of electrotherapy in treatment of acute ankle sprains. Not enough evidence to support a specific recommendation. [25]
  - Low-level Laser - there is moderate evidence both for and against the use of laser therapy in treatment of acute ankle sprains. Not enough evidence to support a specific recommendation. [25]
  - Supportive Taping – There is unclear evidence in the utility of supportive taping in chronic ankle instability. [13]
- Recommendation Against Use
  - Ultrasound – Ultrasound has not been found to be more effective than sham treatment. It is not recommended to be used for acute ankle sprains. Grade A recommendation on strong level I evidence. [25,34]
  - Kinesiotape for swelling – Kinesiotape application for lymphatic stimulation does not appear to reduce swelling better than normal care in acute ankle sprains up 15 days post treatment. No indication application is beneficial or should be done. Grade B recommendation on moderate Level II evidence. [29]
  - High-Volt Pulsed Current for Swelling – Use of HVPC on lateral grade I-II ankle sprains had no effect on the time to return to play in injured athletes. Recommendation that HVPC is not necessary in the care of lateral ankle sprain rehabilitation. Moderate recommendation from level I RCT. [26]



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## PTOT-8.2.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents [20]
  - Sport participation is not a required daily activity at any age.

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[10,15]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques. [22]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues. [11,12]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation. [7,36]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development. [27]



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### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest. [1]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation. [36]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without. [31]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers [35]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility: [5]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
    - More therapy may be recommended during pubertal changes if decline in function is shown.

## PTOT-8.2.10: Home Medical Equipment

- **Orthotics –** there is moderate evidence that foot orthotics may help to improve postural control in patients with chronic ankle instability. There was no evidence to support that orthotics would reduce recurrence of ankle sprains or assist in other functional areas. Grade B recommendation from level II evidence (Gabriner et al 2015)



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# PTOT-8.3: Ankle and Foot Post-Operative Conditions

## PTOT-8.3.1: Diagnoses Included

- Reduction and Fixation of fracture – ORIF or other procedure
- Achilles Repair
- Tendon Related procedures
- Arthrodesis
- Arthroplasty
- Arthroscopy
- Osteotomy

## PTOT-8.3.2: Definition

Many of the injuries sustained to the foot and ankle have the possibility of needing surgical intervention to help restore healing ability, stability and function. Surgery is often the chosen intervention for unstable or displaced fractures, ruptured tendons and end stage joint degeneration. There are also several chronic conditions in which surgery may be indicated if conservative treatments fail. There is a wide array of surgical procedures and techniques for the foot and ankle. There appears to be good information on surgical technique in the scientific literature. There is also moderate information establishing that daily functional decrease and disability are a common result of surgery to the foot and ankle. Research is very limited, however, on the specificity and efficacy of rehabilitation and physical therapy following surgery in the lower extremity. The more common ankle and foot injuries such as chronic instability, Achilles tendinopathy and fractures also appear to make up the majority of need of surgical intervention.

## PTOT-8.3.3: Clinical Presentation

- Pain around surgical site
- Complaint of swelling in toes, foot, ankle and lower leg
- Use of pain medication
- Unable to bear weight
- Report of traumatic accident
- History of high level activity or possible debility and fall risk
- Younger men (15-30 y/o) and older women (over 50)
- Report of previous ankle injury and instability



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| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Fever | Possible infection |
| Cancer history | Cause of symptoms (metastatic or primary) |
| Unilateral edema | Lower extremity deep vein thrombosis |
| Immune-compromised state | Infection |
| Multiple joint involvement | Rheumatologic diseases |
| Diabetes | Neuropathy |
| Discoloration of foot, exertional foot or calf pain | Vascular occlusion; vascular insufficiency |
| Severe pain, swelling, discoloration, cold to touch | Compartment syndrome |

## PTOT-8.3.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score = 1.2 points [12]) OR Lower Extremity Functional Scale (LEFS) with a score of 64 or less (Minimum detectable change 9 points [2,33])
  - Range of Motion: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Numeric Pain Rating Scale: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services are considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure
  - The Numeric Pain Rating Scale is reduced by 2 points
  - Range of Motion remains below what is required for personal care or essential employment requirements



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## PTOT-8.3.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-8.3.6: Section intentionally left blank

## PTOT-8.3.7: Section intentionally left blank

## PTOT-8.3.8: Management/Intervention (evidence based)

- Specific Post-Surgical Protocol
  - Peroneal tendon repair –
    - There is no consensus in the literature on best or preferred rehabilitation protocol for optimizing recovery and return of function following surgical repair of peroneal tendon tears. Recommendation from level I systematic review [34]
  - Tendon Transfer –
    - Early mobilization for foot-drop correction tendon transfer does not appear to have added risk of tendon pullout. Independent walking was restored more quickly with early mobilization. Study was performed on patients at a Leprosy hospital in India. Carry over to patients without Hansen's disease was not studied. Recommendation from Level I RTC [28]



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- Achilles repair -
  - There were no differences in outcomes up to 11 year follow up for those that had early mobilization compared to those with immobilization for 6 weeks following Achilles repair. Both groups improved in strength similarly. No indication one protocol is better than the other. Recommendation from level I RCT [16]
  - Evidence suggests allowance of immediate full weight bearing and mobilization after the 2nd week post-operatively allows for faster return to work and activity with less use of rehabilitation and no increase in adverse events. There is still no consensus in comparative results with any one specific protocol. Recommendation based on Level I systematic reviews [3,13,25]
- Ankle ORIF -
  - Early active exercise may accelerate return to work and daily function compared to immobilization following ankle ORIF surgery. Early weight bearing also tends to accelerate return to work and daily tasks. Consensus on how early has not been determined. Recommendation based on level I review of 25 Level II-III studies [32]
  - Early ankle activity after fracture related surgery may not have any long term difference. There is evidence of decreased risk of embolism, however increased risk of infection and fixation failure. Possibility of complications should warrant consideration of early activity in this population. Level I evidence [15]
  - Home therapy of 4-6 days prior to ankle fracture ORIF helped reduce hospital stay postoperatively by several days. Home management for swelling and pain was taught by physiotherapist in the ER department and patient was discharged home. Home program may be beneficial in reducing hospital stay after ankle ORIF. Recommendation from level III study [18]
- Hallux Valgus correction –
  - Progressive rehabilitation has been shown to restore gait and improve plantar pressure on the first ray following hallux valgus correction. There is no consensus on time to start rehabilitation following surgery or specific treatment protocols. [27] At 4 weeks post-op, rehabilitation of one time per week for 4- 6 weeks was studied with functional improvements recorded at 6 months. There was no control group. [29]

- Strong Recommendation – none currently available
- Moderate Recommendation – none currently available
- Weak Recommendation
  - Early ROM and rehabilitation
    - Peroneal repair/tenodesis – Several studies have documented starting rehabilitation following surgery within 4 weeks post-op. However other studies started after 4 weeks. There has been no indication of increased adverse events from the trend of early initiation of therapy. Recommendation that early therapy may be safe in foot and ankle peroneal tendon surgeries, however should consider surgical time and communicate with surgeon as well.



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Recommendation from trend of multiple Level II and III studies, however none of the studies were directly studying rehabilitation timeline.[34]

- Neutral Recommendation
  - Custom ankle-foot orthosis with rehabilitation –
    - An integrated orthotic and rehabilitation after ankle or subtalar-only fusion show improvement in function. Cohort study with no control in military population. No indication that custom support is needed following ankle fusion surgeries along with rehabilitation. Recommendation based on one small level III study. [31]
- Recommendation Against Use
  - Ultrasound for fracture –
    - Current available evidence is insufficient to support the routine use of ultrasound for acute fractures in adults. Based on level I review [11]
  - Kinesiotape for swelling –
    - Kinesiotape application for lymphatic stimulation does not appear to reduce swelling better than normal care in acute ankle sprains up 15 days post treatment. No indication application is beneficial or should be done. Grade B recommendation on moderate Level II evidence [24]
  - High-Volt Pulsed Current for Swelling –
    - Use of HVPC on lateral grade I-II ankle sprains had no effect on the time to return to play in injured athletes. Recommendation that HVPC is not necessary in the care of lateral ankle sprain rehabilitation. Moderate recommendation from level I RCT [20]

## PTOT-8.3.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

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  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents [14]
  - Sport participation is not a required daily activity at any age



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### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences. [7,10]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[17]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues. [8,9]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[5,36]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[21]

### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[1]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[36]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[30]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[35]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.



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- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility: [4]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.

## PTOT-8.3.10: Home and Self-care techniques

For rehabilitation of uncomplicated ankle fractures the current evidence recommends primary self-care. There is little evidence that routine physical therapy is needed during or after immobilization in general cases. The overall research is limited, so complications or significant restrictions may need further consideration. [20,22]

### Home Medical Equipment

- Gait assistive devices – walker, crutches, scooter, cane

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# PTOT-8.4: Ankle and Foot Tendinopathy

## PTOT-8.4.1: Diagnoses Included

- Achilles Tendinopathy
- Posterior tibial tendinopathy

## PTOT-8.4.2: Definition

The ankle is made up of the distal tibiofibular syndesmosis, talocrural joint and subtalar joint. Stability of the joint is created through bony congruity of the articulations, ligamentous and non-contractile restraint, and surrounding muscular units. Tendons passing the ankle are some of the longest in the body, especially the Achilles tendon. It is named as the largest and strongest tendon in the body. There are several other tendons that cross the ankle and are of significance: those of the posterior and anterior tibials, flexor digitorum longus, flexor hallicus longus, Peronus longus and brevus. The Achilles is not encased in a true sheath as are many tendons. Due to the size and varied orientation of the Achilles tendon it is generally divided into three areas: Muscle-tendon junction, mid-body, tendon-bone insertion. Injury and irritation is possible to any of the tendons of the ankle-foot area. Symptoms are more common among very active middle aged adults, yet still not uncommon with more sedentary individuals. Tendinopathy of the Achilles tendon is much more prevalent and also more widely researched.[5]

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Fever | Possible infection |
| Cancer history | Cause of symptoms (metastatic or primary) |
| Unilateral edema | Lower extremity deep vein thrombosis |
| Immune-compromised state | Infection |
| Multiple joint involvement | Rheumatologic diseases |
| Diabetes | Neuropathy |
| Discoloration of foot, exertional foot or calf pain | Vascular occlusion; vascular insufficiency |
| Severe pain, swelling, discoloration, cold to touch | Compartment syndrome |

## PTOT-8.4.3: Section intentionally left blank

## PTOT-8.4.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference



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(90%CI) for average score = 1.2 points [17]) OR Lower Extremity Functional Scale (LEFS) with a score of 64 or less (Minimum detectable change 9 points[4, 30])
  - Range of Motion: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Numeric Pain Rating Scale: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services are considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure
  - The Numeric Pain Rating Scale is reduced by 2 points
  - Range of Motion remains below what is required for personal care or essential employment requirements

## PTOT-8.4.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.



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## PTOT-8.4.6: Section intentionally left blank

## PTOT-8.4.7: Section intentionally left blank

## PTOT-8.4.8: Physical and Occupational Therapy Management/Intervention (evidence based)

- Strong Recommendation
  - Mechanical Loading – The most promising evidence for rehabilitation that results in reduced pain and improved function of Achilles tendinopathy involves mechanical loading. Either in the form of eccentric exercise, or a heavy-load, slow speed program. Especially for Mid-body pathology. Research appears mixed in duration of care and specific protocol, however most show improvement within 6-8 weeks with a program where the resistance is progressed. Evidence from several level I studies. [5,14,23,27,34] There is evidence that isolation of eccentric only loading may not be necessary and eccentric-concentric has benefit in achilles tendinopathy. [21,23]
- Moderate Recommendation
  - Low level Laser Therapy –
    - Based on one good quality RCT 12 sessions over 8 weeks helped to reduce pain and stiffness. Research is still limited with no indication of improvement of function.[5]
    - Iontophoresis – in Achilles tendinopathy of less than 3 months duration 4 treatments of iontophoresis with dexamethasone helped reduce pain and improve function. Based on one level II [5,23]
  - Therapeutic Exercise –
    - Progressive functional rehabilitation appeared similar to immobilization in treatment of Achilles tendon rupture. However the groups using functional rehabilitation there was a trend toward earlier return to work. Re-rupture rate did not appear to be increased. Recommendation from level II evidence. [22]
    - Eccentrics – The addition of an eccentric program to multimodal care of insertional Achilles tendinopathy did not increase improvements from control group participants after 4 visits plus a 12 week home program. Eccentrics may not be as effective in patients with insertional tendinopathy. However it does not appear to decrease therapeutic effectiveness. Level II recommendation. [19]
  - Multimodal care vs. home program for tibial tendon dysfunction – Home based care (ice, strengthening and stretching) and center-based care (of HEP + PNF, estim, manual therapy and taping; 15x in 3 weeks) appeared to be equally effective in reducing pain and improving function in subjects with tibial tendon dysfunction. Recommendation that intensive supervised care may not be superior to more home based care with progression. Based on one Level II Randomised trial.
  - Activity Modification – patient education that complete rest is not needed in nonacute Achilles tendinopathy may be advised. Continuation of activities within tolerance may be better than rest while in rehabilitation. Level II evidence [23]



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- Self-care vs. Supervised Care –
  - Home-based programs of orthotics with stretching or stretching and exercise both significantly improved in pain and function over 12 week trial in individuals with posterior tibial tendinopathy. Recommendation from 1 level RCT.[16]

- Weak Recommendation
  - Stretching – Stretching may be helpful in pain reduction and functional improvement in Achilles tendinopathy. There is very little evidence to support its benefit in isolated studies. Level II low quality study [5,23]
  - Manual Therapy – soft tissue mobilization may be useful in reducing pain and improving mobility in those with Achilles tendinopathy. However, there is not moderate or high level evidence to support this. Primarily based on opinion and on level IV evidence [5,23]
  - Running retraining – There is limited evidence that supports the use of training to transition from rearfoot strike pattern to a more anterior placement in Achilles tendinopathy. Most research reviewed used from 3 to 8 sessions with prolonged break afterword for final follow up. The few studies available have low participant numbers. Recommendation from low quality studies and expert opinion.[2]
  - Dry Needling – Only weak expert opinion that use of dry needling with eccentric program may assist to decrease pain in those with chronic symptoms. [23]
  - Shockwave therapy - Shockwave is no better that injection after 3 months. Injection appears to be more effective for pain over three months' time (Chen et al 2018). Achilles tendinosis may respond to extra corporeal shockwave therapy. However, after 12 month follow up groups using shockwave therapy were no better that eccentric groups.[15,27,34]

- Neutral Recommendation
  - Low-level Laser – Evidence continues to be contradictory. No recommendation for us.[23] Addition of LLLT to an eccentric program for Achilles tendinopathy did not result in improved outcomes. Its utility alone has not been established. It may not be an effective modality based on the study parameters. Recommendation based on one level II RCT.[31]
  - Specific Soft-tissue mobilization – there is only very limited, low-quality research from a case study that included soft tissue therapy as part of their protocol. Expert opinion was that they may use soft tissue mobilization even being aware there was little supportive evidence. [27]

- Recommendation Against Use
  - Ultrasound – Ultrasound has not been found to be more effective than other traditional therapeutic exercise or to add benefit to loading programs. Recommendation to not use US in Achilles tendinopathy. Based on one inconclusive RCT and expert opinion.[27]
  - Taping - Clinicians should not use therapeutic elastic tape to reduce pain or improve functional performance for Achilles tendinopathy (Martin et al 2018). There is unclear evidence in the utility of supportive taping in Achilles



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tendinopathy. There does not appear to be formal research. Recommendation on expert opinion only. [5]

## PTOT-8.4.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[18]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[10,13]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[20]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[11,12]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[8,33]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.



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- There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[25]

**Overuse/Sport**

- Physeal injuries in youth are common and often related to overuse during sport participation.
- Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
- The most effective treatment after an overuse injury was extended periods of rest. [1]
- Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation. [33]

**Hypermobility**

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without. [28]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers. [32]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[7]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
    - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-8.4.10: Home and Self-care techniques

### Home Medical Equipment

- Orthotics –
  - There is contradictory evidence in regards to orthotic use of Achilles tendinopathy; orthotics may produce equivalent positive effects as eccentric training. However, they may not be beneficial when added to an eccentric training program. Weak evidence from level I systematic review. [29]
  - There is minimal evidence that foot orthotics may help to reduce pain in and alter foot mechanics while running in patients with Achilles tendinopathy. Grade C recommendation from level II-III evidence [5]
- **Heel lifts –** There is conflicting evidence as to if heel lifts are beneficial for Achilles tendinopathy. They do not appear to add benefit to an eccentric program and cannot be recommended. [5,23]
- **Night Splint** – night splints do not appear to have any benefit when compared to an eccentric program. [24,27]

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# PTOT-8.5: Plantar Fasciitis, Fasciosis

## PTOT-8.5.1: Diagnoses Included

- Plantar Fasciitis
- Plantar Fasciosis
- Plantar Fasciopathy
- Plantar Heel Pain

## PTOT-8.5.2: Definition

The plantar fascia is an aponeurosis that spans the medial tubercle of the calcaneus to the phalanges. This arrangement allows the plantar aponeurosis to act like a pulley that creates tension in the foot during dorsiflexion of the 1st toe. This is commonly called the Windlass Mechanism. Together with the intrinsic foot muscles, the aponeurosis provides stability to the medial longitudinal arch during functional activities. Dysfunction of this plantar aponeurosis, or fascia, resulting in pain and difficulty in activity is very common. The entire etiology of plantar pain and dysfunction is not fully understood. It does appear that chronic overload either from lifestyle or frequent activity is related. Athletic, elderly and high BMI individuals are most affected. Primary symptoms of plantar dysfunction are pain radiating from the medial heel into the arch of the foot, pain with the first steps of the day and with warm up activity. Symptoms can become more pronounced as it progresses. It is common for symptoms to have been going on a year or more before seeking medical help.

## PTOT-8.5.3 Clinical Presentation

Most often plantar pain should be considered as a chronic condition. Patients with these conditions most often present for help after a year or more of having symptoms. Risk factors associated with plantar fascia pain are limited dorsiflexion, high BMI and less active. Frequent running and work related weight bearing with poor shock absorption.[19]

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Fever | Possible infection |
| Cancer history | Cause of symptoms (metastatic or primary) |
| Unilateral edema | Lower extremity deep vein thrombosis |
| Immune-compromised state | Infection |
| Multiple joint involvement | Rheumatologic diseases |
| Diabetes | Neuropathy |
| Discoloration of foot, exertional foot or calf pain | Vascular occlusion; vascular insufficiency |
| Severe pain, swelling, discoloration, cold to touch | Compartment syndrome |



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## PTOT-8.5.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score = 1.2 points [15]) OR Lower Extremity Functional Scale (LEFS) with a score of 64 or less (Minimum detectable change 9 points [4,30])
  - Range of Motion: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Numeric Pain Rating Scale: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services are considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure
  - The Numeric Pain Rating Scale is reduced by 2 points
  - Range of Motion remains below what is required for personal care or essential employment requirements

## PTOT-8.5.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.



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- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only

## PTOT-8.5.6: Section intentionally left blank

## PTOT-8.5.7: Section intentionally left blank

## PTOT-8.5.8: Physical and Occupational Therapy Management/Intervention (evidence based)

- Strong Recommendation
  - Manual Therapy
    - Joint and soft tissue mobilization to help improve flexibility and joint mobility can help reduce pain and improve function in people with heel pain. Benefit has been demonstrated in 6 treatments over 4 weeks. Grade A recommendation based on strong evidence.[21]
    - Addition of 8 treatments of ankle and foot mobilization to improve dorsiflexion to stretching did not appear to be more effective than stretching alone on improving dorsiflexion in those with plantar pain. Routine use of dorsiflexion specific mobilizations may not be needed. Level I evidence[29]
    - Use of manual therapy alone for plantar pain conditions cannot be recommended. Manual therapy alone has not been shown more beneficial. Multimodal care is recommended. Based on lack of supportive evidence.[12]
  - Stretching
    - Plantar-specific and gastrocnemius/soleus stretching can provide short term pain relief in patients with plantar facial pain. Most benefit appears to be between 2 weeks for 4 months. No evidence of long term or functional benefit from stretching alone. Grade A recommendation on strong evidence. [14,21]
    - Stretching exercises specific to the plantar fascia is superior to repetitive radial shock-wave therapy in the treatment of acute plantar fasciopathy. Stretching should be tried prior to shock-wave therapy. Recommendation from one Level I RCT. [26]
    - Stretching appears safe and effective[28]
  - Taping
    - Short term anti-pronation taping (up to 3 weeks) has shown to be helpful in reducing pain and improving function in individuals with plantar fasciitis. Grade A recommendation from strong evidence. [21,24]



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- Moderate Recommendation
  - Low level Laser Therapy
    - Based on one good quality RTC 12 sessions over 8 weeks helped to reduce pain and stiffness. Research is still limited with no indication of improvement of function. [5]
  - Shock Wave Therapy –
    - Extracorporeal shock wave therapy appears to reduce pain and especially morning pain in cases of plantar pain that have failed other treatments. ESWT may be helpful in more chronic plantar conditions with failed trials of traditional physical therapy. Recommendation from limited level I evidence [19,21] It may be more effective when combined with stretching.[25]
  - Concentric–Eccentric strengthening
    - High load strength training with specific concentric-eccentric heel raise exercise demonstrated higher improvement in function than stretching alone in those with plantar fasciial pain. Patients had 1 supervised visit and were instructed to perform the exercise every other day for 3 months. Use of concentric-eccentric exercise that stresses the plantar fascia maybe beneficial over 3 months. Recommendation from level II RTC.[16]
  - Self-care vs. Supervised Care
    - A program of 7 exercises performed at home after 1 supervised visit was as effective as a corticosteroid injection plus stretching for plantar heel pain and function over 12 weeks. Patients may be able to reduce pain and improve function with minimal supervised care.[3]
- Weak Recommendation
  - Low-level Laser
    - LLLT may reduce pain in some individuals with planter pain and allow tolerance to activity. There is little evidence to guide dosing or frequency. Grade C recommendation from limited moderate evidence.[21]
    - Use of 15 laser sessions was more effective than 15 US sessions on pain and function in chronic plantar pain. LLLT may be more beneficial than ultrasound for plantar pain. One, level II RCT. [31]
  - Myofascial release
    - After 12 sessions of myofascial release therapy, the intervention group showed significant improvements in pain and function at 4 and 12 weeks. Control group was sham ultrasound. Can only surmise that myofascial release is superior to no treatment at all. May be helpful option but not additional information on specific dosage/frequency. Recommendation from one limited RCT. [1]
- Neutral Recommendation
  - Phonophoresis
    - There is limited evidence that phonophoresis with ketoprofen may reduce pain in individuals with plantar pain. Grade C recommendation from limited moderate evidence.[21]



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- Foot intrinsic strengthening
  - There is limited evidence to advise on the use of exercises specific to foot intrinsic strengthening in the overall care of people with plantar pain.[16]
  - **Lower extremity strengthening** hip and lower extremity strength deficits have been identified with lower extremity overuse injuries. There is little evidence in those with plantar pain specifically. Strengthening may be prescribed to help control pronation and force attenuation. Expert Opinion. [21]

- Recommendation Against Use
  - Dry Needling
    - There is limited evidence to support the use or clinical benefit from dry needling for plantar fasciitis. Its use cannot be recommended. Based on lack of evidence. Expert opinion [21]
  - Electrotherapy
    - There appears to be little to no benefit from electrotherapies in patients with heel pain and plantar fasciitis. Recommendation to use manual therapy, stretching and foot orthoses instead for the short and long term (1-6 months). Grade D recommendation for use of electrotherapy based on strong evidence against benefit. [21]
  - Ultrasound
    - Ultrasound has not been found to be more effective than other treatment options. Recommendation to not use US in plantar pain conditions. Grade C recommendation based on one weak study. [21]

## PTOT-8.5.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[17]
- Sport participation is not a required daily activity at any age



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### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[9,13]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[18]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[10,11]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[7,33]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[22]

### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest. [2]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[33]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without. [27]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers. [32]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.



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- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility: [6]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.

## 8.5.10: Home and Self-care techniques

### Home Medical Equipment

Orthotics

- Supporting the medial longitudinal arch with orthotics (custom or pre-fabricated) appears to reduce pain and improve function from 2 weeks up to 1 year, especially to those that respond to supportive taping. Grade A recommendation from strong to moderate evidence.[21]

Heel lifts

- There is conflicting evidence as to if heel lifts are beneficial for Achilles tendinopathy. They do not appear to add benefit to an eccentric program. [5]

Night Splint

- A 1-3 month program of night splints in individuals with heel pain may help reduce pain, especially first-step pain in the morning. Grade A recommendation from strong evidence. [21]

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# PTOT-8.6: Hip Fracture, With or Without ORIF

## PTOT-8.6.1: Diagnoses Included

- Intracapsular proximal femoral fracture
- Extracapsular proximal femoral fracture
- Surgical interventions to fixate proximal femoral fracture (Superior edge of femoral head to approx. 5cm distal of the lesser trochanter) except total hip arthroplasty (THA). THA has its own guideline in this publication.[12]

## PTOT-8.6.2: Definition

Hip fracture is the plain term for a proximal femoral fracture. The fracture occurs in the area from the tip of the femoral head to approximately 5 cm distal to the lesser trochanter. The fractures can be divided into intra- and extra-capsular depending on location. This categorization is often of more importance for surgical approach and technique.[12]

## PTOT-8.6.3: Clinical Presentation

- Fractures are usually the result of trauma or falls.
- The elderly and women have a higher incidence.
- Depending on the specific fracture and surgical repair, weight bearing may be protected for a period of weeks.
- Patient usually has pain complaints over the lateral thigh and/or the groin, occasionally on the buttock.
- Ecchymosis and swelling may be present.
- Functional limitations immediately post-procedure are very common.
- May be a report of bone density decrease
- Very common for patients to report a surgical repair with a stay in the hospital or other rehab facility prior to any home care or outpatient care.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma post op | Fracture, dislocation, ligament tear, avascular necrosis |
| Fever, severe pain, drainage | Possible infection |
| Lower extremity shortening or external rotation | Fracture |
| Unilateral edema | Lower extremity deep vein thrombosis |
| Recent invasive procedures post op (dental work, urologic procedures) | Infection |
| Diabetes | Neuropathy |
| Multiple joint involvement | Rheumatologic diseases |
| Unilateral edema | Deep vein thrombosis |
| History of steroid use | Avascular necrosis |
| Immune-compromised state | Infection |



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## PTOT-8.6.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score = 1.2 points [15]) OR Lower Extremity Functional Scale (LEFS) with a score of 64 or less (Minimum detectable change 9 points [3,26])
  - Range of Motion: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Numeric Pain Rating Scale: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services are considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure
  - The Numeric Pain Rating Scale is reduced by 2 points
  - Range of Motion remains below what is required for personal care or essential employment requirements

## PTOT-8.6.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.



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- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-8.6.6: Section intentionally left blank

## PTOT-8.6.7: Section intentionally left blank

## PTOT-8.6.8: Physical and Occupational Therapy Management/Intervention (evidence based)

Quality, peer reviewed, evidence to guide the skilled physical therapy care following a hip fracture is limited in amount and quality of the evidence. There is no one protocol that has been established as best practice. Relevant evidence applicable to the care of these patients will be outlined with recommendations where possible.

Initiation of Physical Therapy Care – Early mobilization with a physical therapist appears safe and effective in promoting early recovery of the ability to transfer without assistance. A moderate recommendation from a RCT indicates mobilization can occur as soon as the day after surgery. Further recommendations are that nursing can reinforce patient mobility at other times without help from skilled care providers.[12]
Special care for patient with dementia or psychological factors

- There have been low quality trials of enhanced care for patients with dementia that led to reduced rates of complication and institutionalization up to 3 months after discharge. However, there was not enough evidence to support any recommendation of enhanced care above usual active care for people with dementia being seen for hip fracture rehabilitation. Neutral recommendation from low quality studies.[25]
- Those with dementia or living in care facilities showed greater need for supervision in the transition to a home program instead of continuing with hospitalization. They were able to show improvement with a home program however. Moderate recommendation from high quality RCT. [17]
- Interdisciplinary care in patients with mild to moderate dementia is supported for those who have sustained a hip fracture in helping them to improve functional outcomes. Strong recommendation[1]
- Trials using reorientation, intensive skilled therapy and/or cognitive behavior therapy were not found to have significant differences in outcomes at 12 months after discharge. Evidence was too low of quality to recommend any change to usual practice.[6]



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- Strength training
  - Progressive strength training increased leg extensor and hip flexor strength as well as walking speed compared to just motor training by 3 months after surgery. Strong recommendation based on high quality evidence.[12]
  - Strength training up to 70-80% of a 1 repetition maximum intensity is recommended to help improve balance, mobility and ADL's in patients after discharge from the hospital. Even up to 6 months post fracture. Recommendation based on strong evidence. [1,27]
  - There is no statistically significant evidence that ADL, gait and balance testing improves better after 3 months post-surgery with strength training versus motor training. High-moderate evidence.[12,14]
  - Inclusion of structured progressive resistance training after hip fracture appears to be important to improve mobility. It appears that training done in other settings then the hospital show greater improvements from the intervention exercise. Moderate recommendation from moderate quality evidence.[10]
  - Exercise programs extending up to 12 months after surgery may result in significant improvement in some functional areas: knee extension, balance, timed-up-and –go Test, "fast" gait speed. Some evidence to suggest better adherence with a community based program. Strong evidence[21]
- Gait training
  - There is no evidence that specific treadmill training is better than control on walking speed or pain. High evidence (Ftouh et al 2017, Handoll et all 2011)
  - There is no evidence that specific treadmill training reduces length of hospital stay compared to control. Moderate evidence [12]
- Transition to home care
  - Consider early supported discharge from hospital to home if patient is medically stable and patient has the ability to participate in continued rehabilitation. Is able to transfer and walk short distances. There is a significant increase in functional independence measures with home-based care compared to usual care. Strong recommendation with high quality evidence.[12]
  - Participants in a home program had a significantly shorter hospital stay. Those with dementia or living in care facilities showed greater need for supervision. Participants also gained walking ability similar to those staying a rehab program. Strong level of evidence from one RCT. [17]
  - Patients who had completed standard rehabilitation after hip fracture showed improved physical function at both 6 and 9 months with the use of a self-led home exercise program. Moderate evidence from RCT. [18]
- Home program following hospital discharge versus continued outpatient care
  - Participants discharged from the hospital to home improved mobility recovery better than standard care after a yearlong home-based progressive rehab program. Study participants were seen 5-6 times over that year by a physiotherapist (including 4-5 program updates). A year long home program with minimal home visits and no special training or equipment is feasible. Moderate recommendation, one RCT of moderate quality.[23]



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- Physical agents and modalities
  - Use of modalities and/or passive treatments should be limited. The goal is to transition the patient as quickly as possible to active care, self-management and functional independence. There is no current best evidence to give recommendations on the use of modalities after hip fracture.
- Trigger Point Dry Needling
  - Very low quality to moderate quality evidence suggests that dry needling is more effective that no treatment, sham and other treatments for reducing pain. Low quality evidence suggests superior outcomes for function when compared to no treatment. There is no difference in functional outcomes with compared to other therapy treatments. Any long term benefit evidence is lacking. Level 1a. [13]

## PTOT-8.6.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

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  - Sport participation is not a required daily activity at any age

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  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[19]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[8,9]



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### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[5,29]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[20]

### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
- Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
- The most effective treatment after an overuse injury was extended periods of rest.[1]
- Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[29]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[24]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[28]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[4]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-8.6.10: Home and Self-care Techniques

The patient can be taught to use medical equipment and administer self-care at his residence. Evidence has already been presented recommending an early discharge from the hospital or care facility can be as beneficial as standard care. Also that mobility may improve better with a home program vs standard care. The evidence would suggest that for most patients following hip fracture surgery, discharge to home with a progressive program may result in equal or better outcomes than standard care. It is understandable that there may be some need for minimal visits to progress a home program over time.[12,17,23]

### Home Medical Equipment

- Hot packs/cold packs after incision heals
- Theraband, ankle weights, for home exercise
- Assistive gait devices, wheelchair
- ADL assistive devices – shower chairs, rails

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# PTOT-8.7: Hip Tendinopathy (non-OA, non-surgical)

## PTOT-8.7.1: Diagnoses Included

- Hip pain unspecified
- Greater trochanteric pain syndrome
- Hip bursitis
- Groin pain
- Osteitis pubis
- Proximal hamstring strain
- Proximal iliotibial band pain/friction
- Gluteal tendinopathy
- TFL tendinopathy

## PTOT-8.7.2: Definition

- The extra-capsular areas of the hip are mostly comprised of soft tissues and their attachments to the proximal femur or origins on the pelvic bones. The tendons and other fascia attaching and supporting the muscles are certainly important to the utility of the hip. Major muscle groups surround the hip joint and allow for movement in all planes. Several bursa are also present in the hip area, especially near the greater trochanter. Any of these structures can become irritated, overworked, injured or even ruptured. It appears that injuries in these categories are more often seen in patients that are young and active, however some can be result of underuse and general weakness.[3,17]
- There are a multitude of diagnoses possible in regards to the soft tissue structures surrounding the hip. Unfortunately, there is very limited quality evidence for most of these diagnoses. The mechanism of injury, demographic of patients and rehabilitation possibilities of these injuries are not similar to intra-capsular injuries/deterioration or surgery. Dysfunctions such as femoroacetabular impingement and labral tears both appear to be associated with osteoarthritis of the hip joint.[14] They will not be included in this guideline. Lack of evidence does not allow creation of individual guidelines at this time. For the purposes of this guideline the following categories of extra-capsular hip pathology will be considered:
  - Gluteal tendinopathy (Greater trochanteric pain syndrome(GTPS))
  - Proximal hamstring tendinopathy
  - Adductor/Groin tendinopathy /Osteitis pubis
  - Proximal Iliotibial band syndrome/TFL



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## PTOT-8.7.3: Clinical Presentation

- Gluteal tendinopathy/GTPS -
  - Lateral hip pain over the greater trochanter that is aggravated by activity
  - Generally mid age in athletes and inactive adults
  - Presents in females more than males
  - Pain at night, especially with trying to lie on the same side
  - Report of repetitive activity
- Proximal Hamstring tendinopathy
  - Often patient will report participation in activities involving running and sprinting
  - May report participation in activities that require extreme range of motion demands of the hamstrings (dancing, cheer)
  - May have report of similar injuries in the past
  - Pain near the gluteal cleft
  - Pain with sitting
- Adductor/Groin Tendinopathy
  - Often patient will report participation in activities involving running, kicking and changing directions.
  - Active populations
  - Younger active populations more often specific to osteitis pubis
  - Pain with activity, especially changing directions
  - Pain starting in medial hip/groin that may also spread down medial thigh
- Iliotibial band Syndrome/TFL tendinopathy
  - Often will report regular running
  - Often will have pain at the knee, however can also present with pain at the lateral hip and thigh
  - Pain at night, especially with trying to lie on the same side
  - Report of repetitive activity
  - May have pain with prolonged weight bearing, especially on one limb

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma post op | Fracture, dislocation |
| Fever, severe pain | Possible infection |
| Lower extremity shortening or internal rotation | Dislocation |
| Unilateral edema | Lower extremity deep vein thrombosis |
| Recent invasive procedures post op (dental work, urologic procedures) | Infection |
| “Pistoning” during gait | Dislocation |



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## PTOT-8.7.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score = 1.2 points[19]) OR Lower Extremity Functional Scale (LEFS) with a score of 64 or less (Minimum detectable change 9 points [4,33])
  - Range of Motion: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Numeric Pain Rating Scale: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services are considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure
  - The Numeric Pain Rating Scale is reduced by 2 points
  - Range of Motion remains below what is required for personal care or essential employment requirements

## PTOT-8.7.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.



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- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-8.7.6: Section intentionally left blank

## PTOT-8.7.7: Section intentionally left blank

## PTOT-8.7.8: Physical and Occupational Therapy Management/Intervention (evidence based)

- Evidence to guide treatment of extra-capsular hip pathology is very limited. Much of the scientific evidence on the conservative treatment through rehabilitation to date is of low or very low quality. Often due to risk of bias, low participants or no randomization (case studies) it is difficult to extrapolate any result for clinical purposes. There is also not enough evidence to support one protocol over another. Evidence does suggest that physical therapy is beneficial, however, and may be helpful in reducing the time to return to function. [3,14,22,25,29] Where possible, best evidence recommendations have been outlined below based on the level of recommendation, followed by population specific recommendations:
  - Moderate recommendation – based on moderate quality evidence including randomized trials
    - Dry Needling vs Cortisone injection – Dry needling does not appear to be inferior to cortisone injection after 6 weeks. Number of dry needling and injection was not investigated. Short term trial of dry needling may have similar result to cortisone injection for patients with GTPS. Level 1b evidence, 1 RCT only.[5]
    - Lengthening exercise in hamstring injury – addition of lengthening exercise in the rehabilitation of hamstring injury was more effective than traditional care alone on reducing return to play time. This did not have an effect on re-injury rate however, which is high in this type of injury. Meta-analysis, level I[28]
    - Progressive agility and trunk stabilization may help reduce reinjure rates for those with hamstring injuries after a rehabilitation program.[20,28] Minimal recommendation – based on low quality evidence or expert opinion only
    - Manual Therapy –
      - Joint mobilization may be indicated when capsular restrictions of the hip are present and impair mobility or function. Soft tissue mobilization such as deep tissue or friction massage may be indicated when muscle and fascia impair hip mobility. Expert opinion[14,29]Therapeutic exercise –
      - Exercise therapy may improve short-term outcomes better than passive modalities in groin pain.[1]



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        - May address mobility, strength, power and deconditioned deficits identified through examination and functional assessment. Expert opinion [14]
        - Eccentric Exercise – evidence in tendinopathies of other body areas appears to support its use with good results. There does not appear to be current evidence specific to the hip however. Expert opinion based on strong evidence from results in other body areas but not hip.[29] Neuromuscular re-education/Pain science – neuromuscular re-education procedures to address coordination may be used. Discussions involving more recent theories on pain science may be helpful.[14]
    - No/neutral recommendation – Low quality evidence with no indication of preference
        - Aquatic vs land based exercise – No difference in hip abductor or knee extensor strength in aquatic vs land based therapeutic exercise. Application of resistance may be inadequate in aquatic exercise reviewed. Level I review of low quality studies.[21]
        - Osteitis Pubis – Current best evidence is of low quality and no recommendations on specific treatments that may be more effective than another of this specific diagnosis. Level I review[6]
    - Recommendation against – current evidence demonstrates no benefit
        - In cases of insertional tendinopathies passive stretching for elongation or that places a tensile and compressive load may be counterproductive and is not recommended.[17]
        - Sacroiliac mobilization does not appear to have any therapeutic effect in acute hamstring injury. Moderate recommendation against. Level I [28]
        - Ultrasound does not appear to have a beneficial effect on muscle healing in hamstring injuries. Expert Opinion based on moderate evidence.[20]

**Athletic Considerations –**

- Hip tendinopathies are often the result of high level athletic participation. Controlling tendon load will be of importance in their rehabilitation. Activity modification while still allowing some levels of participation may be helpful. This may also involve movement retraining and alteration (gait, mechanics, form, cadence, etc). Low quality evidence and expert opinion.[17]
    - Return to play time for groin related injuries may be much shorter for cases treated with multimodal physical therapy than cases treated surgically. Consideration should be made for rehabilitation based on with or without surgical technique. Low quality level IV evidence reported in level I review. [22,32]
    - Progressive agility and stabilization appears to reduce re-injury rate when compared to standard strengthening program for hamstring injury but does not appear to reduce return to play time. [28]
    - Runners might benefit from mobilization, hip strengthening and advice about running shoes and surfaces when dealing with ITBS. Expert opinion[35] 8.7.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal



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- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

**Activity of Daily Living**

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[18]
  - Sport participation is not a required daily activity at any age

**Attention/Task Completion**

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences. [11,16]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[23]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[12,13]

**Growth/Maturation**

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[9,37]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[26]



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### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[2]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[37]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[31]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[36]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[8]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.

## PTOT-8.7.9: Section intentionally left blank

## PTOT-8.7.10: Home and Self-care techniques

Participation by the patient in a home program, as taught by their provider, is considered part of usual care. Patients should be consistent with performing a home program of mobility, exercise and modification.

- Alternatives/Adjunct Management
- Referral to medical doctor for cases that do not progress in a timely manner may be necessary. Other treatment options may be – injection, shock wave therapy, medication or surgery.



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# PTOT-8.8: Hip Replacement, Resurface

## PTOT-8.8.1: Diagnoses

- Total hip arthroplasty
- Hip arthroplasty
- Hip resurfacing procedure

## PTOT-8.8.2: Definition

- Total hip arthroplasty involves the implantation of an artificial femoral head and acetabulum to replace a degenerative and painful joint. THA is one of the most common orthopedic surgeries performed. The primary indication for hip replacement surgery is pain arthritis.[12] The procedure may involve replacing only the femoral component (Hemiarthroplasty). Components may be cemented, non-cemented, or hybrid (femoral component cemented, with non-cemented acetabular component).
- More recently, the use of a resurfacing procedure is being used in patients that are relatively younger and more active than traditional patients that would receive a full hip replacement. [1] This procedure utilizes prosthetics that only replace joint surfaces and there is much less sacrifice of bone tissue

## PTOT-8.8.3: Clinical Presentation

- History of progressive hip pain over several years
- History of progressive decline in functional ability
- Pain around the hip, groin, thigh, buttocks and back
- Swelling
- Joint stiffness
- Lower extremity weakness
- Antalgic gait and difficulty walking
- Report of stay in hospital and/or rehabilitation inpatient unit
- May report requires help aides such as cane, walker and caregiver.

### Special Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of the traumatic event.
- Identify surgical complications if applicable
- Familiarize with extent and success of surgery



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- Familiarize with length of hospitalization and inpatient care
- Age and health of patient
- Pain control
- Post-operative precautions from the surgeon

Traditional physical therapy has been routine in the rehabilitation following surgery for some time. However, impairments in muscle strength, postural stability and functional ability up to one year after hip replacement have been documented. There is continued uncertainty regarding effectiveness of physical therapy following hip replacement. [9]

Some consideration of the surgical technique and approach used should be made while establishing a post-operative plan of care. The type of component, any cement and anatomical location of surgical site can all have effects on precautions from the surgeon and healing required.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma post op | Fracture, dislocation |
| Fever, severe pain | Possible infection |
| Lower extremity shortening or internal rotation | Dislocation |
| Unilateral edema | Lower extremity deep vein thrombosis |
| Recent invasive procedures post op (dental work, urologic procedures) | Infection |
| “Pistoning” during gait | Dislocation |

## PTOT-8.8.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score = 1.2 points [7]) OR Lower Extremity Functional Scale (LEFS) with a score of 64 or less (Minimum detectable change 9 points [2,14])
  - Range of Motion: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Numeric Pain Rating Scale: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided



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- A request for continued services are considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure
  - The Numeric Pain Rating Scale is reduced by 2 points
  - Range of Motion remains below what is required for personal care or essential employment requirements

## PTOT-8.8.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

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## PTOT-8.8.8: Physical and Occupational Therapy Management/Intervention (evidence based)

Quality, peer reviewed, evidence to guide the skilled physical therapy care following a hip replacement procedure is very limited. [3,5,9,12] There is no one protocol that has been established as best practice.[5,9]Relevant evidence applicable to the care of these patients will be outlined with recommendations where possible

- Outpatient-supervised care vs home-based unsupervised –
  - Outcomes at 6 months post-surgery were statistically similar for supervised and unsupervised care for participants following hip replacement. Recommendation that early rehab programs can be effectively completed in the home for low-risk patients. Moderate recommendation. One blinded RCT[4]
  - Outpatient supervised rehabilitation did not provide any additional benefit from unsupervised home exercise programs for outcomes of strength, gait speed and cadence. There was a slight higher outcome for timed-up-and-go after supervised physical therapy after 8 weeks of care. Recommendation that strength and function and be improved with a home program. Moderate level evidence.[4]
- Use of post-operative assistive devices and environmental modifications
  - Further quality trials are needed to establish and assess the outcomes of using assistive device and home modification following hip replacement. There is some very limited information to suggest use of such devices may be counterproductive. Not enough evidence for recommendation for or against.[12]
- Progressive Resistance Training
  - Consistent report from studies that muscles trained via PRT will increase in strength after THA. There is also some weak to moderate evidence that PRT can improve functional capacity. Resistance training before and after hip replacement is safe and feasible. Strong recommendation for strengthening in general. [11]
  - Maximal strength training 1 week post-op is feasible and efficient after hip replacement in regaining muscular strength.[8]
- Task Specific vs Traditional Rehabilitation –
  - Inpatient task oriented exercise with an emphasis on early weight bearing appeared superior in functional outcomes of participants when compared to traditional partial weight bearing and open-chained activity. Recommendation for early weight bearing and function related activity for patients with hip fracture. Weak to moderate recommendation. One RTC with limitations [10]
  - Use of an accelerated, tailored rehab exercise program resulted in better functional and strength outcomes after hip resurfacing when compared to traditional care. They also had higher rate of achieving self-selected goals. Participants were seen two weeks after discharge from hospital and were given updated exercises every two weeks over 8 weeks. Superior outcomes may be had with use of exercise programs tailored specific to the patient and their surgical procedure (resurfacing vs replacement). Moderate level evidence but study only included men. RCT[1]



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- Physical Agents and Modalities
  - Use of modalities and/or passive treatments should be limited. The goal is to transition the patient as quickly as possible to active care, self-management and functional independence. There is no current best evidence to give recommendation on the use of modalities after hip replacement or resurfacing surgeries.
- Trigger Point Dry Needling
  - Very low quality to moderate quality evidence suggests that dry needling is more effective that no treatment, sham and other treatments for reducing pain. Low quality evidence suggests superior outcomes for function when compared to no treatment. There is no difference in functional outcomes with compared to other therapy treatments. Any long term benefit evidence is lacking. Level 1a. [6]

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## PTOT-8.8.10: Home and Self-care Techniques

The patient can be taught to use medical equipment and administer self- care at his residence. Evidence has already been presented recommending potential for an early discharge from the hospital or care facility can be as beneficial as standard care. Also that functional outcomes and strength may improve better with a home program vs standard outpatient care. The evidence would suggest that for most patients following hip replacement surgery, discharge to home with a progressive program may result in equal or better outcomes than standard care. It is understandable that there may be some need for minimal visits to progress a home program over and extended time. [1,3]

### Home Medical Equipment

- Cold packs/hot packs after incision heals
- Theraband, ankle weights, for home exercise
- Assistive gait devices, wheelchair, rails or other environmental equipment used sparingly and for more at risk patients. [12]



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# PTOT-8.9: Hip Joint Degeneration and Pathology with or without Arthroscopy

## PTOT-8.9.1: Diagnoses Included

- Hip Osteoarthritis
- Femoroacetabular impingement
- Hip labral tear or pathology
- Hip dysfunction following arthroscopic procedure – chondroplasty, microfracture, labral repair.

## PTOT-8.9.2: Definition

- In adults older than 50 years, hip degeneration and osteoarthritis (OA) is the most common cause of hip pain. OA is a progressive disease of the joints. The disease is characterized by cartilage damage, loss and abnormal bone growth at the joint surface.[17]The OA will progress at varied rates from person to person. Some risk factors have been suggested such as hip retroversion, acetabular impingement, advanced age, higher BMI and regular hip pain. OA in the hip commonly manifests with decreases in internal rotation and flexion ROM and morning stiffness of about 60 minutes.[9]
- Femoroacetabular impingement (FAI) is a hip joint syndrome where abnormalities to the acetabulum or proximal femur result in a bony impingement during movement. This impingement typically occurs at the rim of the acetabulum during flexion and internal rotation at the hip. It appears that a larger proportion of diagnosis is in young, active adults. It is a common cause of hip and groin pain in active individuals, especially with activities requiring greater ranges of motion. Hip arthroscopy is a common choice of treatment; however some may choose to try more conservative care.[4,33]
- Hip arthroscopic procedures can vary based on pathology and technique. There may be one technique or a combination during one surgery. Some common procedures can be debridement, chondroplasty, osteoplasty, osteotomy, microfracture, synovectomy, ligamentum repair and loose body removal. Rates of hip arthroscopic procedures continue to rise. Unfortunately, there is limited evidence on the rehabilitation following these procedures.[8]

## PTOT-8.9.3: Clinical Presentation

- Hip pain – generally progressive over long period of time aside from surgical cases
- Activity limitations with gait and other lower extremity movements
- Pain with high level activity or during sports and recreation
- Reports from young adults may be more indicative of FAI
- Reports from patients older than 50 may be more indicative of OA



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- Morning stiffness
- Feelings of weakness and instability with weight bearing.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma post op | Fracture, dislocation |
| Fever, severe pain | Possible infection |
| Lower extremity shortening or internal rotation | Dislocation |
| Unilateral edema | Lower extremity deep vein thrombosis |
| Recent invasive procedures post op (dental work, urologic procedures) | Infection |
| "Pistoning" during gait | Dislocation |

## PTOT-8.9.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score = 1.2 points [19]) OR Lower Extremity Functional Scale (LEFS) with a score of 64 or less (Minimum detectable change 9 points [6,28] )
  - Range of Motion: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Numeric Pain Rating Scale: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services are considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure
  - The Numeric Pain Rating Scale is reduced by 2 points
  - Range of Motion remains below what is required for personal care or essential employment requirements



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## PTOT-8.9.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

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## PTOT-8.9.7: Section intentionally left blank

## PTOT-8.9.8: Physical and Occupational Therapy Management/Intervention (evidence based)

- Hip OA Non-Surgical Care –
  - Patient Education – education should be provided by clinician to the patient regarding activity modification, exercise, weight reduction and unloading of joints. Strong recommendation. Level I-II support [9]
  - Manual Therapy –
    - Manual therapy may be beneficial in mild hip OA who present with some limitation of joint mobility and/or pain. Dose and duration continues to be vague in the literature. As hip motion improves transition to strengthening should take place. No evidence to suggest manual therapy is superior to exercise in care of hip OA. Strong recommendation. Level I-IV support [9]



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- There was moderate evidence that manual therapy alone does not significantly improve function. There was limited low quality evidence that manual therapy may reduce pain. Evidence is limited, therefore no recommendation was given on the use of manual therapy for hip OA. Level I review[34]
- Manual physical therapy along with education and a home exercise program of 10 sessions over 12 weeks did not show any benefit over sham ultrasound in participants with hip OA in reducing pain or improving function. No evidence to support multi-modal type physical therapy. Moderate level evidence, RCT [4]
- There was no improved benefit to function, range of motion or perceived improvement with the addition of manual therapy to exercise therapy when treating those with hip OA. Participants were given 8 treatment over 8 weeks (French et al 2014). Similar result up to 1 year follow-up. No additional benefit to combined manual and exercise therapy. [1]

- Therapeutic Exercise –
  - Clinicians should prescribe individualized exercise in the treatment of hip OA including flexibility, strengthening and endurance to address functional limitation. Patients should be prescribed these activities 1-5 times a week over 6-12 weeks. No evidence to support exercise in clinic only versus at home only. Strong recommendation, Level I-III support [9]
  - Exercise therapy is more effective than minimal control in reducing pain in the short term for people with hip OA. No additional benefit from adding manual therapy. Recommendation for use of exercise in hip OA. Strong recommendation. Level I support [5]
  - Among therapeutic exercise, strength training appears to result in greatest improvements for pain, disability, function and range of motion from 8-24 weeks time. Moderate improvements in physical function and pain also appear to result from stretching and mobility. Strong recommendations. Level I evidence [7,17]
  - Not sufficient evidence to recommend on High vs low intensity exercise for improving pain and function in those with hip OA. Level I review [24]
- Manual therapy vs therapeutic exercise vs combined – High quality evidence to recommend exercise therapy over control in the short and long term. Low quality evidence to recommend manual therapy alone and manual therapy combined with exercise over control in the short and long term. Exercise appears to reduce pain and improve function. Limited evidence to recommend manual therapy to reduce pain and improve function post treatment and at follow up. Higher level evidence for exercise, not enough evidence to indicate exercise alone over manual care alone. Level I recommendations [26]
- Ultrasound – Short term use (2 weeks) of ultrasound at 1Mhz; 1 Wcm2 for 5 minutes each to the anterior, lateral and posterior hip may reduce pain when part of a hip exercise rehab program. Moderate recommendation from 1 RCT. Level I support [9]



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- FAI Conservative and Post-Surgical Care –
  - Post-surgical rehab – 7 skilled care visits (30 min) over 14 weeks lead to greater outcomes in pain and function when compared to control in participants who had undergone arthroscopic surgery for FAI. Moderate level RCT [4]
  - Protocol Specific – No current evidence to support the use of one rehabilitation protocol versus another in the rehabilitation following FAI surgery. Current published protocols appear to be descriptive and of opinion only. Expert opinion that skilled care is important after FAI surgery. Recommendation for individualized approach in care. Level I systematic review.[8,32]
  - Non-operative care – There is limited evidence to show clinical effectiveness in physical therapy for the non-operative care for FAI. Some evidence to suggest that physical therapy and activity modification may have initial benefit compared to no care. Recommendation for trial of minimal skilled care and activity modification for non-surgical care of FAI. Level I systematic review[33]

## PTOT-8.9.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[20]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[13]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques. [21]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues. [14,15]



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### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation. [11,31]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development. [22]

### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[2]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation. [31]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[27]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers. [30]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility: [10]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-8.9.10: Home and Self-Care techniques

- **Home Exercise Program –** strong recommendation that exercise regularly reduces pain and improves function in those with hip OA. Strong recommendation to give education and advice on a home program. [3,9]
- **Activity modification** – activity modification to reduce pain is recommended (Cibulka et al 2017)

### Home Medical Equipment

- Assistive devices may be needed for a time, especially recently following hip arthroscopic surgery
- Bracing – not recommended as a first line of treatment in hip OA.[9]

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# PTOT-8.10: Lower Extremity, Amputation with Subsequent Prosthesis, AKA & BKA

## PTOT-8.10.1: Synonyms

Lower limb amputation

## PTOT-8.10.2: Definition

Lower extremity amputation is removal of all or part of the limb. Disarticulation is the removal of all or part of the limb through the joint. In general, age, level of amputation, and presence of comorbidities will most significantly impact degree of regaining function. The greater the sparing of the residual limb, the higher the functional level may be achieved.

## PTOT-8.10.3: Clinical Presentation

Presents with soft or semi-rigid dressing, bulbous swelling, non-healing wound, phantom limb pain, hypersensitivity, joint contractures, muscle weakness/atrophy, reduced endurance, impaired mobility and gait impairments.

### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Assessment of employment, home environment, and social support
- Pain assessment

| Red Flag | Possible Consequence or Cause |
|---|---|
| Fever, severe pain | Infection |
| Diabetes | Neuropathy |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of residual limb, progressive pain with ambulation | Arterial occlusion |
| Skin rash with fever and tenderness | Cellulitis |
| Immune-compromised state | Infection |



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## PTOT-8.10.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score = 1.2 points[18]) OR Lower Extremity Functional Scale (LEFS) with a score of 64 or less (Minimum detectable change 9 points[19, 20], or specific tests such as the Amputee Mobility Predictor (AMP), the Amputee Mobility Predictor with a prosthesis (AMPRO), the Amputee Mobility Predictor-Bilateral (AMP-B) or the ABC Scale.
  - Range of Motion: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Numeric Pain Rating Scale: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services are considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure
  - The Numeric Pain Rating Scale is reduced by 2 points
  - Range of Motion remains below what is required for personal care or essential employment requirements

## PTOT-8.10.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
  - The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
  - Achievable goals that are related to activities of daily living have been met.
  - Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
  - No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
  - A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
  - If, or when, the member has been non-compliant with the treatment plan.



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- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.

## PTOT-8.10.6: Referral Guidelines

- Refer patient to their primary care provider for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines, or improvement has reached a plateau
  - Skin breakdown of the residual limb or of the contralateral lower extremity
  - Inadequate cardiopulmonary fitness for required tasks
  - Inadequate pain control
  - Contracture not responding to treatment

## PTOT-8.10.6: Section intentionally left blank

## PTOT-8.10.7: Section intentionally left blank

## PTOT-8.10.8: Physical and Occupational Therapy Management/Intervention

- The physical therapist is only one of the participants in a multidisciplinary approach to rehabilitation for lower extremity amputation patients. The therapist works closely with the surgeon, prosthetist, and other team members to facilitate maximal recovery and function for the patient.
- The decisions regarding whether a prosthesis is appropriate and which prosthesis to select depend on the patient's age, level of amputation, skin condition and coverage, comorbid medical conditions, cognitive status, and level of motivation and goals.[5]
- Prognosis varies depending on etiology of amputation (e.g., vascular versus nonvascular) and type (level) of amputation.
  - The lower the level of the amputation, the better the prognosis. Patients with lower amputations are more likely to be ambulatory, both in their home and in the community.
  - The majority of patients with nontraumatic LEA have comorbidities that may adversely affect their prognosis.
  - Patients with transtibial amputation have a 20% chance of eventual conversion to transfemoral amputation[17]
- Evidence
  - Errorless learning may be a more effective learning strategy than trial and error when teaching patients with transtibial amputations to don a prosthesis.[6]
  - Specialized rehabilitation may lead to greater functional gains compared to consultative rehabilitation in veterans with amputations.[7]
  - Hip abductor strength training was found to improve functional performance and balance confidence in patients with unilateral transfemoral amputation in a study conducted in Canada.[8]



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- Mirror-feedback therapy was reported to reduce center-of-pressure displacements under the nonaffected extremity in patients with transfemoral amputation.[9]
- Compensatory-step training may improve the ability of patients with amputations to recover from postural disturbances and avoid falling.[10]
- The use of treadmills for gait training assumes that treadmill gait and overground gait are similar enough that the effect of treadmill practice will transfer to overground performance. However, data suggest that there are differences, including altered kinematics and energy costs. Patients with lower extremity amputations may have difficulty adjusting to the treadmill, in part because they are more reliant on visual information than nonimpaired individuals due to their loss of proprioception from the involved limb[11]

## PTOT-8.10.9: Section intentionally left blank

## PTOT-8.10.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self- care at his residence.

### Home Medical Equipment

- Cold packs/hot packs
- Theraband for therapeutic exercises
- Ace wrap for wrapping of residual limb, stump shrinker/socks
- Electrical stimulation for pain relief
- Assistive gait devices
- Prosthesis

### Self-Care Techniques

- Instruction in home exercise program for ROM and strengthening
- Hot packs/cold packs, if needed, to relieve discomfort
- Education in skin care guidelines, ace wrapping the residual limb, donning and doffing prosthesis
- Home exercise program, instruct patients and caregivers in use of prosthesis
- Instruct caregivers in assisting mobility as required
- Instruct patient in edema control
- Refer to community resources for access and support



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| PTOT-9.0: Orthopedic – Lumbosacral | |
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# PTOT-9.1: Lumbar Post-Surgical Conditions

## PTOT-9.1.1: Conditions Included

- Post Arthroscopic Discectomy
- Post Laminectomy
- Post Laminectomy with Interbody Fusion
- Failed back surgery syndrome

## PTOT-9.1.2: Definition

Post-surgical condition, in which patient continues to present with abnormal findings in strength, ROM, and pain referred to the sacro-iliac, and/or lower extremity. Patient may also have altered reflexes and sensation.

## PTOT-9.1.3: Clinical Presentation

- Patient may report trauma, or insidious onset.
- Disc herniations tend to occur more frequently in younger patients due to the gradual dehydration of the nucleus pulposus that normally occurs with aging.
- Patient will probably have spinal precautions in the acute and sub-acute phases that vary by method of surgery and surgeon preference.

### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.
- Determine if trauma occurred post-operatively; determine nature and extent of traumatic event.



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| Red Flag | Possible Consequence or Cause |
|---|---|
| Onset following minor fall or heavy lifting in elderly, or osteoporotic patient | Fracture |
| Direct blow to the back in young adult | Fracture |
| Saddle anesthesia | Cauda equina syndrome |
| Severe, or progressive neurologic complaints | Cauda equina syndrome |
| Global, or progressive motor weakness in the lower extremities | Cauda equina syndrome |
| Recent onset of bowel dysfunction, or acute onset of bladder dysfunction in association with low back pain | Cauda equina syndrome |
| Unexplained weight loss | Malignancy |
| Prior history of cancer | Malignancy |
| Pain that is worse with recumbency, or worse at night | Malignancy |
| Fever, or recent bacterial infection | Infection |
| Intravenous drug abuse, or immunosuppression | Infection |
| Prolonged steroid use | Osteoporosis |

## PTOT-9.1.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
- Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score =1.2 points [34]) OR The Oswestry Disability Index (ODI) with a score of 20% or higher (Minimally Clinically Important Difference of 12.8% or 6.4 raw points [14]) OR The StarT Back Screening Tool (SBT) with a score of >3 ([27]) OR Roland-Morris Disability Questionnaire. [65]
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
  - Surgery date within the past 6 months
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
  - Patient's level of independence
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold



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- The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
- Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
- Reduction in complicating factors (such as positive neurological signs)
- The patient is unable to maintain progress independently

## PTOT-9.1.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-9.1.6: Referral Guidelines

- Refer patient to their primary care provider, for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines or improvement reaches a plateau;
  - Atrophy of lower extremity occurs;
  - Signs of fracture or dislocation occurs;
  - Increased neurologic signs/symptoms: increased LE numbness/tingling, increased LE weakness, increased LE pain, decreased LE reflexes.

## PTOT-9.1.7: Section intentionally left blank



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## PTOT-9.1.8: Physical and Occupational Therapy Management/Intervention

Therapy provided should be based on the individual presentation with the following considerations:

- Depending on level of pain, modalities to address pain may be utilized.
- Flexibility and lumbar stabilization exercises are common once patient is taken off post-surgical precautions.
  - Home program, individually prescribed, is central to the care of all patients. The teaching for this program should be started on the first day of therapy and continue throughout the formal therapy program with a planned transition.
  - Because multiple factors can contribute to this syndrome, patients are considered to be suffering from a chronic pain syndrome. It is recommended that these patients be treated by a multi-disciplinary team, including at least an MD anesthesiologist, physical therapist, occupational therapist and psychologist to help manage the rehabilitation.
  - Physician specific protocols will be considered in the context of the plans definition of medical necessity.

### Lumbar Discectomy

- Two-year recurrent low back pain may occur in 15% to 25% of patients depending on the level of recurrent pain considered clinically important, and this leads to worse patient reported outcomes at 1 and 2 years postoperatively. [60]
- Exercise programs starting four to six weeks post-surgery seem to lead to a faster decrease in pain and disability than no treatment, with small to medium effect sizes, and high-intensity exercise programs seem to lead to a slightly faster decrease in pain and disability than is seen with low-intensity programs, but the overall quality of the evidence is only low to very low. No significant differences were noted between supervised and home exercise programs for pain relief, disability or global perceived effect. [58]
- Weak evidence suggests osteopathic type manipulation may be a feasible approach for postoperative management for lumbar disc surgery. [38]
- No differences have been found between general and patient-specific exercise programs. Local factors such as the individual patient characteristics identified by specific assessment findings, clinician expertise and patient preferences should direct exercise selection. [32]
- Inconclusive evidence exists for the effectiveness of outpatient physical therapy post first lumbar discectomy. Best practice remains unclear. [67]
- However, the subgroup of patients who presented with longstanding symptoms (> 22 weeks), sequestered-type herniation, and large disc herniation size (> 8.7 mm AP diameter), should undergo early surgical decompression, if initial non-operative treatment fails to yield satisfactory results. [60,75]
- Studies reported that surgical interventions could be performed at periods of 6 months of onset or greater without impacting recovery. [71]



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## Lumbar Fusion

- Inconclusive, very low-quality evidence exists for the effectiveness of physiotherapy management following lumbar spinal fusion. Best practice remains unclear. [67]
- Early start of rehabilitation (6 wk vs. 12 wk) after lumbar spinal fusion resulted in inferior outcomes.[57]
- Rehabilitation approaches should include measures to modify psychological as well as motor functions (Abbott, A. D., 2010). Psychomotor therapy combines cognitive behavioral and motor relearning strategies to modify maladaptive pain cognitions, behavior, and motor control while exercise therapy encompasses physical training focusing on muscular strength, endurance, and cardiovascular fitness. [1]
- Use of modalities and or passive treatments should be limited. The goal is to transition patient as quickly as possible to active care, self-management and functional independence.
- The following table lists the procedures for **Acute Phase** presentation.
- Acute care is characterized by a short and relatively severe course. Need for care is proportional to the severity of the signs or symptoms of the particular case. Frequency of therapeutic visits is gradually reduced over a short period of time, generally 1-4 weeks.

| Expected Outcome | Procedures/Modalities Such As |
|---|---|
| Decrease pain | ◆ Modalities to relieve pain e.g. Cryotherapy, TENS, interferential current |
| Improve vascularity and extensibility of soft tissue and connective tissue | ◆ Soft tissue mobilization<br>◆ Myofascial Release |
| Improve lumbar flexibility | ◆ Gentle Flexibility exercises (hamstring stretch, Hip flexors stretch, Quadriceps stretch) |
| Improve strength and power of back musculature and ability to walk for least 30 minutes | ◆ Isometric exercises of abdominal and back muscles<br>◆ Stability exercises in side-lying, standing |
| Patient education and initiation of home exercise program | ◆ Physician protocol may require lumbar orthotics/brace<br>◆ Avoid bending, twisting, or lifting more than 5 pounds<br>◆ Application of ice or hot-packs<br>◆ Remain as active as possible<br>◆ Body mechanics<br>◆ Teach home exercise program |

- The following table lists the procedures for **Subacute Phase** presentation.
  - Subacute care is characterized by an intermediate and less severe course. It is a combination of direct care and with an emphasis on home management consisting of patient motivation and compliance. Intensity of care is guided by the condition of healing tissue structures, and generally includes less frequent therapeutic visits gradually tapering over a short period of time.



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| Expected Outcome | Procedures/Modalities Such As |
|---|---|
| Restore flexibility of lumbar spine | ◆ Flexibility exercises (hamstring stretch, Hip flexors stretch, back muscle stretch, Quadriceps stretch, pelvic mobilization)<br>◆ Endurance training<br>◆ Lumbar range of motion exercises once restrictions are lifted |
| Increase strength and endurance of Lumbar spine and lower extremities | ◆ Advanced dynamic stabilization exercises<br>◆ Strengthening exercises to trunk and lower extremity |
| Improvement in body mechanics and postural stabilization | ◆ Postural stabilization activities<br>◆ Postural Control<br>◆ Body mechanics |
| Ability to perform physical actions, tasks or activities related to self-care, home management, work, community and leisure | ◆ Gradual resumption of activities relating to self-care and home management<br>◆ Self-management of symptoms<br>◆ Functional restoration<br>◆ Teach home exercise program |

- The following table lists procedures for **Corrective/Rehabilitative Phase** presentation.
- Corrective or rehabilitative care is the stage of ongoing care, and may also refer to conditions that are chronic in nature. Treatment is directed toward further symptom reduction and the achievement of optimal structural and functional restoration. In most cases, this type of care is largely active and is typically directed by the provider and performed by the patient as a home program.

| Expected Outcome | Procedures/Modalities Such As |
|---|---|
| Increase strength and endurance of Lumbar spine and lower extremities | ◆ Advanced dynamic stabilization exercises<br>◆ Progressive resistive exercise program |
| Ability to perform physical actions, tasks or activities related to self-care, home management, work, community and leisure | ◆ Gradual resumption of activities relating to work, community and leisure<br>◆ Self-management of symptoms<br>◆ Work hardening or vocational rehabilitation to learn different job skills<br>◆ Postural control and body mechanics<br>◆ Teach home exercise program |



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## PTOT-9.1.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[35]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[17,26]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques. [42]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues. [18,19]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[13,80]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[47]



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### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest[4]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[80]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without .[70]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers. [79]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility: [9]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.

## PTOT-9.1.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self- care at his residence.

### Home Medical Equipment

- Hot packs/cold packs
- Theraband
- Gym ball
- Home electrical stimulation unit



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## Self-Care Techniques

- Postural advice, instruction in proper body mechanics
- Lumbar stabilization exercises, flexibility exercises, as indicated
- Aerobic conditioning
- Cold/heat applications, if needed, to relieve discomfort/stiffness
- Brief use of lumbar support, if necessary, in the acute stages to limit motion
- Instruct patient in any surgery specific precautions

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# PTOT-9.2: Lumbosacral Radicular Conditions

## PTOT-9.2.1: Synonyms

- Lumbar Radiculopathy
- Lumbago with Sciatica
- Pain in lower limb
- Radiating pain in a dermatome
- Disc herniation
- Bulging disc
- Lumbosacral Radicular Conditions can be categorized according to the International Classification of Functioning, Disability and Health (ICF) impairment-based category of low back pain[174] in the following ways:
  - Acute low back pain with related (referred) lower extremity pain (b28015 Pain in lower limb)
  - Acute, subacute, or chronic low back pain with radiating pain (b2804 Radiating pain in a segment or region)

## PTOT-9.2.2: Definition

Lumbosacral radicular conditions are those involving lumbar nerve root irritation as a result of lumbar disc or other spondylitic pathology.

## PTOT-9.2.3: Clinical Presentation

- Typical patient is between ages of 25-60.
- Activity precipitating pain, typically involves bending, twisting, and/or lifting.
- No aggravating event in 50% of patients.
- Usually reports history of several or more resolved low back pain episodes previous to current onset.
- Pain and stiffness in low back
- Often associated with numbness, pain, and/or weakness that may reach to the distal ends of lower extremities
- Extremity symptoms may predominate
- Midline disc protrusions may involve both extremities
- Type and radiation of pain vary
- Worse with prolonged sitting, standing, bending, stooping, lifting
- Better with rest



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### Special Considerations

- Rule out red flags (require medical management and/or referral to physician) See Table below.
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Onset following minor fall or heavy lifting in elderly or osteoporotic patient | Fracture |
| Direct Blow to the back in young adult | Fracture |
| Saddle anesthesia | Cauda equina syndrome |
| Severe or progressive neurologic complaints | Cauda equina syndrome |
| Global or progressive motor weakness in the lower extremities | Cauda equina syndrome |
| Recent onset of bowel dysfunction, or acute onset of bladder dysfunction in association with low back pain | Cauda equina syndrome |
| Unexplained weight loss | Malignancy |
| Prior history of cancer | Malignancy |
| Pain that is worse with recumbency, or worse at night, pain at rest | Malignancy |
| Fever, or recent bacterial infection | Infection |
| Intravenous drug abuse or immunosuppression | Infection |
| Prolonged steroid use | Osteoporosis |
| Pain that does not change with change in position | Kidney disease |

## PTOT-9.2.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score =1.2 points [82]) OR The Oswestry Disability Index (ODI) with a score of 20% or higher (Minimally Clinically Important Difference of 12.8% or 6.4 raw points [37]) OR The StarT Back Screening Tool (SBT) with a score of >3 ([58]) OR Roland-Morris Disability Questionnaire[136].
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
  - Positive neurological signs



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- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
  - Patient's level of independence
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently

## PTOT-9.2.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.



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## PTOT-9.2.6: Referral Guidelines

Refer patient to their primary care provider, for evaluation of alternative treatment options if:

- Improvement does not meet above guidelines or improvement reaches a plateau;
- Atrophy of lower extremity occurs;
- Signs of fracture or dislocation occurs;
- Increased neurologic signs/symptoms: increased LE numbness/tingling, increased LE weakness, increased LE pain, decreased LE reflexes.

## PTOT-9.2.7: Section intentionally left blank

## PTOT-9.2.8: Physical and Occupational Therapy Management/Intervention

- Natural history studies demonstrated that 70% of patients with lumbar radiculopathy showed improvement within 4 weeks following onset of symptoms (Alentado et al. 2014).
- General Activity Advice and Education (high level of evidence)
  - Clinicians are encouraged to educate patient/clients to continue/rapidly resume normal daily activities which have been shown to lead to quicker recovery and improved overall function. Patients should progressively increase their physical activity levels according to an agreed plan rather than being guided by their pain level. [26,36,72,118,152,167]
- Manual therapies (moderate to high level of evidence)
  - Mobilization/manipulation technique interventions for the lumbar spine are recommended to provide added help to shorten pain duration, range of motion and patient satisfaction. Moderate evidence for recommending thrust manipulation within 1-2 weeks after onset of symptoms.[8,17,20,57,60,93,142,152]
  - Mobilization/Manipulation may not be effective in chronic LBP. [137]
  - Manual therapy techniques for improvement of hip mobility is recommended due to emerging evidence of moderate to high level supporting improvement in lumbar symptoms with improvement in hip passive movement [21,55,11,125,132,172,173]
- Exercise/training and centralization/directional preference exercise (moderate to high level of evidence)
  - It is not recommend that clinicians prescribe specific exercises during the first few weeks after an initial onset of low back pain. Both systematic and guidelines show varying or no effect of early exercise. [20,51,162,164]
  - Centralization and directional preference exercises.[2,19,31,102,103,115,143,170]
  - Motor Control, Core specific, or Stabilization exercises are no better than General Exercises in the long term. [145,169]
  - Clinician's should consider Group Exercise programs for non-specific LBP.[126,135,153]
  - Trunk coordination, endurance and strengthening exercises [24,76,80,83,97,104,131]
  - Aerobic Exercise is suggested (chronic) [98,112]



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- Multidisciplinary Rehabilitation (chronic) [25]
- Superficial Heat (acute) [25]
- Dry Needling (chronic) [25,66]

- Clinical Interventions Not Recommended (moderate to high level of evidence or lacks sufficient evidence (noted) to recommend)
  - Traction [11,38,62,140,154,163]
  - Therapeutic ultrasound [67,157]
  - Electrotherapy modalities including TENS and electrical stimulation [155,163]
  - Laser modality [37,68]
  - Kinesiotaping [1,165]
  - Phonophoresis [67]
  - Low Level Laser Therapy- insufficient evidence [68]
  - Pilates- insufficient evidence [175]
  - Muscle Energy Technique- insufficient evidence [57]

## PTOT-9.2.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents [85]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[42, 56]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[99]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.



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- Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues. [43,44]

**Growth/Maturation**

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[34,160]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development. [113]

**Overuse/Sport**

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest. [7]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation. [160]

**Hypermobility**

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without. [141]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers. [159]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility: [28]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.



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- More therapy may be recommended during pubertal changes if decline in function is shown.

## PTOT-9.2.10: Home and Self-Care techniques

The importance of educating patients to understand that uncomplicated mechanical low back pain (LBP) has a natural course of recovery cannot be overemphasized. The patient can be taught to use medical equipment and administer self-care at his residence. General recommendations are to resume normal, or near normal, activity as soon as possible.

### Home Medical Equipment

- Hot pack/cold pack

### Self-Care Techniques

- Postural advice, instruction in proper body mechanics
- Flexibility exercises
- Lumbar stabilization exercises
- Aerobic conditioning, such as walking or swimming
- Heat applications, cold packs, if needed, to relieve discomfort/stiffness
- Proper Nutrition
- Stress management

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# PTOT-9.3: Lumbar Spinal Stenosis

## PTOT-9.3.1: Synonym

- Degenerative spinal stenosis (DSS)
- Spinal Stenosis
- Lumbar Stenosis

## PTOT-9.3.2: Definition

Lumbar spinal stenosis is defined as any narrowing of the lumbar spinal canal, nerve root canals, and/or intervertebral foramina that may encroach on the nerve roots of the lumbar spine. Facet joint arthrosis and hypertrophy, bulging and thickening of the ligamentum flavum, posterior/lateral bulging of the disk, and degenerative spondylolisthesis are the most common changes contributing to lumbar spinal stenosis. Spinal stenosis is largely a degenerative condition; however, in some cases it occurs as a congenital narrowing of the spinal canal. Because degenerative changes are the predominant cause of lumbar spinal stenosis, patients are generally older than age 50 with a long history of low back pain. [181]

## PTOT-9.3.3: Section intentionally left blank

## PTOT-9.3.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score =1.2 points [86]) OR The Oswestry Disability Index (ODI) with a score of 20% or higher (Minimally Clinically Important Difference of 12.8% or 6.4 raw points [40]) OR The StarT Back Screening Tool (SBT) with a score of >3 [64]) OR Roland-Morris Disability Questionnaire[140]
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
  - Positive neurological findings
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
  - Patient's level of independence



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- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinically Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently

## PTOT-9.3.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-9.3.6: Referral Guidelines

- Refer patient to their primary care provider, for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines or improvement reaches a plateau;
  - Atrophy of lower extremity occurs;
  - Signs of fracture or dislocation occurs;
  - Increased neurologic signs/symptoms: increased LE numbness/tingling, increased LE weakness, increased LE pain, decreased LE reflexes.



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## PTOT-9.3.7: Clinical Presentation

- Most patients have symptoms of pain, and/or numbness of one or both legs.
- Chronic nerve compression may lead to diminished lower extremity reflexes and strength or sensation deficits.
- Lumbar range of motion, particularly in extension, is limited and painful, often reproducing leg symptoms.
- Symptoms tend to be posture dependent, worsening with spinal extension, and improving with flexion.
- Compression of the nerve within the canal may result in a limitation of the arterial supply or claudication resulting from the compression of the venous return (neurogenic claudication).
- Neurogenic claudication presents as poorly localized pain, paresthesias, and cramping of one or both lower extremities.
- Symptoms are provoked by walking and relieved by sitting or bending [76]
- Flattened lumbar lordosis
- Lumbar ROM restrictions side bending is often limited bilaterally
- Deficits in vibratory or pinprick sensation
- Strength and reflex deficits
- Diminished walking tolerance

### Specific Considerations

- Rule out red flags (require medical management and/or referral to physician) See Table below.
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.



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| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Onset following minor fall, or heavy lifting in elderly or osteoporotic patient | Fracture |
| Direct blow to the back in young adult | Fracture |
| Saddle anesthesia | Cauda equina syndrome |
| Severe or progressive neurologic complaints | Cauda equina syndrome |
| Global or progressive motor weakness in the lower extremities | Cauda equina syndrome |
| Recent onset of bowel dysfunction or acute onset of bladder dysfunction in association with low back pain | Cauda equina syndrome |
| Unexplained weight loss | Malignancy |
| Prior history of cancer | Malignancy |
| Pain that is worse with recumbency or worse at night | Malignancy |
| Fever or recent bacterial infection | Infection |
| Intravenous drug abuse or immunosuppression | Infection |
| Prolonged steroid use | Osteoporosis |

## PTOT-9.3.8: Physical/Occupational Therapy Management

Current evidence for surgical and non-surgical treatment to improve walking ability is of low and very low quality and thus prohibits strong recommendations to guide clinical practice. [7]

The treatment plan needs to be individualized based on patient presentation (Besen, E., et al 2015; Whitman, JM et al 2006). There is moderate evidence showing patients with lumbar spinal stenosis who were surgical candidates and who consented to surgery achieved similar long-term functional gains when offered surgical decompression compared with an evidence-based PT regimen. [41] Self-management strategies may be a practical and effective means to improve walking ability, functional status, and quality of life in this chronic and often progressive condition. [11]

### General Treatment Considerations when lower back pain is present

- Manual therapies (moderate to high level of evidence)
  - Mobilization/manipulation technique interventions for the lumbar spine are recommended to provide added help to shorten pain duration, range of motion and patient satisfaction. Moderate evidence for recommending thrust manipulation within 1-2 weeks after onset of symptoms. [9,20,23,26,35,60,63,98,146,156]
  - Mobilization/Manipulation may not be effective in chronic LBP[141]
  - Manual therapy techniques for improvement of hip mobility is recommended due to emerging evidence of moderate to high level supporting improvement in lumbar symptoms with improvement in hip passive movement. [23,57,128,135,175,176]
- Exercise/training and centralization/directional preference exercise (moderate to high level of evidence)
  - It is not recommend that clinicians prescribe specific exercises during the first few weeks after an initial onset of low back pain. Both systematic and guidelines show varying or no effect of early exercise.[22,53,165,167]



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- Centralization and directional preference exercises.[2,21,105,106,118,146,173]
- Motor Control, Core specific, or Stabilization exercises are no better than General Exercises in the long term.[148,172,178]
- Clinician's should consider Group Exercise programs for non-specific LBP.[129,138,156]
- Trunk coordination, endurance and strengthening exercises[26,79,83,86,100,107,134,179]
- Aerobic Exercise is suggested (chronic)[101,115]
- Multidisciplinary Rehabilitation (chronic)[27,91]
- Superficial Heat (acute)[27]
- Dry Needling (chronic) [27,68]

- Clinical Interventions Not Recommended (moderate to high level of evidence or lacks sufficient evidence (noted) to recommend)
  - Traction [13,40,64,143,158,166]
  - Therapeutic ultrasound [69,160]
  - Electrotherapy modalities including TENS and electrical stimulation [158,166]
  - Laser modality [69,70]
  - Kinesiotaping [1,168]
  - Phonophoresis [69]
  - Low Level Laser Therapy- insufficient evidence [70]
  - Pilates- insufficient evidence [178]
  - Muscle Energy Technique- insufficient evidence [59]

**Considerations Specific to Lumbar Spinal Stenosis**

- Exercise/training and directional preference exercise (based on favorable evidence)
  - Flexion exercises for the lumbar spine should be emphasized, as they reduce lumbar lordosis and decrease stress on the spine. Spinal flexion exercises increase the spinal canal dimension, thus reducing neurogenic claudication (NC). Williams' flexion-biased exercises target increased lumbar lordosis, paraspinal and hamstring inflexibility, and abdominal muscle weakness [175]
  - Lumbar extension exercises should be avoided in this population, as spinal extension and increased lumbar lordosis are known to worsen this condition.[175]
  - Ultrasound may provide transient analgesia and increased soft tissue flexibility.[175]
  - General conditioning activities are useful and may include stationary cycling and treadmill walking[175]
- Manual therapies (based on favorable evidence)
  - Manual therapy may be of benefit in addition to exercise and self-management programs.[7,135,175]
- Acupuncture- Acupuncture may be helpful as an adjunct therapy [49]
- Clinical Interventions Not Recommended (moderate to high level of evidence or lacks sufficient evidence (noted) to recommend)
  - Traction- lacks sufficient evidence
  - Transcutaneus Electrical Nerve Stimulation (TENS)- lacks sufficient evidence



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## PTOT-9.3.9: Section intentionally left blank

## PTOT-9.3.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self -care at his residence.

### Home Medical Equipment

- Hot packs
- Cold packs
- Home electrical stimulation unit
- Treadmill
- Stationary Bicycle

### Self-Care Techniques

- Postural advice, instruction in proper body mechanics
- Lumbar stabilization exercises, flexibility exercises, as indicated
- Aerobic conditioning
- Cold/heat applications, if needed, to relieve discomfort/stiffness
- Brief use of lumbar corset type support

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# PTOT-9.4: Non-Specific Low Back Pain

## PTOT-9.4.1: Diagnoses Included:

- Lumbago
- Backache
- Non-Specific Low Back Pain
- Non-radicular Low Back Pain
- Lumbosacral segmental/somatic dysfunction
- Spinal instabilities
- Flatback syndrome
- Lumbago due to displacement of intervertebral disc
- Disorder of central nervous system, specified as central nervous system sensitivity to pain
- Persistent somatoform pain disorder

## PTOT-9.4.2: Definition

Low Back Pain is a term used to describe low back pain, nonspecific in origin, and/or nature. It can be acute, or chronic in nature. It is generally not used to describe episodes that involve radicular symptoms.

## PTOT-9.4.3: Section intentionally left blank

## PTOT-9.4.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinically Important Difference (90%CI) for average score =1.2 points [85]) OR The Oswestry Disability Index (ODI) with a score of 20% or higher (Minimally Clinically Important Difference of 12.8% or 6.4 raw points [39]) OR The StarT Back Screening Tool (SBT) with a score of >3 [63] OR Roland-Morris Disability Questionnaire.[139]
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time



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- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently

## PTOT-9.4.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.



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## PTOT-9.4.6: Referral Guidelines

- Refer patient to their primary care provider, for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines or improvement reaches a plateau;
  - Atrophy of lower extremity occurs;
  - Signs of fracture or dislocation occurs;
  - Increased neurologic signs/symptoms: increased LE numbness/tingling, increased LE weakness, increased LE pain, decreased LE reflexes.

## PTOT-9.4.7: Clinical Presentation

- The onset of pain is usually insidious, typically but not limited to occurring between the 3rd and 6th decades of life.
- Patient may report a prior history of episodic low back pain lasting over several years.
- Pain may be at rest but typically worse with motion
- May report pain in the lower back, hips, or posterior thigh (above the knee) with active motion
- Stiffness upon arising from a seated position
- Essentially constant awareness of some level of back discomfort, or limitations in motion
- Pain and stiffness in the low back which may have intermittent, sporadic, sharp local pain
- Patient is in general good health
- May relate tenderness to palpation in the lumbar spine and sacroiliac joints
- May demonstrate ROM restrictions in the lumbar spine
- Absence of neurological signs

### Special Considerations

- Rule out red flags (require medical management and/or referral to physician) See Table below.
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.



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| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Onset following minor fall or heavy lifting in elderly or osteoporotic patient | Fracture |
| Direct Blow to the back in young adult | Fracture |
| Saddle anesthesia | Cauda equina syndrome |
| Severe or progressive neurologic complaints | Cauda equina syndrome |
| Global or progressive motor weakness in the lower extremities | Cauda equina syndrome |
| Recent onset of bowel dysfunction, or acute onset of bladder dysfunction in association with low back pain | Cauda equina syndrome |
| Unexplained weight loss | Malignancy |
| Prior history of cancer | Malignancy |
| Pain that is worse with recumbency, or worse at night, pain at rest | Malignancy |
| Fever, or recent bacterial infection | Infection |
| Intravenous drug abuse or immunosuppression | Infection |
| Prolonged steroid use | Osteoporosis |
| Pain that does not change with change in position | Kidney disease |

## PTOT-9.4.8: Physical/Occupational Therapy Management/Intervention

- General Activity Advice and Education (high level of evidence)
  - Clinicians are encouraged to educate patient/clients to continue/rapidly resume normal daily activities which have been shown to lead to quicker recovery and improved overall function. Patients should progressively increase their physical activity levels according to an agreed plan rather than being guided by their pain level.[29,122,155] Manual therapies (moderate to high level of evidence)
  - Mobilization/manipulation technique interventions for the lumbar spine are recommended to provide added help to shorten pain duration, range of motion and patient satisfaction. Moderate evidence for recommending thrust manipulation within 1-2 weeks after onset of symptoms.[9,20,23,26,35,60,63,98,146,156]
  - Mobilization/Manipulation may not be effective in chronic LBP[141]
  - Manual therapy techniques for improvement of hip mobility is recommended due to emerging evidence of moderate to high level supporting improvement in lumbar symptoms with improvement in hip passive movement[23,57,128,135,175,176]
- Exercise/training and centralization/directional preference exercise (moderate to high level of evidence)
  - It is not recommend that clinicians prescribe specific exercises during the first few weeks after an initial onset of low back pain. Both systematic and guidelines show varying or no effect of early exercise.[22,53,165,167]
  - Centralization and directional preference exercises[2,21,105,106,118,146,173]
  - Motor Control, Core specific, or Stabilization exercises are no better than General Exercises in the long term.[148,172,178]
  - Clinician's should consider Group Exercise programs for non-specific LBP[129,138,156]
  - Trunk coordination, endurance and strengthening exercises[26,79,83,86,100,107,134,179]



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- Aerobic Exercise is suggested (chronic)[101,115]
- Multidisciplinary Rehabilitation (chronic)[27,91]
- Superficial Heat (acute) [27]
- Dry Needling (chronic) [27,68]

- Clinical Interventions Not Recommended (moderate to high level of evidence or lacks sufficient evidence (noted) to recommend)
  - Traction[13,40,64,143,158,166]
  - Therapeutic ultrasound[69,160]
  - Electrotherapy modalities including TENS and electrical stimulation[158,166]
  - Laser modality[69,70]
  - Kinesiotaping[1,168]
  - Phonophoresis[69]
  - Low Level Laser Therapy- insufficient evidence[70]
  - Pilates- insufficient evidence[178]
  - Muscle Energy Technique- insufficient evidence[59]

## PTOT-9.4.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - participation in recess,
  - physical education,
  - play and other physical activities similar to peers,
  - navigating school hallways,
  - socializing with peers,
  - employment for adolescents[85]
  - Sport participation is not a required daily activity at any age.

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[42,56]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[99]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.



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- Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[43,44]

**Growth/Maturation**

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[34,160]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[113]

**Overuse/Sport**

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[7]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[160]
  - Hypermobility
- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[141]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers. [159]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[28]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.



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- More therapy may be recommended during pubertal changes if decline in function is shown.

## PTOT-9.4.10: Home and Self-Care Techniques

The importance of educating patients to understand that uncomplicated mechanical low back pain (LBP) has a natural course of recovery cannot be overemphasized. The patient can be taught to use medical equipment and administer self-care at his residence. General recommendations are to resume normal, or near normal, activity as soon as possible.

### Home Medical Equipment

- Hot pack/cold pack

### Self-Care Techniques

- Postural advice, instruction in proper body mechanics
- Flexibility exercises
- Lumbar stabilization exercises
- Aerobic conditioning, such as walking or swimming
- Heat applications, cold packs, if needed, to relieve discomfort/stiffness
- Proper Nutrition
- Stress management

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# PTOT-10.0: Section intentionally left blank

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# PTOT-11.1: Shoulder Adhesive Capsulitis

## PTOT-11.1.1: Diagnoses Included:

- Adhesive capsulitis
- Frozen Shoulder
- Shoulder periarthritis

## PTOT-11.1.2: Definition

Adhesive Capsulitis is a common cause of shoulder pain and stiffness. The pain and stiffness has been reported to last up to 2 or even 3 years. The early stages can often be very painful [26].

Other terms used as a descriptive diagnosis of the same cluster of presentation are "Frozen Shoulder" and "Periarthritis". Adhesive capsulitis generally occurs on a continuum characterized by progression of pain and reduced mobility of the shoulder through stages. Loss of mobility and function may be minimal or significant. Current theoretical evidence suggests the capsuloligamentous complex and musculotendinous structures surrounding the shoulder are involved.

## PTOT-11.1.3: Clinical Presentation

A general presentation would demonstrate shoulder pain and progressive loss of passive motion in multiple planes of motion of the shoulder, especially in external rotation and abduction. [4]

### Special Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect physical therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.
- Patients with diabetes mellitus and thyroid disorders are at risk.
- Greater prevalence in individuals 40-65 years of age
- More prevalent in female patients



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| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture, rotator cuff tear, tendon rupture |
| Exertional, history of cardiac diagnosis | Cardiac pain can radiate to the shoulder |
| Constant, relieved/worse with meals, positional, associated with fatty meals | Gastrointestinal diseases including cholelithiasis |
| Pleuritic, shortness of breath, associated with cough | Pulmonary diseases |
| Multiple joint involvement, tophi | Rheumatology diseases (gout) |
| Fever, severe pain | Possible infection |
| Cancer history | Cause of symptoms (metastatic or primary) |
| Unilateral edema | Upper extremity deep vein thrombosis |
| Immune-compromised state | Infection |
| Discoloration of hand, cold | Arterial occlusion |

## PTOT-11.1.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points [20]) OR the Disability of the Arm, Hand and Shoulder score (DASH) OR QuickDASH with a score of 11 or higher (Minimal Clinically Important Difference of 10 and 15 points respectively [14]) OR The Shoulder Pain and Disability Index (SPADI) with a score of 20 or higher (minimum clinical important difference of 8-13 points [7,27])
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)



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- Reduction in complicating factors (such as positive neurological signs)
- The patient is unable to maintain progress independently

## PTOT-11.1.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
  - The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
  - Achievable goals that are related to activities of daily living have been met.
  - Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
  - No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
  - A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
  - If, or when, the member has been non-compliant with the treatment plan.
  - Therapy services are for pain mediation alone.
  - Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
  - Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
  - Therapy services are for sports performance enhancement only.

## PTOT-11.1.6: Section intentionally left blank

## PTOT-11.1.7: Section intentionally left blank

## PTOT-11.1.8: Physical/Occupational Therapy Management/Intervention

Conservative treatment of shoulder disorders generally includes rest, medication and specific rehabilitation approaches.[30] These may include exercise, manual therapy and various therapeutic modalities. Use of modalities and/or passive treatments should be limited. The goal is to transition the patient as quickly as possible to active care, self-management and functional independence. The interventions should be designed to improve the movement and function of the patient and lessen or alleviate the activity limitations commonly reported by the patients who meet the diagnostic criteria of that pattern [23]

- High Recommendation
  - Outcome Measures:
  - Strong evidence, Highly recommended Grade A[4,22,23]
    - There are several outcome measures designed to assess patients with shoulder disorders. These tools can be classified as shoulder joint specific, shoulder disease specific or upper limb specific. Over 30 tools have been published. Validated functional outcome measures should be used before and



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after interventions intended to alleviate the impairments of body function and structure, activity limitations and participation restrictions.
    - Patient Education: Level I evidence, Grade B recommendation [4]

- Clinicians should utilize patient education that describes the natural course of adhesive capsulitis, promotes activity modification to allow pain-free ROM and function. Providers should also educate patients to match the intensity of stretching to their level of irritability.

- Moderate Recommendation
    - Therapeutic exercise (therapeutic ex.):
        - Stretching Exercises – Fair level of evidence II, Grade B [4]. Clinicians should instruct patients in stretching exercises. Intensity should be determined by the patient's irritability level.
        - Activity based programming more effective than manual therapy and PNF after 10 visits (30 minute each) over 3 months time. Based on one level II study [21]
    - Fair evidence Level II for non-specific shoulder pain
        - Often supplemented with joint mobs techniques: not proven to be superior to therapeutic ex alone for pain reduction, increase in ROM and function and decrease in disability [10].
        - Exercise is effective for producing small improvement in ROM [28]
        - Comparison of customized vs. standard exercise: equally effective in increasing strength, function and decreasing pain intensity [29]
    - Manual Therapy:
    - Joint Mobilization – Fair to moderate evidence level II, IV Grade C [4]
        - Utilization of joint mobilization mainly at the glenohumeral joint to reduce pain and increase motion and function. There is no evidence to suggest superiority compared to other interventions. There is no evidence to specify supervised care frequency. There is also evidence to suggest that joint mobilization along with a home program may be superior to joint mobilization alone (level II).
    - Manual Therapy combined with exercise – Moderate to low evidence. [26]
        - The best available data indicates that combination of manual therapy and exercise may not be as effective as steroid injection in the short term. After an injection, manual therapy and exercise may have similar effects to sham ultrasound; but it may provide greater patient reported outcomes.
        - Shoulder jt. mobs combined with hot pack active exercise stretching, soft tissue mobilization and education, may improve acute shoulder pain in the short term compared to combined treatments alone. Level I [8]
        - Manipulative therapy in addition to usual medical care accelerates recovery of shoulder symptoms [9].
        - Joint mobs useful to reduce pain and increase ROM and function for adhesive capsulitis Grade C Level III/IV (weak evidence) [3]



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- Neutral Recommendation
  - Modalities:
  - High to weak evidence for recommendation: conflicting
    - Heating or electrical modalities can have positive benefit on pain, theoretically. The impact of modality use on the natural course of adhesive capsulitis has not been determined. Use of ultrasound, diathermy or electrical stimulation may help to reduce pain and improve ROM. Level II-IV, Grade C [4]
- Low Recommendation
  - Trigger Point Dry Needling
    - Very low quality to moderate quality evidence suggests that dry needling is more effective that no treatment, sham and other treatments for reducing pain. Low quality evidence suggests superior outcomes for function when compared to no treatment. There is no difference in functional outcomes with compared to other therapy treatments. Any long term benefit evidence is lacking. Level 1a. [15]
- Not Recommended
  - Ultrasound – US did not have any additional effect when added to exercise and mobilization. Also, strong to moderate recommendation based on level I-II evidence. [2,13]
  - Transcutaneous electrical nerve stimulation (TENS):
    - Insufficient evidence to include or exclude for shoulder pain
    - Weak evidence Level III/IV for adhesive capsulitis combined with mobility and stretching. [22,23]
  - Kinesiotaping:
    - No Significant changes between taping and sham taping on pain or kinematics in individuals with shoulder pain [6]
    - Current evidence does not support the use of “Kinesio Taping” for shoulder pain (among other conditions) after systematic review. [30]

## PTOT-11.1.9: Section intentionally left blank

## PTOT-11.1.10: Home and Self-Care Techniques

Stretching Exercises – Fair level of evidence II, Grade B [4]. Clinicians should instruct patients in stretching exercises. Intensity should be determined by the patient’s irritability level.

Education on activity modification and keeping activity within the limits of pain and function [19]

The patient can be taught to use medical equipment and administer self-care at his residence. The qualified health care provider should be able to educate the patient on a regular home exercise program. There does not appear to be a difference between exercise done at home or the clinic. [24]



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## Home Medical Equipment

- Hot packs/cold packs
- Pulleys for self assisted range of motion
- Theraband for therapeutic exercises

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# PTOT-11.2: Shoulder Fractures (Non-surgical)

## PTOT-11.2.1: Diagnoses Included

- Proximal Humeral Fracture
- Clavicular Fracture
- Glenoid Fracture

## PTOT-11.2.2: Definition

Upper limb fractures are a common injury affecting most age groups. The most common upper limb fracture occurs along the proximal third of the humerus. [7] Whereas the shoulder complex involves not only the proximal portion of the humerus, but the scapulae and the clavicle, fractures to any of these bones could impact function. It is also common for people with fractures affecting the shoulder to be referred to physical therapy to help restore lost function. Prior to attending physical therapy, some fractures may be surgically stabilized. For the purposes of this guideline section, only non-surgical shoulder fracture rehabilitation will be considered. Guidelines for post-surgical rehabilitation of shoulder fixation will be considered as part of the shoulder post-surgical guideline found in a separate section.

## PTOT-11.2.3: Clinical Presentation

- Shoulder pain
- Arm immobilized in sling, splint or swath
- Report of X-ray or other radiologic findings
- Pain with movement
- Reduce strength, especially if had prolonged casting or other immobilization

### Special Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect physical therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.
- Patients with diabetes mellitus and thyroid disorders are at risk.
- Greater prevalence in individuals 40-65 years of age
- More prevalent in female patients
- Length of immobilization
- Other joints involved (elbow, wrist, neck)



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| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture, rotator cuff tear, tendon rupture |
| Exertional, history of cardiac diagnosis | Cardiac pain can radiate to the shoulder |
| Constant, relieved/worse with meals, positional, associated with fatty meals | Gastrointestinal diseases including cholelithiasis |
| Pleuritic, shortness of breath, associated with cough | Pulmonary diseases |
| Multiple joint involvement, tophi | Rheumatology diseases (gout) |
| Fever, severe pain | Possible infection |
| Cancer history | Cause of symptoms (metastatic or primary) |
| Unilateral edema | Upper extremity deep vein thrombosis |
| Immune-compromised state | Infection |
| Discoloration of hand, cold | Arterial occlusion |

## PTOT-11.2.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points [14]) OR the Disability of the Arm, Hand and Shoulder score (DASH) OR QuickDASH with a score of 11 or higher (Minimal Clinically Important Difference of 10 and 15 points respectively [10]) OR The Shoulder Pain and Disability Index (SPADI) with a score of 20 or higher (minimum clinical important difference of 8-13 points [5,19])
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)



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- Reduction in complicating factors (such as positive neurological signs)
- The patient is unable to maintain progress independently

## PTOT-11.2.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-11.2.6: Section intentionally left blank

## PTOT-11.2.7: Section intentionally left blank

## PTOT-11.2.8: Physical/Occupational Therapy Management/Intervention

There has been recent evidence to suggest that in patients with displaced proximal humeral fractures involving the surgical neck surgical intervention does not lead to better outcomes up to two years after the injury .[12,18] When adhering to the ProFHER protocol, patients with non-surgical intervention were given a sling for a period of time followed by active rehabilitation within the National Health Service (United Kingdom). An informational pamphlet about self-care was used during the sling period. Basic physical therapy and promotion of a home program followed [18]. More complex fractures may require surgical intervention. Evidence based recommendation of treatment is limited and will be combined with a shoulder post-surgical guideline.



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However, there is evidence to suggest improved outcomes and fracture union for displaced clavicle fractures that are corrected surgically compared to non-surgically [1]. There may be more patients seeking non-surgical rehabilitation following displaced proximal humeral fractures than with displaced clavicle fractures.

The interventions should be designed to improve the movement and function of the patient and lessen or alleviate the activity limitations commonly reported by the patients who meet the diagnostic criteria of that pattern [15].

In a systematic review ranging from 1985 to 2004 the authors were not able to find research of high enough quality to assess the use of treatment modalities in proximal humeral fractures. All 66 studies identified were of too low quality to support a decision either way.[16]

- High Recommendation
  - Outcome Measures:
  - Strong evidence, Highly recommended Grade A [12,18]
    - There are several outcome measures designed to assess patients with shoulder disorders. These tools can be classified as shoulder joint specific, shoulder disease specific or upper limb specific.
- Moderate Recommendation
  - Manual Therapy:
    - Early vs Delayed mobilization of proximal humeral fracture (minimally displaced): low quality evidence in favor of early mobilization. May result in fewer problems at one year, less overall sessions of physical therapy and better quality of life at 16 weeks. [12]
- Neutral Recommendation
  - Early Introduction of exercise for Proximal Humeral Fractures
    - Starting exercise earlier after conservatively managed fractures can reduce pain in the short term and increase activity. Three studies started with the first week following fracture compared to 3 weeks. After one year, early exercise group showed less disability. Multiple moderate to low quality studies [7]
- Low Recommendation
  - Supervised exercise vs home only for proximal humeral fractures
    - Upon review, there was preliminary evidence that adding supervised exercise to a home program may reduce upper limb activity and increase short term impairment. [7]
  - Supervised therapy plus a home program compared to home program alone for proximal humeral fractures.
    - There is no available evidence that adding supervised exercise to a home exercise program (compared to a home program alone) improves upper limb activity or reduces impairment [7]



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- Not Recommended
  - Kinesiotaping:
    - No Significant changes between taping and sham taping on pain or kinematics in individuals with shoulder pain [4]
    - Current evidence does not support the use of "Kinesio Taping" for shoulder pain (among other conditions) after systematic review.[20]
  - Therapeutic Ultrasound:
    - The addition of ultrasound was not superior to placebo ultrasound when used as part of physical therapy in the short term for shoulder pain [2]

## PTOT-11.2.9: Section intentionally left blank

## PTOT-11.2.10: Home and Self-Care Techniques

Current evidence suggests that patients with proximal humeral fractures do not have any additional benefit and may have some short term reduced upper arm ability when additional exercise is given beyond a home program. [7] However early introduction to exercise and movement may help to reduce pain and increase arm use.[7,12]

### Home Medical Equipment

- Hot packs/cold packs
- Pulleys for self-assisted range of motion
- Theraband for therapeutic exercises

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# PTOT-11.3: Shoulder Non-Specific Conditions

## PTOT-11.3.1: Diagnoses Included

- Shoulder Pain and Dysfunction
- Shoulder Myofascial Pain
- Shoulder Dislocation
- Shoulder Sprain
- Acromioclavicular Sprain
- Glenohumeral Joint Degenerations
- Other shoulder conditions not associated with fracture, surgery, tendinopathy or capsular adhesions

## PTOT-11.3.2: Definition

For the purpose of these guidelines “shoulder” refers to the articulation of the scapula, clavicle and humerus together with the ligaments, tendons, muscles and other soft tissues with a functional relationship to these structures [8]. There is no universal definition of shoulder pain. Types of shoulder pain:

- “Acute shoulder pain” is defined as pain that has been present for less than three months. It does not refer to the severity or quality of the pain.
- “Chronic shoulder pain” is pain that has persisted for longer than 3 months.[8]

## PTOT-11.3.3: Clinical Presentation [40]

- Patient will present with shoulder pain
- Patient may present with limited shoulder movement, however shoulder mobility may be within functional limits
- The patient’s condition may be related to a specific injury or the onset may be insidious.
- Often associated with functional weakness of the affected shoulder and arm
- Pain with daily activity and self-care
- Better with rest, but the patient may complain of trouble sleeping on the affected side

### Special Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related and to what extent and nature of the event. Moderate evidence, grade B [8,19,41]



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| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture, dislocation, rotator cuff tear |
| Exertional, history of cardiac disease | Cardiac pain can radiate to the shoulder |
| Constant, relieved/worse with meals, positional, associated with fatty meals | Gastrointestinal diseases including cholelithiasis and perforated ulcer |
| Pleuritic pain, shortness of breath, associated with cough | Pulmonary diseases |
| Multiple joint involvement | Rheumatology diseases |
| Fever, severe pain | Possible infection |
| Cancer history, night pain | Cause of symptoms (metastatic or primary) |
| Unilateral edema | Upper extremity deep vein thrombosis |
| Immune-compromised state | Infection |
| Unexplained weight loss | cancer or autoimmune dysfunction |
| Pain at rest or unrelated to activity | visceral source |
| History of smoking | lung cancer and referred pain from cancer |
| Other conditions referring to the shoulder | cervical radiculopathy |

## PTOT-11.3.4: Requirements for Physical/Occupational Therapy Visits

Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:

- Functional Outcome Measurements showing significant functional limitations using the **Patient Specific Functional Scale (PSFS)**– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points [36]) OR the Disability of the Arm, Hand and Shoulder Score (DASH) **OR QuickDASH** with a score of 11 or higher (Minimal Clinically Important Difference of 10 and 15 points respectively [27]) OR **The Shoulder Pain and Disability Index (SPADI)** with a score of 20 or higher (minimum clinical important difference of 8-13 points [6])
- ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
- Pain: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided



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- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently

## PTOT-11.3.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-11.3.6: Referral Guidelines

- Refer patient to their primary care provider for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines, or improvement has reached a plateau
  - Atrophy of upper extremity occurs



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## PTOT-11.3.7: Section intentionally left blank

## PTOT-11.3.8: Physical/Occupational Therapy Management/Intervention (evidence based)

- Shoulder pain is one of the most common reasons that people seek medical attention. Prospective studies in Europe have shown approximately 11 out of 1000 patients seen by a family practitioner have shoulder pain. Over 50% of patients diagnosed by a general practitioner to have shoulder tendonitis are referred to physical therapy [3].
- There is a wide variety of treatment approaches, likely related to uncertainty about the efficacy of these multiple interventions. The interpretation of shoulder pain research is complicated by the broad inclusion criteria that allow mixed populations with different etiologies of shoulder pain.
- Differential evaluation of musculoskeletal findings is used to determine the most relevant physical impairments associated with the patient's reported activity limitations and medical diagnosis. Clusters of the clinical findings that commonly co-exist in patients are described as impairment patterns and are labeled according to the key impairments in body functions associated with that cluster. The impairment patterns drive the interventions which focus on normalizing the key impairments of body function. The interventions are designed to improve the movement and function of the patient and lessen or alleviate the activity limitations commonly reported by the patients who meet the diagnostic criteria of that pattern. Patients often fit more than one impairment pattern and the most relevant impairments and intervention may change during the course of their rehab. Thus, it is very important to continually re-evaluate.[41]

**It is important to take prognostic risk factors into consideration and to intervene early to prevent progression to chronic pain. [8]**

- High Recommendation
  - Outcome Measures:
  - Strong evidence, Highly recommended Grade A [40,41]
    - There are several outcome measures designed to assess patients with shoulder disorders. These tools can be classified as shoulder joint specific, shoulder disease specific or upper limb specific. Over 30 tools have been published. Validated functional outcome measures should be used before and after interventions intended to alleviate the impairments of body function and structure, activity limitations and participation restrictions.
- Moderate Recommendation
  - Therapeutic exercise (therapeutic ex.):
  - Moderate evidence with mod recommendation Grade B
  - Fair evidence Level II for non-specific shoulder pain
  - Focus on scapular control may be more effective than primary focus on deltoid/rotator cuff strength after 12 weekly visits for rehabilitation of glenohumeral instability [71]



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- May improve shoulder pain compared to placebo in people with rotator cuff disease in both short and long term with improvement in function and abduction. (Level I) [1,3,8,41]
- Therapeutic ex.: an effective intervention for pts. with shoulder dysfunction.
- Often supplemented with joint mobs techniques: not proven to be superior to therapeutic ex alone for pain reduction, increase in ROM and function and decrease in disability.[14]
- Exercise is effective for producing small improvement in ROM.[63]
- Comparison of customized vs. standard exercise: equally effective in increasing strength, function and decreasing pain intensity.[71]
- Home exercise program effective in improving symptoms and reduced disability.[44]
- One hour of strength training/week effective in reducing neck and shoulder pain with fewer and longer sessions providing more gains than shorter more frequent.[5]
- Specific exercise is effective in reducing pain, improving function and reduced need for surgery at 3 months.[34]
- Graded exercise is more effective in restoring ADL's in chronic patients vs. usual care.[74]
- Core training should be considered in strengthening program for shoulder due to increased isometric peak torque of glenohumeral movements (Clinically significant).[47]
- Cross body stretch more effective than no stretch and more effective than sleeper stretch in improving int. rotation.[48]
- Exercise, multiple physical modalities are all equally effective in restoring neuromuscular control short term.[31]
- Stretching exercises for adhesive capsulitis with intensity determined by tissue irritability. Moderate evidence Level I /II. [40,41]
- For chronic pain patients: Activity modification: reduce overhead activity, avoid painful arc 60-120 degrees, avoid heavy loading. Stretching and strengthening exercises should be done to relieve pain by improving overall shoulder function and provide short term recovery and long term results.[15]

- Manual Therapy:
  - Manual therapy may decrease pain in shoulder tendinopathy. It is unclear whether it can improve function. Level 1a.[22]
  - Shoulder jt. mobs combined with hot pack active exercise stretching, soft tissue mobilization and education, may improve acute shoulder pain in the short term compared to combined treatments alone. Level I. [8]
  - Manual therapy combined with home exercise: no short term effects but greater improvement noted at follow up (22 weeks) with shoulder function and strength suggest benefits with active treatment take longer to manifest. [9]
  - Manual therapy added to an exercise protocol for shoulder impingement did not increase improvements compared to exercise alone. Level 1b. [16]
  - Combined manual therapy with multimodal or exercise therapy, Grade B.[12]
  - Minor neurogenic shoulder pain and shoulder osteoarthritis respectively. Limited Level C and insufficient evidence.[8]



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- Manipulative therapy in addition to usual medical care accelerates recovery of shoulder symptoms.[10]
- Clinically relevant: the number of muscles with active myofascial trigger points was significantly reduced.[13]
- Scapular mobs may be useful: small increase in ROM and decrease in pain.[61]
- STM with stretching can benefit shoulder posture and muscle function.[11]
- High grade mob technique more effective (by small amount) than low grade technique in improving joint mobility and reducing disability. End range mobility for capsulitis was increased, poor study no control.[68]
- Manipulation more effective than exercise in treating more intense pain in shoulder and neck.[62]
- No data for calcific tendonitis, insufficient data for capsulitis, bursitis, tendonitis non-specific pain.[3]
- Joint mobs useful to reduce pain and increase ROM and function for adhesive capsulitis Grade C Level III/IV (weak evidence).[3]

- Neutral Recommendation
  - Therapeutic ultrasound:
  - High to weak evidence for recommendation: conflicting
    - Good evidence Level 1, RCT good recommendation. Grade A for pain and function. Clinically important benefit for short term relief of calcific shoulder tendonitis for 2 month period, no difference at end of 9 months [3].
    - Grade C Level 1: for capsulitis bursitis and tendonitis, non-specific pain [3].
    - Pulsed ultrasound was not beneficial. [75]
    - Adhesive capsulitis some ROM increase, Level II [41]
    - Ultrasound is commonly used in physiotherapy management of musculoskeletal pain in peripheral joints. Study demonstrated ultrasound has no clinical benefit beyond that of placebo ultrasound in physiotherapy treatment of shoulder pain.[2].

- Low Recommendation
  - Therapeutic Ultrasound when combined with other physical therapy interventions
    - Therapeutic ultrasound results in no improved benefit when combined with other treatments. This is due to low quality evidence. [50]
  - Activity limitations:
  - Grade F Level 5 Expert opinion:
    - Utilize easily reproducible activities[41]
    - The following measures can help to assess changes over time:
      - Pain during sleep
      - Pain and difficulty grooming and dressing
      - Pain and difficulty with reaching activities- to the shoulder level, behind back and overhead.



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- Iontophoresis:
  - No clinically important benefits of acetic acid use were observed. [50]
  - Low level of evidence: case studies: Symptoms of calcific tendonitis joint pain and tenderness soon disappear and range of motion is restored when acetic acid iontophoresis method is employed. [53].
  - Subdeltoid bursitis clinical signs and symptoms improved with use of magnesium sulfate iontophoresis. [72]
- Trigger Point Dry Needling
  - There does not appear to be additional benefit by performing dry needling along with evidence based medicine rehabilitation for shoulder pain [51]. Very low quality to moderate quality evidence suggests that dry needling is more effective that no treatment, sham and other treatments for reducing pain. Low quality evidence suggests superior outcomes for function when compared to no treatment. There is no difference in functional outcomes with compared to other therapy treatments. Any long term benefit evidence is lacking. Level 1a.[28]
- Expert opinion
  - Non Pharmacological interventions:
    - Simple interventions providing information, assurance and encouraging reasonable maintenance of activity may be used alone or in combination with other interventions for the successful management of acute musculoskeletal pain.[8]

- Not Recommended
  - Thermotherapy (heat, cold): Insufficient evidence
    - Thermotherapy (heat, cold): no data for calcific tendonitis, insufficient for capsulitis, tendonitis and bursitis, and non-specific pain. [8]
    - Insufficient Level D for cryotherapy [3]
    - Ice reduced soreness after pitching. Controlled trial non-random [73]
    - Little evidence for use of modalities alone for chronic pain patients.[15]
  - Transcutaneous electrical nerve stimulation (TENS):
  - Insufficient evidence to include or exclude for shoulder pain
    - Uncertain whether TENS is superior to placebo and whether any electrotherapy provides benefits over active interventions [50]
    - No data for calcific tendonitis and insufficient data for capsulitis, bursitis, tendonitis. Insufficient evidence: Level 1 Electrical stimulation[3]. Weak evidence Level III/IV for adhesive capsulitis combined with mobility and stretching[41].
  - Kinesiotaping:
    - No Significant changes between taping and sham taping on pain or kinematics in individuals with should pain [4]
    - Current evidence does not support the use of “Kinesiotaping” for should pain (among other conditions) after systematic review.[52]
    - No effect on pain but changed the area in overall ROM where pain was felt [43].
  - Massage:
    - No data for calcific tendonitis or insufficient data for capsulitis, bursitis, tendonitis [3]



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- Low quality of evidence for improving ROM or function. [63]

## PTOT-11.3.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents [37]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences. [26,74]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques. [42].
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues. [23,24]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation. [18,67]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development. [46]



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### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[7]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[67]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[60]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[66]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[17]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.

## PTOT-11.3.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self-care at his residence.

### Home Medical Equipment

- Theraband for therapeutic exercises
- Overhead pulleys if limited in ROM

### Self-Care Techniques

- Instruction in home exercise program for ROM and strengthening



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# PTOT-11.4: Shoulder Surgical Conditions

## PTOT-11.4.1: Diagnoses Included

- Rotator Cuff Repair (open or closed, with or without clavicle resection or decompression)
- Shoulder Replacement (partial or total)
- Arthroscopic procedures (Capsular, labral, decompression, resection or chondral)
- Reduction and Fixation (open reduction internal fixation (ORIF), plating, pinning, etc. of fracture)

## PTOT-11.4.2: Definition

**Rotator Cuff Repair**

Pain, injury and pathology are common occurrences at the shoulder especially in regards to the muscles and tendons comprising the rotator cuff complex. These occur on a continuum of severity from tendinopathy to full-thickness tears of the muscle or tendon. Causes of the injury can range from acute to degenerative in nature. When conservative care for the underlying condition fails, surgical intervention may be utilized to repair the tendon attachment. It appears that approximately 95% of repairs to muscles/tendons of the rotator cuff are now done arthroscopically. [4,16,33]

**Shoulder Replacement**

Shoulder arthroplasty involves the replacement of one or both articulating portions of the glenohumeral joint. A partial replacement may just involve the humeral head or the glenoid, whereas a total replacement would involve replacing both surfaces with prosthetics. Shoulder replacement surgery is a standard intervention for those with signification loss of function of the shoulder due to previous failed care, trauma and degenerative changes. [38]

**Arthroscopic Procedures**

For the purposes of this guideline, additional arthroscopic procedures of the shoulder may be considered aside from rotator cuff repairs. There are several procedures that may be done in combination, alone or in combination with rotator cuff repairs.

Most often, these other arthroscopic procedures fall into two categories; surgical stabilization and/or decompression. Surgical stabilization may be indicated to resolve anatomical deficits to the capsulolabral complex causing instability [20]. Subacromial decompression via surgical intervention is common as a treatment option for shoulder pain that continues unresolved despite conservative care. [5] A primary goal is to correct impingement syndromes in an effort to prevent further injury or reoccurrence of injury such as in the case of rotator cuff tears.



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**Reduction and Fixation**

Fractures to any of the bony components of the shoulder complex can occur due to trauma or as a result of underlying pathologic conditions. To maintain function, joint congruency and optimal healing of the fractured bones surgical intervention may be needed to align and secure them from movement. Hardware can vary greatly based on the type of fracture and bone quality. The most common of these is the open reduction and internal fixation of a proximal humeral fracture. [21]. Surgical fixation can certainly be utilized for fractures sustained to the clavicle or the scapula as well.

## PTOT-11.4.3: Clinical Presentation

- Pain in shoulder area
- Pain with arm movement
- Swelling, edema and ecchymosis
- Patient may present with arm immobilized
- Loss of strength
- Pain referral may be present
- ROM reduction is typical and may be significant due to immobilization
- Difficulty with daily tasks and may require help with several daily tasks
- Difficulty sleeping
- Cervical pain or tightness
- Incisions may be covered or uncovered in various stages of healing. Itchiness at surgical site is common

**Kim Test**

- Jerk Test
- Anterior Release Surprise Test

**Special Considerations**

- Rule out Red Flags
- Identify surgical complications if applicable
- Familiarize with extent and success of surgery
- Immobilization – duration and position
- Age and health of patient
- Pain control
- Post-operative precautions from the surgeon



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**Rotator Cuff Repair**
Certain consideration should be made with arthroscopic repair vs an open repair surgery. Arthroscopic repairs make up the majority of rotator cuff surgery. Patients presenting for care following an open procedure will often have more extensive incisions, more pain and less function. Age, past medical history, extent of tear, health of tissue prior to repair, duration of symptoms prior to repair, smoking and other health conditions should be considered prior to establishing a rehabilitation plan of care along with consultation from the surgeon.[16,33,35]

**Shoulder Replacement**
Even though this is becoming a common surgical procedure it is still a very invasive treatment option. It generally includes a significant amount of surgical work to several different tissues and structures including bone, muscle, tendon and capsule. Many of these structures are highly vascularized and neural. The surgery may be a result of trauma. Age, past and current medical history and potential for functional recovery are all important to consider.[28]

**Arthroscopic Procedures**
Presentation will vary depending on the extent of the injury and type of surgical procedure performed. There may have been a period of immobilization with a sling. There may have been surgical intervention to several parts of the glenohumeral complex including capsule, labrum, glenoid and distal clavicle. Various techniques are often combined. These may be secondary procedures along with a rotator cuff repair. Understanding the procedure is important [20]

Arthroscopic stabilization is common in active adolescent populations that participate in sport activity. Even after surgery, the dislocation recurrence rate remains higher than in adults [6].

**Reduction and Fixation**
Each fixation surgery will present with variations and differences based on the fracture, type of surgical hardware and technique used. Age and the health of the patient are often major factors, especially in those injured due to a fall. Surgery can be fairly invasive depending on the severity of the fracture [21]

**Red Flags**

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture, rotator cuff tear |
| Exertional, history of cardiac diagnosis | Cardiac pain can radiate to the shoulder |
| Constant, relieved/worse with meals, positional, associated with fatty meals | Gastrointestinal diseases including cholelithiasis |
| Pleuritic, shortness of breath, associated with cough | Pulmonary diseases |
| Multiple joint involvement, tophi | Rheumatology diseases (gout) |
| Fever, severe pain | Possible infection |
| Cancer history | Cause of symptoms (metastatic or primary) |
| Unilateral edema | Upper extremity deep vein thrombosis |
| Immune-compromised state | Infection |



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## PTOT-11.4.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points [23]) OR the Disability of the Arm, Shoulder and Hand score (DASH) OR QuickDASH with a score of 11 or higher (Minimal Clinically Important Difference of 10 and 15 points respectively [18]) OR The Shoulder Pain and Disability Index (SPADI) with a score of 20 or higher (minimum clinical important difference of 8-13 points [1])
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently.



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## PTOT-11.4.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-11.4.6: Section intentionally left blank

## PTOT-11.4.7: Section intentionally left blank

## PTOT-11.4.8: Physical/Occupational Therapy Management/Intervention (evidence based)

### Rotator Cuff Repair

- Specific Protocol –
  - No benefit was found in favor of any one rehabilitation method from research reviewed. Recommendation to obtain surgeon approval for early ROM and may improve function early if small to moderate tear. If a large tear was present recommendation to immobilize 4-6 weeks. More conservative treatment may be needed for massive tears, open surgery and/or additional considerations such as advanced age and poor health status. Systematic Review, moderate –good quality evidence [34]
  - Little high-level evidence exists to support specific timing or protocol of repair rehabilitation. Protocols are based on opinion of clinical expert and their experience. Systematic Review [35]



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- Supervised Therapy vs Unsupervised therapy
  - No difference between groups. Level I and II research with limitations [12]
  - Given the complexity of rehabilitation following surgery, supervised therapy is recommended despite evidence of successful recovery when compared one year out of surgery. Some evidence suggests compliance with a home program can be a problem. Expert Consensus for supervised therapy [33].
- Early Motion after surgery
  - Early motion may improve ROM better than delayed however it increases the risk retearing. Level I-III Moderate Recommendation [24]
  - Early ROM after surgery did not change the outcome or likelihood of tendon healing with small and medium tears. There were no differences in final function with early vs delayed ROM protocols. Level I [26]
- Stretching/Manual Therapy
  - Aggressive stretching should be avoided. Increased rate of re-tear with aggressive manual stretching and unrestricted self-directed stretching. Level I. A gentle approach to rehab would be better for tendon healing and could avoid risk of re-tear. Level II [26,27]
- Frequency
  - Published research lists 12-28 visits. A survey of ASSET members indicated usual care at 1x a week during first 6 weeks then increasing based on need to 2 x a week for phases 2-4 as needed. 90% of members reported usual visits at <25 for uncomplicated postsurgical care [33]
  - Range of visits for skilled care following rotator cuff repair with and without subacromial decompression for both women and men was 14-25; with an average of 14-16. Level 2b [5]
- Transcutaneous Electrical Stimulation
  - Neuromuscular electrical stimulation has been shown to improve posterior rotator cuff function after surgery, however there is little consensus on dosing and time frame. Little power to ascertain level of recommendation. [33]
- Cryotherapy
  - Favorable for use 4 to 23 hours postoperatively to decrease temperature. Level I-II recommendation [12]
  - Decreased pain and improved sleep with cryotherapy in the first 24 hours after surgery. Cryotherapy treatment during the first 10 days after surgery has been shown to reduce opioid use, reduced swelling and less pain in therapy. Evidenced through several studies upon review, Moderate Recommendation [33].



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### Shoulder Replacement

- Specific Protocol – Most rehabilitation programs are based on a protocol developed by Neer et al in 1975. However this protocol has little evidence or validation of functional outcomes. Additional published protocols are generally from expert opinion based on timelines and specific exercise. One program has not been shown to be more effective than another [38]
- Early Motion after surgery – Immediate ROM after TSA may improve a return to function more quickly than with delayed ROM. However, there is no evidence of long term differences. Immediate ROM may lower the healing rate when a lesser tuberosity osteotomy approach was used during surgery. Level I RCT [11]
- Supervised therapy vs Home program – A home based therapy program may provide adequate rehabilitation after TSA. Level III [28]

### Arthroscopic Procedures

- Specific Protocol
  - No difference in resultant function of groups receiving rehabilitation following standard care or The American Society of Shoulder and Elbow Therapists Rehabilitation Guideline for Arthroscopic Anterior Capsulolabral Repair of the Shoulder 2010. [10]
- Stretching/Manual therapy
  - Correct selection of technique and varying level of stress to the repair area are important for success. Gradual application of stress to stimulate healing but not damage tissue is important. Expert Opinion[20]
  - Caution with submaximal tensioning during healing and remodeling phases could potentially harm immature cross-linking of repaired structures in stabilization procedures. Expert Opinion [20]
- Early Motion after Surgery
  - Area of the repair will have reduced strength through first 12 weeks after surgery. Protection of the repair from undue and repetitive stress is recommended for anterior capsular repairs. Recommendation of absolute immobilization up to 4 weeks after repair and relative immobilization for 6 weeks with use of sling for comfort. Expert Opinion [20]
- Frequency
  - Range of visits for skilled care following surgical repair for unidirectional instability: women was 14-23 and men was 10-16. Level 2b [5]
  - Range of visits for skilled care following subacromial decompression for both women and men was 10-15. Level 2b [5]

### Reduction and Fixation

- Early Motion after Surgery – There is limited evidence to recommend on timing of ROM following ORIF for proximal humeral fractures. Some evidence suggests outcomes are similar with early vs delayed mobilization. Level I [21]



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### Trigger Point Dry Needling

- Very low quality to moderate quality evidence suggests that dry needling is more effective than no treatment, sham and other treatments for reducing pain. Low quality evidence suggests superior outcomes for function when compared to no treatment. There is no difference in functional outcomes when compared to other therapy treatments. Any long term benefit evidence is lacking. Level 1a. [19]
- Including one session in the first week may assist with faster increases in function in individuals who have undergone proximal humeral ORIF or rotator cuff repair. 7/10 PEDro score [2].

## PTOT-11.4.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents [25]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences. [13,17]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques. [29].
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues. [14,15]



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### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[37,39]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[30]

### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest[3]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[37]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without [32].
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers [36].
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility [7]:
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-11.4.10: Home and Self-Care techniques

- Education on repair protection and carryover to a home program is crucial to protect the repair but allow for gradual progression. [26, 27, 20]
- Swelling and edema management
- Cleanliness of incision areas
- Pain control
- Introduction of ROM, ADLs and strength as appropriate and over a gradual progression.

### Home Medical Equipment

- Cold Packs
- Pulleys, cane, dowel for ROM
- Sling, swath, abduction pillow

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# PTOT-11.5: Shoulder Tendinopathies

## PTOT-11.5.1: Diagnoses Included

- Sub acromial Impingement
- Rotator Cuff Impingement
- Bicep Tendinosis/Tendinitis
- Shoulder Bursitis
- Rotator cuff tear (non-surgical)

## PTOT-11.5.2: Definition

For the purposes of this guideline, shoulder tendinopathies may encompass several broad diagnoses any of which involve the health and function of the musculotendinous structures of the shoulder complex (i.e. tendinitis, tendinosis). Affected areas could include muscle, tendon, bursa and other fascial layers involved in movement or stabilization of the glenohumeral, acromioclavicular and sternoclavicular joints.

This will most frequently refer to various rotator cuff tendinopathies. Specifically to this area, there is evidence to suggest that diagnoses such as shoulder impingement, RC tendonitis, tendinosis and subacromial bursitis may be considered as the same entity. [33]

## PTOT-11.5.3: Clinical Presentation

- Shoulder pain
- Pain with active abduction
- Loss of functional movement
- Loss of range of motion ROM
- Pain with overhead movements
- Pain with laying on affected side
- May present with decreased pain during use, increased pain after use
- May present with weakness during associated movements.

### Special Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect physical therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.



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| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture, rotator cuff tear, tendon rupture |
| Exertional, history of cardiac diagnosis | Cardiac pain can radiate to the shoulder |
| Constant, relieved/worse with meals, positional, associated with fatty meals | Gastrointestinal diseases including cholelithiasis |
| Pleuritic, shortness of breath, associated with cough | Pulmonary diseases |
| Multiple joint involvement, tophi | Rheumatology diseases (gout) |
| Fever, severe pain | Possible infection |
| Cancer history | Cause of symptoms (metastatic or primary) |
| Unilateral edema | Upper extremity deep vein thrombosis |
| Immune-compromised state | Infection |
| Discoloration of hand, cold | Arterial occlusion |

## PTOT-11.5.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS) – with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points [39]) OR the Disability of the Arm, Shoulder and Hand Score (DASH) OR QuickDASH with a score of 11 or higher (Minimal Clinically Important Difference of 10 and 15 points respectively [28]) OR The Shoulder Pain and Disability Index (SPADI) with a score of 20 or higher (minimum clinical important difference of 8-13 points [8])
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)



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- Reduction in complicating factors (such as positive neurological signs)
- The patient is unable to maintain progress independently

## PTOT-11.5.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-11.5.6: Section intentionally left blank

## PTOT-11.5.7: Section intentionally left blank



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## PTOT-11.5.8: Physical/Occupational Therapy Management/Intervention

Conservative treatment of shoulder tendinopathy generally includes rest, medication and specific rehabilitation approaches. [23] These may include exercise, manual therapy and various therapeutic modalities. Use of modalities and/or passive treatments should be limited. The goal is to transition the patient as quickly as possible to active care, self-management and functional independence. The interventions should be designed to improve the movement and function of the patient and lessen or alleviate the activity limitations commonly reported by the patients who meet the diagnostic criteria of that pattern [42]

- High Recommendation
  - Outcome Measures:
    - Strong evidence, Highly recommended Grade A[41,42]
    - There are several outcome measures designed to assess patients with shoulder disorders. These tools can be classified as shoulder joint specific, shoulder disease specific or upper limb specific. Over 30 tools have been published. Validated functional outcome measures should be used before and after interventions intended to alleviate the impairments of body function and structure, activity limitations and participation restrictions.
- Moderate Recommendation
  - Therapeutic exercise (therapeutic ex.):
  - Moderate evidence with High recommendation Level 1b evidence for use in rotator cuff tendinopathy
    - Exercise programs can be designed by physical therapists with varying experience. There does not appear to be a difference between exercise done at home or the clinic. There should be some level of resistance and it appears higher repetition may have superior outcomes [47]
    - Workers with rotor cuff tendinopathy should be initially treated with exercise prescribed and reviewed by qualified health care provider. Grade B[38]
  - Fair evidence Level II for non-specific shoulder pain
    - May improve shoulder pain compared to placebo in people with rotator cuff disease in both short and long term with improvement in function and abduction. (Level I)[1,2,10,42]
    - Often supplemented with joint mobs techniques: not proven to be superior to therapeutic ex alone for pain reduction, increase in ROM and function and decrease in disability.[16]
    - Exercise is effective for producing small improvement in ROM.[63]
    - Comparison of customized vs. standard exercise: equally effective in increasing strength, function and decreasing pain intensity.[65]
    - One hour of strength training/week effective in reducing neck and shoulder pain with fewer and longer sessions providing more gains than shorter more frequent [6].
    - Specific exercise is effective in reducing pain, improving function and reduced need for surgery at 3 months.[37]



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        - For chronic pain patients: Activity modification: reduce overhead activity, avoid painful arc 60-120 degrees, avoid heavy loading. Stretching and strengthening exercises should be done to relieve pain by improving overall shoulder function and provide short term recovery and long term results.[17]
    - Manual Therapy:
        - Manual therapy may decrease pain in shoulder tendinopathy. It is unclear whether it can improve function. Level 1a.[23]
        - Manual therapy may be combined with exercise for additional benefit. Grade B [38]
        - Manual therapy added to an exercise protocol for shoulder impingement did not increase improvements compared to exercise alone. Level 1b. [18].
        - Shoulder jt. mobs combined with hot pack active exercise stretching, soft tissue mobilization and education, may improve acute shoulder pain in the short term compared to combined treatments alone. Level I [10].
        - Combined manual therapy with multimodal or exercise therapy, Grade B [12].
        - Manipulative therapy in addition to usual medical care accelerates recovery of shoulder symptoms.[13]
        - No data for calcific tendonitis, insufficient data for capsulitis, bursitis, tendonitis non-specific pain.[1]
        - Joint mobs useful to reduce pain and increase ROM and function for adhesive capsulitis Grade C Level III/IV (weak evidence).[1]

- Neutral Recommendation
    - Therapeutic ultrasound:
    - High to weak evidence for recommendation: conflicting
        - Good evidence Level 1, RCT good recommendation. Grade A for pain and function. Clinically important benefit for short term relief of calcific shoulder tendonitis for 2 month period, no difference at end of 9 months.[1]
        - Evidence suggests ultrasound does not enhance outcomes for therapy of rotator cuff tendinopathies compared to exercise alone. Using ultrasound for pain reduction or increased function should be avoided in workers with subacromial impingement syndrome. Grade C.[38]
        - Grade C Level 1: for capsulitis bursitis and tendonitis, non-specific pain.[1]
        - Ultrasound is commonly used in physiotherapy management of musculoskeletal pain in peripheral joints. Study demonstrated ultrasound has no clinical benefit beyond that of placebo ultrasound in physiotherapy treatment of shoulder pain. (Prospective double blind placebo controlled randomized trial.[3]

- Low Recommendation
    - Therapeutic Ultrasound when combined with other physical therapy interventions – Therapeutic ultrasound results in no improved benefit when combined with other treatments. This is due to low quality evidence. Grade C[38,52]
    - Activity limitations- Grade F Level 5 Expert opinion:[41,42]
        - Utilize easily reproducible activities
        - The following measures can help to assess changes over time:
            - Pain during sleep



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        - Pain and difficulty grooming and dressing
        - Pain and difficulty with reaching activities- to the shoulder level, behind back and overhead.
    - Iontophoresis
        - No clinically important benefits of acetic acid use were observed.[52]
        - Low level of evidence: case studies: Symptoms of calcific tendonitis joint pain and tenderness soon disappear and range of motion is restored when acetic acid iontophoresis method is employed.[67]
    - Trigger Point Dry Needling
        - Very low quality to moderate quality evidence suggests that dry needling is more effective that no treatment, sham and other treatments for reducing pain. Low quality evidence suggests superior outcomes for function when compared to no treatment. There is no difference in functional outcomes with compared to other therapy treatments. Any long term benefit evidence is lacking. Level 1a.[30]
- Expert opinion
    - Non Pharmacological interventions:
        - Simple interventions providing information, assurance and encouraging reasonable maintenance of activity may be used alone or in combination with other interventions for the successful management of acute musculoskeletal pain.[10]
- Not Recommended
    - Thermotherapy (heat, cold): Insufficient evidence
        - Thermotherapy (heat, cold): no data for calcific tendonitis, insufficient for capsulitis, tendonitis and bursitis, and non-specific pain.[10]
        - Insufficient Level D for cryotherapy [1]
        - Ice reduced soreness after pitching. Controlled trial non-random.[68]
        - Little evidence for use of modalities alone for chronic pain patients.[17]
    - Transcutaneous electrical nerve stimulation (TENS):
    - Insufficient evidence to include or exclude for shoulder pain
        - Uncertain whether TENS is superior to placebo and whether any electrotherapy provides benefits over active interventions[52]
        - No data for calcific tendonitis and insufficient data for capsulitis, bursitis, tendonitis. Insufficient evidence: Level 1 Electrical stimulation,[1] Weak evidence Level III/IV for adhesive capsulitis combined with mobility and stretching.[41,42]
    - Kinesiotaping:
        - No Significant changes between taping and sham taping on pain or kinematics in individuals with shoulder pain.[5]
        - Current evidence does not support the use of “Kinesio Taping” for shoulder pain (among other conditions) after systematic review.[70]
        - No effect on pain but changed the area in overall ROM where pain was felt.[69]
    - Massage:
        - No data for calcific tendonitis or insufficient data for capsulitis, bursitis, tendonitis.[1]



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- Low quality of evidence for improving ROM or function.[63]

## PTOT-11.5.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents [40]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[24,29]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques. [46.]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[25,26]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[20, 62]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[50]



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### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[9]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[62]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[55]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[61]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[19]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.

## PTOT-11.5.10: Home and Self-Care Techniques

The patient can be taught to use medical equipment and administer self-care at his residence. The qualified health care provider should be able to educate the patient on a regular home exercise program. There does not appear to be a difference between exercise done at home or the clinic.[47]

### Home Medical Equipment

- Hot packs/cold packs
- Theraband for therapeutic exercises



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## Self-Care Techniques

- Home ROM exercises, home self joint mobilization techniques
- Progression to therapeutic exercise—strengthening exercises
- Hot packs/cold packs, if needed, to relieve discomfort
- Education on activity modification and keeping activity within the limits of pain and function [38]

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# PTOT-12.1: Elbow Collateral Ligament Reconstruction

## PTOT-12.1.1: Section intentionally left blank

## PTOT-12.1.2: Tommy John Surgery Definition

The ulnar collateral ligament (UCL) is the strongest and stiffest of the collateral ligaments of the elbow. The three most common causes of UCL injury are dislocation, chronic attenuation in athletes and acute valgus injury. Reconstruction of the collateral ligament is one of the most common surgeries performed on a throwing athlete. The detached ulnar collateral ligament is reattached and any posterior olecranon osteophytes may be removed. The ulnar nerve is typically mobilized and transposed during the procedure. There are several different surgical approaches to manage a torn collateral ligament at the elbow including the Jobe technique, the docking technique, Endobutton, and interference screw techniques.[37] Excellent results can be achieved with ligament reconstruction[13]. However, a small percentage of reconstructions re-tear and need to have a revision which leads to slower rate of return to athletics.[27]

## PTOT-12.1.3: Clinical Presentation

- Symptoms of UCL injury:
  - Medial elbow pain in athletes who throw is the most common symptom. Pain may be especially prominent during the acceleration phase of the overhead throw.
  - Pain is often chronic or recurrent and may lead to a slow erosion of throwing ability.
  - Athletes may report similar pain in previous seasons.
  - Rest generally helps relieve pain.
  - Occasionally, athletes may experience acute pain over the medial elbow, sometimes associated with a popping sensation, during a single throw that causes them to stop throwing immediately.
  - Loss of elbow range of motion (ROM) is occasionally observed.
  - With acute rupture, ecchymosis may be observed over the medial elbow.
  - Pain may be reproduced on making a clenched fist.
  - UCL tenderness may occasionally be difficult to differentiate from flexor pronator tendonitis, but the pain of flexor pronator tendinitis is aggravated by resisting forearm pronation.
- Symptoms following UCL Repair:
  - Patient often presents to therapy in a supportive brace or sling
  - Impaired functional ability
  - Edema in affected upper extremity
  - Pain in affected upper extremity
  - Restricted movement of upper extremity
  - Decreased strength
  - Distal numbness



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### Special Considerations

- Rule out red flags (require medical management and/or referral to physician) See Table below).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture/ligament rupture |
| Fever, severe pain | Possible infection |
| Cancer history | Cause of symptoms (metastatic, primary or paraneoplastic), potential complications of chemotherapy |
| Unilateral edema | Upper extremity deep vein thrombosis |
| Loss of distal pulse | Arterial occlusion |
| Immune-compromised state | Infection |

## PTOT-12.1.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points[19]) OR the DASH OR QuickDASH with a score of 11 or higher (Minimally Clinically Important Difference of 10 and 15 points respectively.[17])
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of time
  - Neurological signs: altered reflexes and/or sensations
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - And response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time



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- Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
- Reduction in complicating factors (such as positive neurological signs)
- The patient is unable to maintain progress independently

## PTOT-12.1.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-12.1.6: Section intentionally left blank

## PTOT-12.1.7: Section intentionally left blank



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## PTOT-12.1.8: Physical/Occupational Therapy Management/Intervention

There is high level of documentation regarding elbow UCL surgical procedures. No specific functional outcome studies were found regarding therapy interventions/protocols. There is a lack of evidence based practice particularly randomized controlled trials and cohort case series information in the literature regarding elbow rehabilitation.[4]

Therapy protocols following UCL reconstruction, based on expert opinion, agree on the need for gradual and protected return of ROM and a resistive exercise program for the entire upper extremity kinetic chain. The rehabilitation program should be based on the specific surgical procedure performed (ie, docking technique versus traditional figure of 8 technique). Advances in surgical technique preserve the origin of the wrist flexors and forearm pronators which allow earlier progression of the rehabilitation program. Resistive exercises aimed at providing dynamic stability to the scapulothoracic, glenohumeral, and ulnohumeral joints are an important part of the comprehensive rehabilitation following reconstruction of the elbow UCL.[15]

The commonalities between the protocols include initial protection of healing tissues (the elbow is immobilized in a posterior splint with elbow held at 90 degrees and wrist free for 7-10 days) and gentle ROM. In the next phase of treatment, motion is gradually increased and a hinged elbow brace is worn. Isotonics for the shoulder are added. In the third phase of treatment, strength and endurance is increased without exacerbating pain. With athletes, throwing exercise is the final phase of treatment.[6,18,38]

## PTOT-12.1.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[22]
  - Sport participation is not a required daily activity at any age



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### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences. [9,16]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[23]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[10,11]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[8,36]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[26]

### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[2]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[36]



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### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[32]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[35]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[7]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.

## PTOT-12.1.10: Home and Self-Care Techniques

- Home program, individually prescribed, is central to the care of all patients. The teaching for this program should be started on the first day of therapy and continue throughout the formal therapy program with a planned transition.
- Patients should be educated in proper protection techniques to be utilized during all activities.
- Retraining for proper positioning to avoid re-injury and other factors in occupationally related overuse syndromes, is an important component of the overall therapy consult.

### Home Medical Equipment

- Cold packs
- Resistance bands
- Therapeutic Putty
- Orthosis, as needed



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## Self-Care Techniques

- Rest, reduce strenuous activities
- Home ROM exercises
- Progression to therapeutic exercise—strengthening exercises
- Cold packs, if needed, to relieve discomfort

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## PTOT-12.2: Elbow Fracture Post-ORIF

### PTOT-12.2.1: Diagnoses included:

- Distal Humerus Open Reduction Internal Fixation (ORIF)
- Coronoid ORIF
- Radial Head ORIF
- Olecranon ORIF

### PTOT-12.2.2: Definition

- A fracture is essentially a structural failure of bone. The nature of the fracture is determined by inherent properties of the bone, its structure, and type of forces applied to it.
  - Forces of tension, compression, bending, and torsion can load bone beyond its structural strength.
  - External forces may render a fracture displaced or undisplaced, with two or more fragments.
  - Displaced fragments may be overriding one another, lateral to each other, extremely distracted from one another, angulated, or rotated out of alignment.
  - Displaced fractures may be open fractures with a fragment breaking through skin, exposing the fracture site to external environment and increases risk of infection.
  - In addition to bony involvement, fractures frequently result in associated injury of soft tissues attached to, or adjacent to, the bone.
  - Radial head can also be dislocated mimicking/complicating an elbow fracture.
  - Fractures may be treated by immobilization with casts, sling/immobilizer, ORIF, percutaneous pinning, or joint replacement.
  - The mechanism for most elbow fractures is direct elbow trauma or a fall onto an outstretched hand.



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## PTOT-12.2.3: Clinical Presentation

- Patient often presents to therapy in a supportive brace or sling
- Impaired functional ability
- Edema in affected upper extremity
- Pain in affected upper extremity
- Restricted movement of upper extremity
- Surgical scar/wound
- Decreased strength.

### Special Considerations

- Rule out red flags (require medical management and/or referral to physician) See Table below).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Ligament tear |
| Fever, severe pain | Infection |
| Loss of distal pulse | Compartment syndrome |
| Diabetes | Neuropathy |
| Multiple joint involvement, large tophus | Rheumatologic diseases, gout |
| Unilateral edema | Deep vein thrombosis |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of wrist or hand | Arterial occlusion |
| Immune-compromised state | Infection |

## PTOT-12.2.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points[20]) OR the DASH OR QuickDASH with a score of 11 or higher (Minimally Clinically Important Difference of 10 and 15 points respectively[16])
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of time
  - Neurological signs: altered reflexes and/or sensations



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- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - And response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently

## PTOT-12.2.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-12.2.6: Section intentionally left blank



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## PTOT-12.2.7: Section intentionally left blank

## PTOT-12.2.8: Physical/Occupational Therapy Management/Intervention

Initial therapy interventions are focused on decreasing inflammation, normalizing pain, managing scars, restoring motion and patient education. Proprioception needs to be maintained with eventual progression of exercises to return to maximal functional use of the affected upper extremity. There are widely used therapy protocols following elbow fractures treated with ORIF. However, there is no strong evidence supporting any specific protocol. The following treatment techniques have been studied and reported in the literature.

### Splint use with posttraumatic elbow stiffness

- High level of evidence
  - Stiffness is common after elbow injuries and motion is difficult to recover. Avoiding elbow stiffness with early motion is preferable to trying to deal with it after a contracture has occurred. One randomized controlled study showed good results in range of motion with splinting and exercise for posttraumatic elbow stiffness. This study found that static progressive elbow splints and dynamic elbow splints had no difference in the end results and the choice of splinting method should be based on clinician's professional judgment.[27] Another systemic search found evidence that supports static progressive splinting 3x/day for 30 minutes in each direction was most effective for patients with post traumatic and post-surgical elbow stiffness.[32]

### Passive exercise

- Moderate level of evidence
  - Passive range of motion is an effective way to increase ROM after a fracture, joint injury or period of immobilization.[30]

### Specific Rehabilitation Intervention

- Insufficient evidence
  - There are widely accepted therapy treatments following ORIF's. However, there is not enough evidence available to determine the best form of rehabilitation. There is also not enough evidence available to determine if results are better when interventions are started during immobilization period versus post immobilization.[18]



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**Early motion following elbow surgical treatment**

- Lacks sufficient evidence
  - Specific to elbow fractures, there lacks robust evidence on the timing of mobilization, specifically early mobilization, after non-surgical or surgical treatment for adults with elbow fractures. There is a need for high quality, well-reported, randomized controlled trials comparing early versus delayed mobilization with commonly-occurring elbow fractures, treated with or without surgery.[19]
  - Some studies found beginning mobilization early in the postop rehabilitation process leads to less pain and edema. It also results in earlier return to work, less stiffness and better preserved range of motion. Mobilization should begin as soon as bone and joint stability are established.[2,36]
  - One study found heterotopic ossification following elbow surgery is more common when surgery is delayed or when there is a longer period of immobilization following surgery.[4]

**Use of silicone gel sheeting to manage postop scars**

- Low level and Conflicting level of evidence
  - Some studies report low level of evidence to support silicone gel use in preventing hypertrophic scaring in newly healed post-surgical wounds.[34] Other studies report silicone is effective, safe and is the gold standard of treatment to prevent hypertrophic scaring in clinical studies that have been done.[31] More randomized, controlled trials are needed in this area to determine sound evidence for the use of silicone gel in prevention of keloids following surgery.

**Strength training of nonaffected upper extremity during period of immobilization.**

- Low Level of Evidence
  - There is low quality evidence of clinically marginal benefits for cross education involving strength training of the nonfractured upper extremity during period of immobilization with or without surgical repair.[18]



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## PTOT-12.2.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[23]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[12,15]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[25]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[13,14]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[10,43]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[29]



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### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[3]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[43]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[39]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[42]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility: [8]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-12.2.10: Home and Self-Care Techniques

- It is necessary for patients to understand the importance of early motion while protecting the surgical repair. The home program for postop elbow ORIF conditions should include edema control techniques, use of orthosis, pain control techniques, range of motion and activities of daily living (ADL's). The home program is central to the care of all patients. The teaching for this program should be started on the first day of therapy and continue throughout the formal therapy program with a planned transition.

### Home Medical Equipment

- Cold packs
- Compression ace wrap/tubigrip for edema control
- Orthosis
- Resistance band(s) for therapeutic exercises
- Heat packs

### Self-Care Techniques

- Instruction in proper fit/purpose of any orthosis
- Home exercise program for edema control
- Cold pack/hot pack, if needed, to relieve discomfort
- ROM exercises
- Progression to therapeutic exercise - strengthening exercises
- Resumption of ADL's with affected upper extremity

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## PTOT-12.3: Elbow Nonspecific

### PTOT-12.3.1: Diagnoses included

- Olecranon Bursitis
- Elbow Sprain/Strain
- Elbow Dislocation
- Elbow Pain

### PTOT-12.3.2: Definition

- Made up of three articulating surfaces within a common capsule, the elbow is a complex joint. Lateral stability is provided by the lateral collateral ligament over the radiohumeral joint, and the annular ligament that supports the superior radioulnar joint. Medial stability is provided by the fan shaped medial collateral ligament extending from the medial epicondyle to the olecranon and coronoid processes.
- Three main functional muscle groups cross the joint; muscle groups originating proximal to the elbow control flexion and supination (brachialis and biceps), and elbow extension (triceps). In addition the medial and lateral epicondyles are the origin of the common wrist flexor and extensor groups. Flexor group also provides wrist ulnar deviation and forearm pronation. Extensor group controls wrist radial deviation and supination, in addition to wrist extension.
- Sprains and strains of the elbow are commonly produced by valgus stresses, hyperextension or traction. Sprains and strains may be graded from microtrauma to partial tears of muscle or ligaments, to complete tears or avulsion. Dislocations can occur, some of which may reduce prior to medical attention, however, dislocations may leave patients with derangement of the joint structures. The most common elbow dislocation occurs when the radius or ulna moves posterior to the humerus, generally with considerable force, and possibly with associated fractures. This is usually the result of falling on an outstretched hand (FOOSH). Anterior and lateral dislocations also can occur, usually from a direct posterior blow to a flexed elbow. In children the most common elbow dislocation is subluxation of the radial head distally through the annular ligament. This most often occurs when the arm is pulled.
- The olecranon bursa lies between the superior olecranon and the skin. It may become inflamed because of trauma, inflammatory disease such as gout, or most often prolonged pressure. Usually the elbow joint is not involved as the bursa and the joint do not communicate unless rheumatoid arthritis is present.



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## PTOT-12.3.3: Clinical Presentation

- With olecranon bursitis:
  - The classic finding is posterior elbow swelling that is very clearly demarcated, appearing as a goose egg over the olecranon process.
  - Bursitis may be the result of a direct blow to the bursa or lifestyle (leaning on elbow for extended time such as at a desk)
  - The affected site may be tender to palpation.
  - The area may be warm and red, particularly with infection.
  - Skin inspection may reveal abrasion or contusion if there was recent trauma.
  - Vital signs may reveal fever, but generally only with advanced infection.
  - Elbow range of motion (ROM) usually is normal, but occasionally the end range of elbow flexion may be slightly limited due to pain.
  - Patients with systemic inflammatory processes (e.g., rheumatoid arthritis) or crystal deposition disease (eg, gout, pseudogout) may reveal evidence of focal inflammation at other sites.
  - Patients with rheumatoid arthritis may, upon inspection of the elbow, have rheumatoid nodules.
  - Symptoms should gradually resolve
  - Elbow pain during active or passive ROM may increase the clinician's suspicion of fracture of the olecranon process if there is a history of trauma.
- With elbow dislocations:
  - Complaints of recurrent painful clicking, snapping, clunking, or locking of the elbow are common.
  - Swelling
  - Painful motion
  - Decreased motion especially elbow extension
  - Altered sensation in ulnar or median nerve distribution depending on severity
  - Impaired functional ability
  - Weakness in elbow and hand
- With elbow sprains/strains:
  - Pain around the elbow, medially, and/or laterally
  - May have history of swelling
  - History of trauma
  - Restricted elbow range of motion
  - Altered sensation in ulnar or median nerve distribution depending on severity
  - Impaired functional ability
  - Varus and/or valgus stress testing is painful
  - Resisted wrist flexion and/or pronation may be painful
  - Symptoms should gradually resolve



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### Special Considerations

- Rule out red flags (require medical management and/or referral to physician) See Table below).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture/ligament rupture, neural damage |
| Fever, severe pain | Possible infection |
| Cancer history | Cause of symptoms (metastatic, primary or paraneoplastic), potential complications of chemotherapy |
| Unilateral edema | Upper extremity deep vein thrombosis |
| Loss of distal pulse | Arterial occlusion |
| Immune-compromised state | Infection |
| Cold Intolerance, fatigue, constipation | Hypothyroidism |
| Multiple joint involvement, unusual skin rashes, other vascular involvement | Rheumatologic diseases (e.g., Rheumatoid arthritis, Sjogren's Syndrome, Systemic Lupus Erythematosis, Polyarteritis nodosa) |
| Stocking-glove neurological involvement | Diabetes, alcoholism, B12 deficiency |
| Auto repair occupation, battery exposure | Lead poisoning |
| Hand/skull disproportionately large | Acromegaly |

## PTOT-12.3.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points [21]) OR the DASH OR QuickDASH with a score of 11 or higher (Minimally Clinically Important Difference of 10 and 15 points respectively[19])
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of time
  - Neurological signs: altered reflexes and/or sensations
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors,



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- Natural history and chronicity of condition,
- Expectation for functional improvement with skilled intervention,
- And response to treatment provided

- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently.

## PTOT-12.3.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-12.3.6: Section intentionally left blank

## PTOT-12.3.7: Section intentionally left blank



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## PTOT-12.3.8: Physical/occupational Therapy Management/Intervention

- Initial therapy interventions are focused on decreasing inflammation, normalizing pain, restoring motion and patient education. Proprioception needs to be maintained with eventual progression of exercises to return to maximal functional use of the affected upper extremity. There are widely used therapy protocols following elbow injuries. However, there is no strong evidence supporting any specific protocol. The following treatment techniques have been studied and reported in the literature.

### Splint use with posttraumatic elbow stiffness

- High level of evidence
  - Stiffness is common after elbow injuries and motion is difficult to recover. Avoiding elbow stiffness with early motion is preferable to trying to deal with it after a contracture has occurred. One randomized controlled study showed good results in range of motion with splinting and exercise for posttraumatic elbow stiffness. This study found that static progressive elbow splints and dynamic elbow splints had no difference in the end results and the choice of splinting method should be based on clinician's professional judgment.[29]Another systemic search found evidence that supports static progressive splinting 3x/day for 30 minutes in each direction was most effective for patients with post traumatic and post-surgical elbow stiffness.[35]

### Passive exercise

- Moderate level of evidence
  - Passive range of motion is an effective way to increase ROM after a fracture, joint injury or period of immobilization.[32]

### Incorporate ADL activities in the treatment of hand injuries

- Moderate level of evidence
  - One randomized, controlled study found high level of evidence supporting therapeutic that mimic Activities of Daily Living (ADL's) improve the functions of the hand more effectively than just therapeutic activities such as range of motion, strength and modalities. This study suggests adding ADL simulated activities to treatment following hand injuries.[20]



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### Early Mobilization with elbow dislocations

- Insufficient evidence
  - There is no clear evidence available on early mobilization with elbow injuries. However, most of the relevant literature reports clinical outcomes decrease with increased time of elbow immobilization after trauma. The early mobilization programs need to allow for controlled movements without putting strain on the injured structures. [6]
  - Some studies have found stiffness and heterotopic ossifications after elbow dislocation are common occurrences. It is felt that elbow dislocations should be treated by controlled early mobilization in braces with limited range of motion to decrease stiffness and HO.[6]
  - One trial compared early mobilization of the elbow with immobilization for three weeks in a plaster cast following elbow dislocation. This trial found no firm evidence of differences between the two interventions in the recovery of elbow range of motion or pain at one year. None of the trial participants had an unstable elbow or had suffered another dislocation.[45]
  - Range of motion with the arm overhead improves elbow stability following an elbow LCL injury. Initiating early motion in this “safe position” may decrease elbow stiffness and allow optimal ligament healing. If exercises are done in a dependent position, active motion with forearm pronation should be encouraged as this helps stabilize an elbow with a LCL injury. Varus positioning should be avoided as this worsens instability.[33]
- Nonsurgical treatment of elbow instability versus immobilization treatment. (No evidence showing that surgical technique is superior to nonsurgical)
- This study compared surgical treatment to nonsurgical casting for 3 weeks with elbow instability. At 1 year, there were no significant differences in mobility, stability, or elbow and grip strength between the two groups.[39]

### Exercises and heterotopic ossification

- Lacking evidence
  - Some have thought that passive ROM in elbow injuries can lead to heterotopic ossification (HO). There is no solid evidence in literature that shows PROM causes or exacerbates HO. Therefore, passive motion is an accepted treatment for elbow injuries.[7]



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## PTOT-12.3.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents [24]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[13,18]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[26]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[14,15]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[11,48]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[34]



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### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[2]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[48]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[42]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[47]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[9]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-12.3.10: Home and Self-Care Techniques

- Home program, individually prescribed, is central to the care of all patients. The teaching for this program should be started on the first day of therapy and continue throughout the formal therapy program with a planned transition. With elbow injuries, it is important to include joint protection education in the home program as well as range of motion exercises and progressive exercises.

### Home Medical Equipment

- Cold packs
- Orthotics as needed
- Resistance bands for progressive exercise

### Self-Care Techniques

- Rest, reduce strenuous activities
- Home ROM exercises
- Progression to therapeutic exercise—strengthening exercises
- Cold packs, if needed, to relieve discomfort
- Education for proper positioning to avoid re-injury
- Orthotic use as needed

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# PTOT-12.4: Elbow Neuropathy

## PTOT-12.4.1: Diagnoses Included

- Cubital Tunnel Syndrome with and without release
- Ulnar Nerve Transposition
- Ulnar Nerve Compression
- Radial Nerve Entrapment
- Radial Tunnel Syndrome (RTS)
- Posterior interosseous nerve syndrome (PINS)
- Cubital Tunnel, Ulnar Nerve Entrapment

## PTOT-12.4.2: Definition

Entrapment neuropathies of the upper extremity are common problems. What has traditionally been attributed to features of normal aging (eg, weakness, loss of function or sensation) has been subsequently recognized in younger patients whose vocations require repetitive motion to complete work-related tasks. Repetitive motion, force, posture, and vibratory influences on the peripheral nerves of the upper extremity are poorly understood but are blamed as contributing factors to the development of neuropathic symptoms.

The ulnar nerve can be compressed or entrapped at a number of locations, including the cubital tunnel and in the medial intermuscular septum. Due to the superficial location of the ulnar nerve, repetitive motion may initiate a cycle of inflammation and edema that inhibits the normal gliding of the nerve. Additional injury occurs when traction forces caused by elbow flexion produce an additional compressive force on the internal architecture of the nerve. The severity of the nerve injury will be dependent on the magnitude, duration, and character of the applied forces. Ulnar nerve transposition is accomplished by creating a new tunnel using the flexor muscles of the forearm. The ulnar nerve is then moved (transposed) out of the cubital tunnel and placed in the new tunnel.

Radial tunnel syndrome involves compression of the deep branch of the radial nerve. Compression of the nerve occurs during elbow extension, forearm pronation, and wrist flexion which cause the Extensor Carpii Radialis Brevis (ECRB) and the fibrous edge of the superficial part of the supinator to tighten around the nerve. The superficial branch of the radial nerve can also become entrapped where it pierces the fascia between the brachioradialis and extensor carpi radialis longus tendons. This is known as superficial radial nerve palsy.

- The posterior interosseous nerve has various potential sites of compression as it traverses through the radial tunnel:
  - Fibrous bands connecting the brachialis to the brachioradialis.
  - Vascular leash of Henry, a fan of blood vessels that cross the nerve at level of radial neck.



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- Medial proximal portion (leading edge) of ECRB.
- Between fibrous bands at proximal and distal edge of the supinator; proximal border is referred to as Arcade of Fröhse.
- PINS involves loss of motor function of some, or all of the muscles innervated by the posterior interosseous nerve, and is characterized by weakness.

## PTOT-12.4.3: Clinical Presentation

- Non operative ulnar nerve compression:
  - Activity related pain and paresthesias distal to the elbow through the ulnar nerve distribution, most often of the small finger and ulnar side of the ring finger
  - Pain and tenderness about the medial aspect of the elbow
  - Decreased sensation in the ulnar distribution of the hand
  - Weakness of grip power and dexterity
  - Progressive inability to separate the fingers
  - Symptoms may be aggravated by resting the flexed elbow on a firm surface
  - May have recurrent subluxation of the nerve over the epicondyle
  - Clawing contracture of the ring and little fingers (late sign)
  - In chronic cases, pain may be referred into the scapular region
- Post-operative ulnar nerve transposition:
  - Wound/scar at elbow
  - May complain of hypesthesia in ulnar nerve distribution
  - Elbow pain
  - Swelling at the elbow
  - Decreased elbow ROM
  - Decreased grip and pinch
  - Muscle weakness
  - Numbness and/or sensory changes
  - Impaired upper extremity function
- Radial nerve entrapment:
  - Pain, poorly localized over the radial aspect of the proximal forearm
  - Maximal tenderness over the radial tunnel
  - Weakness of wrist and finger extensors
  - Pain may be reproduced by resisted middle finger extension
  - Abnormal sensation on the dorsum of the hand
  - Symptoms mimic those of tennis elbow:
    - Tenderness over the lateral aspect of the elbow
    - Pain on passive stretching of the extensor muscle
    - Pain on resisted extension of the wrist and fingers
    - More prevalent in women age 30-50



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- PINS (posterior interosseous nerve syndrome)
  - Symptoms look like DeQuervain's disease with shooting or burning pain along posterior-radial forearm, wrist, and thumb associated with wrist flexion and ulnar deviation
  - loss of motor function of some, or all of the muscles innervated by the posterior interosseous nerve
  - Weakness
  - Impaired fine motor control.

**Special Considerations**

- Rule out red flags (require medical management and/or referral to physician). See Table below).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture/ligament rupture |
| Fever, severe pain | Possible infection |
| Cancer history | Cause of symptoms (metastatic, primary or paraneoplastic), potential complications of chemotherapy |
| Unilateral edema | Upper extremity deep vein thrombosis |
| Loss of distal pulse, severe pain 12-24 hours after trauma | Compartment syndrome |
| Immune-compromised state | Infection |
| Cold Intolerance, fatigue, constipation | Hypothyroidism |
| Multiple joint involvement, unusual skin rashes, other vascular involvement, tophi | Rheumatologic diseases (e.g., rheumatoid arthritis, Sjogren's syndrome, systemic lupus erythematosus, polyarteritis nodosa), gout |
| Stocking-glove neurological involvement | Diabetes, alcoholism, B12 deficiency |
| Auto repair occupation, battery exposure | Lead poisoning |
| Hand/skull disproportionately large | Acromegaly |



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## PTOT-12.4.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points [18]) OR the DASH OR QuickDASH with a score of 11 or higher (Minimally Clinically Important Difference of 10 and 15 points respectively[17])
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
  - Neurological signs: altered reflexes and/or sensations
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently



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## PTOT-12.4.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-12.4.6: Section intentionally left blank

## PTOT-12.4.7: Section intentionally left blank

## PTOT-12.4.8: Physical/Occupational Management/Intervention

- Typical management strategies used when treating neuropathies include explanation and education, postural and ergonomic advice, joint mobilization, orthotics, soft tissue techniques, neural mobilization and exercise. Due to the lack of high level evidence, no specific treatment protocols or strong recommendations can be made. The following interventions have been studied and reported in literature.

**Home program alone with ulnar nerve compression**

- Insufficient Evidence
  - Evidence from one small RCT of conservative treatment showed that in mild cases, patients who were given information on movements or positions to avoid had the same beneficial effects in improving work activities and reducing night pain as those patients who were using splints or doing exercises.[6]Tendon and nerve gliding with neuropathies



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- Insufficient evidence
  - One MRI study showed that gentle nerve gliding did not aggravate the inflammatory process but rather decreased intraneural edema. Nerve and tendon gliding in a carpal tunnel study showed an immediate decrease in carpal tunnel pressure in patients with carpal tunnel syndrome.[37]

**Treatment with elbow splint, nerve glides, home program (Evidence does not support any one treatment over another with cubital tunnel syndrome)**

- At a 6 month follow-up, no significant differences were found in performance, satisfaction, pain, strength or neurophysiological parameters between those treated with just splinting, those treated with just nerve glides and those treated with just education.[33]

**Splinting (with and without steroid injections) to treat cubital tunnel (No evidence to support any greater effect with steroids in addition to splinting)**

- At 6 month follow-up, no significant differences were found in symptoms and nerve conduction studies between patients using an elbow splint and those using a splint and receiving an injection.[33]

**Exercise therapy with peripheral neuropathy**

- Insufficient evidence
  - Inadequate evidence from randomized controlled trials was found when trying to determine if exercises affected levels of disability in patients with peripheral neuropathy. There was evidence, however, that strengthening exercises moderately improve muscle strength in people with peripheral neuropathy.[6]12.4.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal
- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

**Activity of Daily Living**

- Children need to play and explore their environment including:
  - participation in recess,
  - physical education,
  - play and other physical activities similar to peers,
  - navigating school hallways,
  - socializing with peers,
  - employment for adolescents [21]
  - Sport participation is not a required daily activity at any age.



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### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences. [12,16]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques. [25]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues. [13,14]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[8,43]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[28]

### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[2]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[43]



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### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[38]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[42]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[7]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.

## PTOT-12.4.9: Section intentionally left blank

## PTOT-12.4.10: Home and Self-Care Techniques

- Home program, individually prescribed, is central to the care of all patients. The teaching for this program should be started on the first day of therapy and continue throughout the formal therapy program with a planned transition. Home programs with elbow neuropathies may include education in rest/reduction of strenuous activities, identification of causative factors and correction of faulty techniques

### Home Medical Equipment

- Cold packs
- Resistance bands
- Therapeutic Putty
- Splint, if necessary
- Elbow pads



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## Self-Care Techniques

- Rest, reduce strenuous activities
- Home ROM exercises
- Progression to therapeutic exercise—strengthening exercises
- Cold packs, if needed, to relieve discomfort
- Instruction in splint use, if necessary

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# PTOT-12.5: Elbow Tendinopathies

## PTOT-12.5.1: Diagnoses Included

- Lateral epicondylitis
- Medial epicondylitis
- Tennis elbow
- Golfer's elbow
- Epitrochlear bursitis
- Epicondylosis
- Peritendonitis
- Epicondylalgia

## PTOT-12.5.2: Definition

Lateral epicondylitis is a pathologic condition of the common extensor muscles at their origin on the lateral humeral epicondyle. It specifically involves the tendons of the muscles that control wrist extension and radial deviation resulting in pain on the lateral side of the elbow with contraction of these muscles. It most commonly involves the extensor carpi radialis brevis tendon. This injury is typically caused by activities that involve wrist extension/grasp as the wrist extensors contract during grasping activities to provide stability to the wrist. There may be a partial tear of the tendon fibers at, or near their point of insertion on the humerus. Risk factors are forceful repetitive wrist or forearm movement. In 10% of cases, conservative measures have failed and a fascial release may be performed.

Medial epicondylitis is a pathologic condition of the flexor muscles at their origin on the medial humeral epicondyle. It specifically involves the tendons of the muscles that control wrist flexion and ulnar deviation resulting in pain on the medial side of the elbow with contraction of these muscles. It commonly involves the flexor carpi radialis brevis and pronator teres tendons. This injury is typically caused by activities that involve wrist flexion/grasp and pronation as the wrist flexors contract during grasping activities to provide stability to the wrist. There may be a partial tear of the tendon fibers at, or near their point of insertion on the humerus. Risk factors are forceful repetitive wrist or forearm movement.



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## PTOT-12.5.3: Clinical Presentation

- Symptoms are typically unilateral and tend to involve the dominant arm.
- Aching pain generally increases with activity and may be present at night
- May have a weakened grip on the affected side.
- Elbow range of motion is typically normal.
- Onset is often between 35 and 50 years of age (mean 45)
- Condition is more common in men than women
- Specific to Lateral epicondylitis:
- Localized tenderness just distal and anterior to the lateral epicondyle
- Pain increases with resisted wrist extension, especially with the elbow in extension
- Specific to Medial epicondylitis:
- Complaints of pain over the flexor-pronator origin slightly distal and anterior to the medial epicondyle.
- Pain is made worse by gripping, resisted wrist flexion and pronation, and passive wrist extension and supination

### Special Considerations

- Rule out red flags (require medical management and/or referral to physician) See Table below.).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Fever, severe pain | Possible infection |
| Unilateral edema | Upper extremity deep vein thrombosis |
| Immune-compromised state | Infection |
| Cancer history | Cause of symptoms (metastatic or primary) |
| Discoloration of hand/fingers | Vascular occlusion, shunt emboli (dialysis patients) |
| Multiple joint involvement, tophi | Rheumatological diseases; gout |
| Exertional symptoms, history of cardiac disease | Anginal equivalent |



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## PTOT-12.5.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points [24]) OR the DASH OR QuickDASH with a score of 11 or higher (Minimally Clinically Important Difference of 10 and 15 points respectively[21])
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
  - Neurological signs: altered reflexes and/or sensations
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently



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## PTOT-12.5.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-12.5.6: Section intentionally left blank

## PTOT-12.5.7: Section intentionally left blank

## PTOT-12.5.8: Physical/Occupational Therapy Management/Intervention

### Clinical Interventions with moderate level of evidence

- Stretching and eccentric strengthening interventions for epicondylitis are recommended to help with the recovery. Most studies show that eccentric strengthening is more effective than concentric exercises. (Moderate evidence) [23,55]
- Exercise is an effective way to manage tendonitis. Exercise has been shown to lead to greater and faster decrease in pain, less sick leave, fewer medical consultations, and increased work ability. However, there are no specific guidelines on the intensity, duration, or frequency of exercise. General guidelines recommend gradually increasing resistance (Moderate evidence)[13]
- The ulnar-humeral lateral glide and radial head posteroanterior glide are techniques that can be used following the Mulligan mobilization. The patient performs the pain-producing movement in conjunction with sustained mobilization. These glides have been helpful in decreasing pain and increasing grip strength.(Moderate evidence)[13]



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- Cryotherapy provides acute relief of tendinopathies. The most effective use of cold is melting ice water through a wet towel for 10 minutes (moderate evidence)[55]
- Manipulating the cervical and thoracic spine in addition to stretching, plus mobilization of the wrist and forearm provides short term and mid term relief of symptoms. Moderate evidence.[23]
- Manual therapy techniques targeting the cervical and thoracic regions provide additional clinical benefits beyond local elbow treatment alone (Moderate evidence)[13]
- Extracorporeal shock wave therapy is a noninvasive, relatively safe and effective treatment of pain relief with chronic tendinopathy. (Moderate evidence)[55]

**Clinical Interventions lacking sufficient evidence or with conflicting evidence.**

- When treating lateral epicondylitis Modalities may be considered to help with pain. However, there is little research that supports or refutes modalities (including ultrasound, iontophoresis, phonophoresis and low level laser treatment).[3,55]
- Low level laser treatment continues to have contradictory findings for use in elbow tendinopathies. It may be a safe alternative to corticosteroid injections and Non-Steroidal Anti-Inflammatory Drugs. However after peer review, there appears to be poor results and high variability. There is need for more studies comparing treatment with low level laser therapy to other pain treatments for elbow tendonitis.[6,33]
- Literature does not provide conclusive evidence that there is one preferred treatment modality over another modality.[45]
- Cross friction massage may help with healing however, there is not sufficient evidence on this treatment method and its effect on pain, grip strength and functional status.[12,23,31]
- Elbow straps or sleeves can be helpful in reducing pain with gripping.[28,29]
- There is no conclusive evidence supporting the use of orthotics with elbow tendinopathy.[55]



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## PTOT-12.5.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - participation in recess,
  - physical education,
  - play and other physical activities similar to peers,
  - navigating school hallways,
  - socializing with peers,
  - employment for adolescents[27]
  - Sport participation is not a required daily activity at any age.

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[14,22]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[30]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[15,16]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[11,53]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[34]



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### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[2]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[53]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[44]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[52]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[9]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-12.5.10: Home and Self-Care Techniques

- The importance of educating patients to understand that epicondylitis is a self limiting condition that often resolves gradually in 12-18 months is crucial. Instruct patient on avoiding pain provoking activities. The patient can be taught self stretching, use of counter force brace, and progressive strengthening. It is also important to educate patients in proper ergonomics such as minimizing forceful exertions and repetition in addition to keeping wrist and forearm in neutral positions.

### Home Medical Equipment

- Hot packs/cold packs
- Resistance bands/ Therapeutic Putty for therapeutic exercises
- Counterforce bracing
- Wrist splint

### Self-Care Techniques

- In acute phase, r, reduce strenuous activities.
- Home ROM exercises, stretching wrist extensor/flexor musculature
- Progress strengthening exercises as tolerated
- Hot packs/cold packs, if needed, to relieve discomfort
- Proper work station set up, proper body mechanics

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# PTOT-12.6: Hand Fractures post ORIF

## PTOT-12.6.1: Diagnoses included

- ORIF Phalanges
- ORIF Metacarpals

## PTOT-12.6.2: Definition

- A fracture is essentially a structural failure of bone. The nature of the fracture is determined by inherent properties of the bone, its structure, and type of forces applied to it.
  - Forces of tension, compression, bending, and torsion can load bone beyond its structural strength.
  - External forces may render a fracture displaced or nondisplaced, with two or more fragments.
    - Displaced fragments may be overriding one another, lateral to each other, extremely distracted from one another, angulated, or rotated out of alignment.
    - Displaced fractures may be open fractures with a fragment breaking through skin, exposing the fracture site to external environment and increases risk of infection.
  - In addition to bony involvement, fractures frequently result in associated injury of soft tissues attached to, or adjacent to, the bone.
  - Fractures may be treated by immobilization with casts, sling/immobilizer, ORIF, percutaneous pinning, or joint replacement.
  - Fractures and dislocations of the phalanges occur from a variety of mechanisms. In younger patients, these injuries are more likely to be sports related, while older patients are likely to be injured by machinery or by falls. Crush injuries are common at the distal phalanx, while the PIPJ is usually damaged by an axial blow to the finger

## PTOT-12.6.3: Clinical Presentation

- Impaired functional ability
- Pain
- Swelling
- Decreased flexibility of hand
- Muscle atrophy

### Special Considerations

- Rule out red flags (require medical management and/or referral to physician) See Table below).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.



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| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Ligament tear |
| Fever, severe pain | Infection |
| Loss of distal pulse | Infection, arterial occlusion |
| Diabetes, paresthesias | Neuropathy, other metabolic disorders, (e.g. B12 deficiency, hypothyroidism) |
| Multiple joint involvement | Rheumatologic diseases |
| Unilateral edema | Deep vein thrombosis |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of wrist or hand | Arterial occlusion |
| Immune-compromised state | Infection |

## PTOT-12.6.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points [19]) OR the DASH OR QuickDASH with a score of 11 or higher (Minimum detectable change 15 points [14]) OR Hand Assessment Tool.[33]
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 50% of time
  - Neurological signs: altered reflexes and/or sensations
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - And response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently



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## PTOT-12.6.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-12.6.6: Section intentionally left blank

## PTOT-12.6.7: Section intentionally left blank

## PTOT-12.6.8: Physical/Occupational Therapy Management/Intervention

Initial therapy interventions are focused on decreasing inflammation, normalizing pain, managing scars, restoring motion and patient education. Proprioception needs to be maintained with eventual progression of exercises to return to maximal functional use of hand. There are widely used protocols following hand fractures treated with ORIF. One evidence based protocol for the treatment of metacarpal fractures has been established by Angela Toemen and Robyn Midgley.

**Early motion following surgical treatment (Moderate level of Evidence with high level of documentation)**
Beginning mobilization early in the postop rehabilitation process leads to less pain and edema. It also results in earlier return to work, less stiffness and better preserved range of motion. Mobilization should begin as soon as bone and joint stability are established.[2,31]



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**Incorporate ADL activities in the treatment of hand injuries (Moderate level of evidence)**

- One randomized, controlled study found high level of evidence supporting therapeutic activities that mimic ADL's improve the functions of the hand more effectively than just therapeutic activities such as range of motion, strength and modalities. This study suggests adding ADL simulated activities to treatment following hand injuries. [16]

**Splint use (moderate evidence)**

- Appropriate splinting can help increase ROM and reduce contractures after a joint injury.[26]
- Passive exercise (Moderate level of evidence)
- Passive range of motion is an effective way to increase ROM after a fracture, joint injury or period of immobilization.[26]

**Metacarpal fractures and home programs (moderate level of evidence)**

- One study with level II evidence reports that postoperative metacarpal fractures treated with a home program do just as well as those treated with traditional therapy. [15]

**Use of silicone gel sheeting to manage postop scars (Low level and Conflicting level of evidence)**

- Some studies report low level of evidence to support silicone gel use in preventing hypertrophic scaring in newly healed post surgical wounds.[29] Other studies report silicone is effective, safe and is the gold standard of treatment to prevent hypertrophic scaring in clinical studies that have been done.[27] More randomized, controlled trials are needed in this area to determine sound evidence for the use of silicone gel in prevention of keloids following surgery.

**Contrast baths to manage edema (Conflicting level of evidence)**

- Contrast baths may increase skin temperature and blood flow but the evidence on its effect of edema is conflicting. In addition, there is no clear determination of the relationship between the physiological effects of contrast baths and hand function. [5]

**Specific Rehabilitation Intervention (Insufficient evidence)**

- There are widely accepted therapy treatments following ORIF's. However, there is not enough evidence available to determine the best form of rehabilitation and what interventions should be used to optimize functional recovery. There is also not enough good quality evidence available to determine if results are better when interventions are started during immobilization period versus post immobilization. In addition, no determination has been made on how frequent or how long care should be provided. [17]



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**Strength training of nonaffected hand/wrist during period of immobilization. (Low Level of Evidence)**

- There is low quality evidence of clinically marginal benefits for cross education involving strength training of the nonfractured hand during period of immobilization with or without surgical repair.[17]

## PTOT-12.6.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - participation in recess,
  - physical education,
  - play and other physical activities similar to peers,
  - navigating school hallways,
  - socializing with peers,
  - employment for adolescents [21]
  - Sport participation is not a required daily activity at any age.

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[10,13]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[22]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[11,12]



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### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[9,40]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[25]

### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[3]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[40]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[35]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[39]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[8]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-12.6.10: Home and Self-Care Techniques

- It is necessary for patients to understand the importance of early motion while protecting the surgical repair. The home program for postop hand ORIF conditions should include edema control techniques, use of protective orthosis, pain control techniques, range of motion and ADL's. The home program is central to the care of all patients. The teaching for this program should be started on the first day of therapy and continue throughout the formal therapy program with a planned transition.

### Home Medical Equipment

- Cold packs
- Theraband for therapeutic exercises
- Heat packs
- Theraputty
- Orthosis
- Compression glove/Coban

### Self-Care Techniques

- Instruction in proper fit/purpose of any orthosis
- Home exercise program for edema control
- Cold pack/hot pack, if needed, to relieve discomfort
- ROM exercises
- Progression to therapeutic exercise - strengthening exercises
- Resumption of ADL's with affected hand

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# PTOT-12.7: Hand Fractures – Nonsurgical

## PTOT-12.7.1: Diagnoses included:

- Phalange Fractures
- Metacarpal Fractures
- Broken fingers
- Broken hand

## PTOT-12.7.2: Definition

- A fracture is essentially a structural failure of bone. The nature of the fracture is determined by inherent properties of the bone, its structure, and type of forces applied to it.
  - Forces of tension, compression, bending, and torsion can load bone beyond its structural strength.
  - External forces may render a fracture displaced or nondisplaced, with two or more fragments.
  - Displaced fragments may be overriding one another, lateral to each other, extremely distracted from one another, angulated, or rotated out of alignment.
  - Displaced fractures may be open fractures with a fragment breaking through skin, exposing the fracture site to external environment and increases risk of infection.
  - In addition to bony involvement, fractures frequently result in associated injury of soft tissues attached to, or adjacent to, the bone.
  - Fractures may be treated by immobilization with casts, sling/immobilizer, ORIF, percutaneous pinning, or joint replacement.
  - Fractures and dislocations of the phalanges occur from a variety of mechanisms. In younger patients, these injuries are more likely to be sports related, while older patients are likely to be injured by machinery or by falls. Crush injuries are common at the distal phalanx, while the PIPJ is usually damaged by an axial blow to the finger.

## PTOT-12.7.3: Clinical Presentation

- Impaired functional ability
- Pain
- Swelling
- Decreased flexibility and range of motion of hand and wrist
- Muscle atrophy



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### Special Considerations

- Rule out red flags (require medical management and/or referral to physician) See Table below).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Ligament tear |
| Fever, severe pain | Infection |
| Loss of distal pulse | Infection, arterial occlusion |
| Diabetes, paresthesia | Neuropathy, other metabolic disorders, (e.g. B12 deficiency, hypothyroidism) |
| Multiple joint involvement | Rheumatologic diseases |
| Unilateral edema | Deep vein thrombosis |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of wrist or hand | Arterial occlusion |
| Immune-compromised state | Infection |

## PTOT-12.7.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points [17]) OR the Disability of the Arm, Shoulder and Hand score (DASH) OR QuickDASH with a score of 11 or higher (Minimally Clinically Important Difference of 10 and 15 points respectively[13])
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 50% of time
  - Neurological signs: altered reflexes and/or sensations
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - And response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold



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- The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
- Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
- Reduction in complicating factors (such as positive neurological signs)
- The patient is unable to maintain progress independently

## PTOT-12.7.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-12.7.6: Section intentionally left blank

## PTOT-12.7.7: Section intentionally left blank



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## PTOT-12.7.8: Physical/Occupational Therapy Management/Intervention

- Initial therapy interventions are focused on decreasing inflammation, normalizing pain, restoring motion and patient education. Proprioception needs to be maintained with eventual progression of exercises to return to maximal functional use of hand. There are widely used therapy protocols following hand fractures. One evidence based protocol for the treatment of metacarpal fractures has been established by Angela Toemen and Robyn Midgley.

**Incorporate ADL activities in the treatment of hand injuries (Moderate level of evidence)**

- One randomized, controlled study found high level of evidence supporting therapeutic activities that mimic ADL's improve the functions of the hand more effectively than just therapeutic activities such as range of motion, strength and modalities. This study suggests adding ADL simulated activities to treatment following hand injuries.[15]

**Splint use (moderate evidence)**

- Appropriate splinting can help increase ROM and reduce contractures after a joint injury.[24]

**Passive exercise (Moderate level of evidence)**

- Passive range of motion is an effective way to increase ROM after a fracture, joint injury or period of immobilization.[24]

**Splint use versus early motion in MC neck fracture (moderate level of evidence)**

- Two options for conservative management of boxer's fracture (metacarpal neck fracture of small digit) have good results. One option is to splint the CMC joint, MP joint and IP joint to immobilize digit. The other option is taping the digit and applying a CMC orthosis which does not limit motion. Neither one of these non-operative treatment regimen for fracture of the neck of the fifth metacarpal can be recommended as superior to the other.[26]

**Early motion with extra-articular hand fractures: (Insufficient evidence)**

- Evidence does not support or refute beginning early motion in joints surrounding an extraarticular hand fracture. There is little evidence on the effects of healing and functional outcomes with early motion.[11]

**Ultrasound (Insufficient Evidence)**

- While a potential benefit of ultrasound in the treatment of acute fractures in adults cannot be ruled out, the currently available evidence is insufficient to support the routine use of this treatment.[14]



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## PTOT-12.7.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - participation in recess,
  - physical education,
  - play and other physical activities similar to peers,
  - navigating school hallways,
  - socializing with peers,
  - employment for adolescents[19]
  - Sport participation is not a required daily activity at any age.

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[8,12]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[20]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[9,10]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[7,35]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[23]



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### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[2]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[35]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[30]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[34]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[6]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-12.7.10: Home and Self-Care Techniques

- The home program is central to the care of all patients. The teaching for this program should be started on the first day of therapy and continue throughout the formal therapy program with a planned transition. It is necessary for patients to understand the importance of following through with edema control, orthoses, pain control, range of motion and using upper extremity with ADL's to maximize return of functional use of their hand.

### Home Medical Equipment

- Cold packs
- Compression glove/coban
- Theraband/theraputty for therapeutic exercises
- Heat packs
- Orthosis

### Self-Care Techniques

- Instruction in proper fit/purpose of any orthosis
- Home exercise program for edema control
- Cold pack/hot pack, if needed, to relieve discomfort
- ROM exercises
- Progression to therapeutic exercise - strengthening exercises
- Resumption of ADL's with affected hand

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# PTOT-12.8: Hand- Post Dupuytren's Release

## PTOT-12.8.1: Diagnoses Included

- Viking disease
- Palmar fasciitis

## PTOT-12.8.2: Definition

- Dupuytren's contracture is characterized by the proliferation of fibroblasts and production of collagen starting in the fibrofatty tissue of the hand. Initially this presents as nodules with puckering of the skin in the palmar and digital fascia along longitudinal tension lines. In the advanced stage, the nodules progress to form cords on the fascia. Fibrous tissue adheres to overlying skin and may also involve the tendon sheath of the long flexors of the finger. Flexion contracture develops at the MCP and PIP. Ultimately, the joint capsule contracts and permanent changes at the articular surfaces of the bones occur. When the disease has progressed so that the MCP joint contracts to 30 degrees and the deformity becomes a functional problem there are several options for treatment. Collagenase injection was approved by the FDA in 2010. It is a conservative treatment which may be done in the physician's office. The affected cord is injected and the next day the treated joint is manipulated to attempt cord rupture. Minimal hand therapy is usually needed following this procedure.
- Percutaneous needle fasciotomy is a minimally invasive treatment that is usually performed under local anesthesia. It involves multiple punctures of the cord using the bevel of a needle. It may be performed as an initial intervention or for recurrent disease.
- A more invasive Dupuytren's release (fasciotomy) may be performed. This surgery involves making an incision in the palm of the hand to remove inflamed and contracted connective tissue. The extent of the operation is dependent upon whether the contracture affects one or several fingers. Timing of the operation is based on the rate of progression of the disease and, consequently, may be performed in stages.
- Because of some genetic predisposition to Dupuytren's disease and contractures, symptoms may recur or progress after treatment. Between 50-80% of individuals treated surgically have good return of hand function and decreased pain for 10 years.



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## PTOT-12.8.3: Clinical Presentation

- A patient typically presents with a history of progressive loss of range of motion (extension) of the affected finger(s) which led to patient having surgical release.
- The fourth digit most commonly is involved. The fifth, third, and second fingers are involved in decreasing order of frequency. Specifically, there is a decreased ability to extend the MCP joint(s) fully, and sometimes a decreased ability to extend the PIP joint(s) fully is noted.
- The history may refer to an isolated nodule in this area, initially somewhat tender, which may have hardened and then progressed to cording.
- Asking about functional disabilities may elicit a history of certain tasks that the individual can no longer perform, such as grasping objects and typing.
- Postoperative pain may be present and often times resolves completely over time. Prior to surgery, Dupuytren's is usually a painless condition
- Postoperative swelling in digits and hand is typical
- No sensory deficits are reported, unless there is some other concomitant pathology. Sensory impairments may be present following surgery depending on the extent of the surgery.
- Prior to surgery, strength is usually normal. Postoperatively, patient will have less strength which increases as healing progresses.
- Postoperatively, patient will present with wound/scar at surgical site
- Dupuytren's is more common in men than women and is most prevalent in people of European descent

### Special Considerations

- Rule out red flags (require medical management and/or referral to physician) See Table below).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture, ligament tear |
| Fever, severe pain | Infection |
| Diabetes, paresthesia | Neuropathy, other metabolic conditions (e.g. B12 deficiency, hypothyroidism) |
| Multiple joint involvement, tophi | Rheumatologic diseases, gout |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of arm or hand | Arterial occlusion; vascular insufficiency |
| Immune-compromised state | Infection |



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## PTOT-12.8.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points[20]) OR the Disability of the Arm, Shoulder and Hand score (DASH) OR QuickDASH with a score of 11 or higher (Minimally Clinically Important Difference of 10 and 15 points respectively[18]), OR Hand Assessment Tool.[37]
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 50% of time
  - Neurological signs: altered reflexes and/or sensations
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently



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## PTOT-12.8.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-12.8.6: Section intentionally left blank

## PTOT-12.8.7: Section intentionally left blank

## PTOT-12.8.8: Physical/Occupational Therapy Management/Intervention

- Hand therapy following Dupuytren's release is a common practice. Various protocols have been found in the literature reviewed. Commonalities in protocols include initial splinting, edema control, wound management and gentle ROM to control the inflammatory response. This is followed by gradual increase of ROM and scar management. Some protocols include strengthening while others do not. If strength is an issue, this is never done in the early stages of rehab. As there is no specific protocol with high evidence based results, the therapist needs to use clinical reasoning and adapt the treatment protocols as appropriate.[6,14,39] High Level of evidence for no need for splinting preoperatively.
  - There is high level of evidence supporting no benefit of treatment with splints and stretches for nonoperative Dupuytren's contracture. There is high level of evidence showing that stretching for less than 7 months has no clinically important effects on joint mobility when treating a contracture. (The studies did not follow patients for greater than 7 months). There is also moderate to high level of evidence showing that treating a contracture with stretching/splinting,



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does not provide any change in quality of life or level of pain.[19]Some clinicians feel one therapy visit prior to surgery is beneficial to assess preoperative ROM, intrinsic muscle strength, and sensation. The severity of the condition preoperatively is a good predictor of the post op rehabilitation process. The therapy visit can be used to educate and prepare patients for the rehabilitation expectations following surgery. There is no level of evidence to support the benefits of a preoperative therapy visit.

- Moderate level of evidence:
  - There is controversy on whether or not all post op patients need to be splinted. There is moderate level of evidence supporting therapy alone is as effective in regaining motion as therapy plus splinting. It is suggested that splints should only be used postoperatively when there is a loss of active extension.[9,25]
  - There are other studies with moderate evidence to support low tension splinting versus splinting with mechanical stretch following Dupuytren's release. When the hand is splinted with little tension on the surgical site, there have been fewer complications with wound healing and less postoperative flare ups. Improvements in ROM are not affected over the long run in splinting with low tension versus splinting with stretch provided.[15,35]Use of silicone gel sheeting to manage postop scars (Low level and Conflicting level of evidence)
- Some studies report low level of evidence to support silicone gel use in preventing hypertrophic scaring in newly healed post-surgical wounds.[33]Other studies report silicone is effective, safe and is the gold standard of treatment to prevent hypertrophic scaring in clinical studies that have been done.[30]More randomized, controlled trials are needed in this area to determine sound evidence for the use of silicone gel in prevention of keloids following surgery.

**Contrast baths to manage edema (Conflicting level of evidence)**

- Contrast baths may increase skin temperature and blood flow but the evidence on its effect of edema is conflicting. In addition, there is no clear determination of the relationship between the physiological effects of contrast baths and hand function. [4]



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## PTOT-12.8.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[24]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[10,16]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[27]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[11,12]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
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  - Younger populations may require less/no treatment depending on presentation.[8,44]
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  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[29]



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### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[2]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[44]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without. [39]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[43]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[7]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-12.8.10: Home and Self-Care Techniques

- Home program, individually prescribed, is central to the care of all patients. The teaching for this program should be started on the first day of therapy and continue throughout the formal therapy program with a planned transition. Specific to Dupuytren's release, patients need to understand the importance of controlling initial postop inflammation and allowing the wounds to heal with progression of range of motion and return of functional use of hand. Patients also need to understand the diagnosis of Dupuytren's and the chance of the condition returning.

### Home Medical Equipment

- Cold packs
- Splint
- Compression glove
- Coban
- Cica gel

### Self-Care Techniques

- Instruction in active and passive range of motion
- Edema control techniques
- Scar management techniques
- Progressive strengthening exercises if needed
- Education in use of splint

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# PTOT-12.9: Hand Tendinopathies

## PTOT-12.9.1: Diagnoses Included

- Trigger finger
- Trigger digit
- Stenosing tenosynovitis

## PTOT-12.9.2: Definition

Trigger finger (TF) is one of the most common causes of hand pain and disability. The diagnosis is made when a finger is “locked” or attempts to lock in a position of flexion. If the flexor tendon cannot re-enter the canal at the A1 pulley, it assumes a flexed or “locked” position. This is usually due to the formation of a nodule in the flexor digitorum superficialis (FDS) tendon, where it glides under the A1 pulley in the region of the metacarpal head.

The condition begins as discomfort in the palm during movements of the involved digit(s). Gradually, or, in some cases acutely, the flexor tendon causes painful popping or snapping as the patient flexes and extends the digit.

Injection therapy is generally the first line of management. Surgery is considered for those in whom injections have failed or in whom other pathology, particularly RA, is the probable cause of the symptoms.

## PTOT-12.9.3: Clinical Presentation

- For nonoperative conditions, there is often a tender nodule that can be palpated overlying the metacarpophalangeal (MCP) joint
- For postoperative conditions, there will be a wound/scar at the A1 pulley
  - Pain in the affected area
  - Swelling
  - Reports of decreased strength
  - Hypersensitivity may be present at scar
  - Limited range of motion or fixed deformity
  - Snapping or popping sensation
  - In patients with diabetes, trigger fingers are more common and are less likely to respond to treatment.

### Special Considerations

- Rule out red flags (require medical management and or referral to physician). See Table below).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event



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| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Fever, severe pain | Possible infection |
| Unilateral edema | Upper extremity deep vein thrombosis |
| Immune-compromised state | Infection |
| Cancer history | Cause of symptoms (metastatic or primary) |
| Discoloration of hand/fingers | Vascular occlusion, shunt emboli (dialysis patients) |
| Exertional symptoms, history of cardiac disease | Anginal equivalent |

## PTOT-12.9.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points [25]) OR the Disability of the Arm, Shoulder and Hand score (DASH) OR QuickDASH with a score of 11 or higher (Minimal Clinically Important Difference of 10 and 15 points respectively [20] OR Hand Assessment Tool[45]
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
  - Neurological signs: altered reflexes and/or sensations
  - Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors,
  - Natural history and chronicity of condition, and
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently



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## PTOT-12.9.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-12.9.6: Section intentionally left blank

## PTOT-12.9.7: Section intentionally left blank

## PTOT-12.9.8: Physical/Occupational Therapy Management/Intervention

### Surgical intervention (High Level of Evidence with high level of documentation)

- There is strong evidence supporting surgical release of trigger fingers. Surgery is often considered when injections have been unsuccessful or the digit is in a locked position. Also, surgery has been more effective with patients who are diabetic. [3]
- Surgical release of the first annular (A1) pulley is most effective overall in both diabetics and nondiabetics alike.[30]

### Steroid Injections (Moderate Level of Evidence)

- Local steroid injection is safe and effective in short term treatment and is therefore recommended as the first level of treatment. However, when compared with surgery, there is a higher level of recurrent symptoms after 6 months. Some physicians use splints in addition to injection. Research shows that injections are not as successful in diabetic patients.[3]



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### Cryotherapy (Moderate level of evidence)

- Cryotherapy provides acute relief of tendinopathies. The most effective use of cold is melting ice water through a wet towel for 10 minutes.[53]

### Manual therapies (Low Level of evidence)

- There is insufficient evidence to support or refute the use of manual therapy for trigger finger

### Orthotics

- There is no definitive evidence supporting the benefits of splinting trigger fingers. There is a good documentation on the topic with multiple studies. The studies lack high level of evidence, however, it is agreed that splinting is a good option for those who wish to avoid invasive treatment and for those with mild to moderate symptoms of triggering.
- Managing nonsurgical trigger fingers with splints has been effective with patients who have had symptoms of triggering for less than 6 months. The most common splint fabricated holds the MCP joint in 10-15 degrees of flexion and allows the PIP and DIP joint movement. Patients who have been splinted have demonstrated decreased pain, decreased triggering and perceived overall improvement.[13]
- Use of orthoses reduces patient's pain and stage of stenosing tenosynovitis in triggering fingers.[50]
- If a single digit is triggering, some recommend immobilizing PIP joint and allowing movement at MP and DIP joint. If multiple fingers are involved, it is recommended to immobilize MP joints in 10-15 degrees of flexion. And as with all orthotics, proper fit and compliance of patient affects the success rate.[1]

### Modalities

- There is weak evidence to support the use of modalities including ultrasound and iontophoresis with trigger fingers.[3]Ultrasound, iontophoresis and phonophoresis are of uncertain benefits with tendinopathies.[53]

### Graston Technique

- There is weak evidence supporting the benefits of Graston technique or cross friction massage with trigger fingers. Only one study was found which supports the Graston technique.[26] More studies need to be done in this area.



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### Exercises

- There is insufficient evidence to support exercises with trigger fingers. It may be that exercises and therapy are most beneficial in patients with mild triggering.[43]
- The need for formal physical/occupational therapy postoperatively lacks sufficient evidence. Often times patients progress well with just a home program. Patients may need therapy to regain motion if there was a fixed contracture or limited motion prior to surgery.[43]
- In children younger than 3 years of age, conservative treatment including passive range of motion is effective for trigger thumbs in stage 2. Surgical release is thought to be indicated for stage 3 to avoid flexion deformity.[4]

## PTOT-12.9.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[29]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[14,19]
- There is some evidence that attention is still changing up to approximately 17 years of age.
- There may be more impulsivity in approach to tasks, especially up to about age 15.
- Adolescents can complete progressive home programs that include self-manual techniques. [32]
- There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
- Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[15,16]



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**Growth/Maturation**

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
- There is no evidence that physical therapy in general need to be more involved due to age
- Younger populations may require less/no treatment depending on presentation.[12,52]
- Immature tendon-bone attachment sites and physis are at risk for overuse injury.
- There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[35]

**Overuse/Sport**

- Physeal injuries in youth are common and often related to overuse during sport participation.
- Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
- The most effective treatment after an overuse injury was extended periods of rest.[5]
- Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[52]

**Hypermobility**

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[46]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[51]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[11]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-12.9.10: Home and Self-Care Techniques

- It is important to educate patients on the need to monitor their symptoms with conservative treatment such as the use of splints, ice, activity modification and rest. If symptoms do not improve after 2-4 weeks, it may be necessary to go back to the physician for an injection or progress to surgery. If patient is postoperative, it is crucial for them to understand the need to resume normal use of the hand as soon as possible to prevent range of motion limitations.

### Home Medical Equipment

- Hot packs/cold packs
- Theraputty as triggering resolves
- Splint
- Compression glove/coban to manage postop edema as needed

### Self-Care Techniques

- Splinting to decrease synovitis around the A1 pulley
- Rest, reduce strenuous activities
- Home ROM exercises, stretching wrist extensor musculature
- Progression to therapeutic exercise—strengthening exercises
- Hot packs/cold packs, if needed, to relieve discomfort

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# PTOT-12.10: Thoracic Outlet Syndrome

## PTOT-12.10.1: Synonyms

- Paget-Schroder Syndrome
- Vascular thoracic outlet syndrome
- Neurogenic thoracic outlet syndrome
- Myofascial dysfunction of thoracic outlet

## PTOT-12.10.2: Definition

- The thoracic outlet is the anatomic space bordered by the 1st thoracic rib, the clavicle, and the superior border of the scapula through which the great vessels and nerves of the upper extremity pass. It is further defined by the interscalene interval, a triangle with its apex directed superiorly. This triangle is bordered anteriorly by the anterior scalene muscle, posteriorly by the middle scalene muscle, and inferiorly by the first rib [1]
- Thoracic outlet syndrome (TOS) is a clinical syndrome characterized by symptoms attributable to compression of the neural or vascular anatomic structures that pass through the thoracic outlet: the brachial plexus, the subclavian artery, vein, or both. TOS of a primary vascular occlusion is more specifically referred to as vascular TOS. When the condition is confirmed to be more due to compression on neural tissue it is referred to has neurogenic TOS.[6]

## PTOT-12.10.3: Clinical Presentation

- Pain, numbness and/or tingling throughout involved side UT (no associated pattern)
- Heaviness of the involved upper extremity.
- Neck pain and headaches
- Autonomic phenomena (e.g., cold hands, blanching, swelling)
- Quick fatigue with reaching and overhead activity
- Trouble laying with hand above head
- Forward postural concerns
- Tightness in neck and periscapular areas including the shoulder.
- Findings of Thoracic Outlet Syndrome



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### Specific Considerations

- Rule out red flags (require medical management).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture, ligament tear, tendon rupture |
| Fever, severe pain | Possible infection |
| Unilateral edema | Upper extremity deep vein thrombosis |
| Immune-compromised state | Infection |
| Cancer history | Cause of symptoms (metastatic or primary) |
| Discoloration of hand/fingers | Vascular occlusion, shunt emboli (dialysis patients) |
| Exertional symptoms, history of cardiac disease | Anginal equivalent |

## PTOT-12.10.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the **Patient Specific Functional Scale (PSFS)**– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points[15] OR the **Disability of the Arm, Hand and Shoulder Score (DASH) OR QuickDASH** with a score of 11 or higher (Minimal Clinically Important Difference of 10 and 15 points respectively)[13] OR The **Shoulder Pain and Disability Index (SPADI)** with a score of 20 or higher (minimum clinical important difference of 8-13 points)[2]
  - ROM: < than functional motion (refer to Maximal Complex Motion Necessary for Functional Activities)
  - Pain: limiting function and at least 3/10 for 50% of the time
  - Positive neurological testing
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors and comorbidities,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
  - Patient's level of independence



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- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimum Detectable Change or Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently

## PTOT-12.10.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.



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## PTOT-12.10.6: Referral Guidelines

- Refer patient to their primary care provider, for evaluation of alternative treatment options if:
  - Improvement does not meet above guidelines or improvement reaches a plateau;
  - Atrophy of upper extremity occurs;
  - Signs of fracture or dislocation occurs;
  - Increased neurologic signs/symptoms: increased UE numbness/tingling, increased UE weakness, increased UE pain, decreased UE reflexes.

## PTOT-12.10.7: Section intentionally left blank

## PTOT-12.10.8: Physical/Occupational Therapy Management

True TOS of a neurogenic nature may respond favorably to a course of conservative care. It is recommended that vascular types confirmed with imaging receive surgical consultation. Many patients that present with symptoms of TOS may actually be have more of a myofascial dysfunction affecting the thoracic outlet area. In these cases, non-operative care is recommended and can be effective. Rehabilitation following surgical treatment is also effective and there is a good success rate for return to normal activity. The need for surgical intervention is much lower in cases that are identified acutely vs a chronic presentation.[4,6,14]

- Clinical Intervention – Currently there is limited high quality evidence to support specific treatments for thoracic outlet syndrome. Only one published clinical practice guideline was available with most recommendations based on level III-IV evidence (CDLE 2014). Best evidence as well as sound clinical judgment should be considered during a course of treatment. Non-surgical treatment should be expected to cause significant improvement with in just 4-6 treatments. Progress would then continue to be significant over time. It is recommended that patients who do not respond to conservative measures should not continue and may need surgical or other consultation. Below is a summary of the best limited evidence available specific to TOS non-conservative (and post-surgical) treatment:[4,6,14,17]
  - Activity modification – It is recommended that patients with TOS should try to maintain as much daily function as possible without increasing symptoms during treatment. Activity should be modified to reduce symptoms and allow appropriate rest.
  - Patient Education – Patients should be properly educated on associated anatomy, course of TOS and outcome potential. It is also recommended that they are educated in performing home exercises regularly.
  - Rehabilitative Therapies – Physical and occupational therapy management is considered a gold standard of conservative care prior to surgical intervention. More chronic cases many require interdisciplinary care beyond just physical or occupational therapy. It is recommended to avoid patients becoming dependent on passive treatments and application of manual based care. Care should be active and require a taxing effort. It is also recommended that skilled care should cause significant change within 4-6 visits and that progress should continue. Care may include these various components:



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- Therapeutic exercise, Functional training, Neuromuscular re-education, stretching – should include clinic and home sessions. There is no evidence to support one type of exercise over another. 16-24 sessions for exercise is recommended for a course of care. There is no determination that all sessions need to be in a clinical setting.
- Nerve Gliding – some evidence to suggest this may be helpful. It is recommended that nerve gliding be used more acutely for 6-8 sessions at a maximum. Nerve based symptoms are not changing, referral for further testing would be recommended.

- Passive Treatments including manual therapy – Some use of passive treatments may be helpful during the first 3-4 weeks to help with symptom control.

## 12.10.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[16]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[12]
- There is some evidence that attention is still changing up to approximately 17 years of age.
- There may be more impulsivity in approach to tasks, especially up to about age 15.
- Adolescents can complete progressive home programs that include self-manual techniques.[17]
- There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
- Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[9,10]



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**Growth/Maturation**

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
- There is no evidence that physical therapy in general need to be more involved due to age
- Younger populations may require less/no treatment depending on presentation.[8,23]
- Immature tendon-bone attachment sites and physis are at risk for overuse injury.
- There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[19]

**Overuse/Sport**

- Physeal injuries in youth are common and often related to overuse during sport participation.
- Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
- The most effective treatment after an overuse injury was extended periods of rest.[3]
- Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation. [23]

**Hypermobility**

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without. [21]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[22]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility: [5]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.
- More therapy may be recommended during pubertal changes if showing decline in function.

## PTOT-12.10.9: Section intentionally left blank



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## PTOT-12.10.10: Home and Self-Care Techniques

- The patient should be taught to perform a home exercise program and ways to modify daily tasks and work related tasks.[6]

### Home Medical Equipment

- Hot packs/cold packs
- Theraband for therapeutic exercises
- Use of cervical pillow while sleeping may be helpful
- Gym ball
- Home electrical stimulation unit

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# PTOT-12.11: Wrist Fracture Nonsurgical

## PTOT-12.11.1: Diagnoses included:

- Carpal Fracture
- Distal radius fracture
- Colles fracture
- Scaphoid fracture
- Lunate fracture

## PTOT-12.11.2: Definition

- A fracture is essentially a structural failure of bone. The nature of the fracture is determined by inherent properties of the bone, its structure, and type of forces applied to it.
  - Forces of tension, compression, bending, and torsion can load bone beyond its structural strength.
  - External forces may render a fracture displaced or non-displaced, with two or more fragments.
  - Displaced fragments may be overriding one another, lateral to each other, extremely distracted from one another, angulated, or rotated out of alignment.
  - Displaced fractures may be open fractures with a fragment breaking through skin, exposing the fracture site to external environment and increases risk of infection.
  - In addition to bony involvement, fractures frequently result in associated injury of soft tissues attached to, or adjacent to, the bone.
  - Fractures may be treated by immobilization with casts, sling/immobilizer, ORIF, percutaneous pinning, or joint replacement.
  - Fracture of the distal radius is the most common wrist injury.
- The scaphoid is the most commonly fractured carpal bone. There is a high incidence of delayed healing, or non-union of scaphoid fractures, and are they are inherently unstable.
- Distal radius, scaphoid, and lunate fractures usually are the result of a fall on an outstretched hand. Wrist fractures may be also be caused by hyper flexion mechanisms and by direct blows to the wrist.



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## PTOT-12.11.3: Clinical Presentation

- Pain and tenderness:
  - With scaphoid fractures, the point of maximal tenderness lies in the anatomic snuffbox. Radial deviation of the wrist or axial loading of the first metacarpal may increase pain.
  - Axial loading of the third metacarpal may increase pain with a lunate injury. In addition, lunate fractures may be associated with point tenderness over the lunate fossa (located distal to the radius at the base of the long finger metacarpal).
  - With triquetrum fractures, the point of maximal tenderness is localized to the triquetrum with ulnar sided wrist pain.
  - The classic finding in a Colles fracture is the so-called dinner fork deformity, which is produced by dorsal displacement of the distal fracture fragments. A Smith fracture may show an obvious volar displacement of the wrist relative to the forearm, known as a garden spade deformity.
- Impaired functional ability
- Wrist and finger stiffness, and possibly elbow stiffness
- Decreased grip and pinch
- Open wound/break in skin
- Ecchymosis and swelling
- Impaired circulation
- Atrophy of forearm muscles
- Extent of residual malalignment

### Special Considerations

- Rule out red flags (require medical management and/or referral to physician) See Table below).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Ligament tear |
| Fever, severe pain | Infection |
| Loss of distal pulse | Compartment syndrome |
| Diabetes | Neuropathy |
| Multiple joint involvement | Rheumatologic diseases |
| Unilateral edema | Deep vein thrombosis |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of wrist or hand; delayed capillary refill | Arterial occlusion; arterial insufficiency |
| Immune-compromised state | Infection |



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## PTOT-12.11.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points [21])) OR the DASH OR QuickDASH with a score of 11 or higher (Minimally Clinically Important Difference of 10 and 15 points respectively[17])
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 50% of time
  - Neurological signs: altered reflexes and/or sensations
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - And response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently

## PTOT-12.11.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.



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- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-12.11.6: Section intentionally left blank

## PTOT-12.11.7: Section intentionally left blank

## PTOT-12.11.8: Physical/Occupational Therapy Management/Intervention

- Initial therapy interventions are focused on decreasing inflammation, normalizing pain, restoring motion and patient education. Proprioception needs to be maintained with eventual progression of exercises to return to maximal functional use of the affected upper extremity. There are widely used therapy protocols following wrist fractures. However, there is no strong evidence supporting any specific protocol. The following treatment techniques have been studied and reported in the literature.

**Specific Rehabilitation Intervention (Insufficient evidence)**

- There are widely accepted therapy treatments following wrist fractures. However, there is not enough evidence available to determine the best form of rehabilitation and what interventions should be used to optimize functional recovery. There is also not enough good quality evidence available to determine if results are better when interventions are started during immobilization period versus post immobilization. Nor is there enough good quality evidence supporting therapy vs home program in the long term outcomes of functional use of the upper extremity. In addition, no determination has been made on how frequent or how long care should be provided.[20]
- One observational study found that exercise and advice were the most frequently administered treatment following distal radius fractures. Further research is needed to provide high quality evidence that these interventions improve outcomes following distal radius fractures.[8]



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**Edema Management (High level of evidence)**

- One randomized clinical control study compared the effect of traditional edema control techniques (elevation, compression, coban wrap, isotoner gloves, functional activity) versus a modified manual edema mobilization technique (MEM) (deep breathing, terminus stimulation, axillary stimulation starting in the uninvolved side, MEM to trunk region and then stimulation of involved side). Neither method was superior in terms of edema reduction. However, the modified MEM group needed fewer sessions to decrease edema vs the traditional edema control group. [25]

**Incorporate ADL activities in the treatment of hand injuries (Moderate level of evidence)**

- One randomized, controlled study found high level of evidence supporting therapeutic activities that mimic Activities of Daily Living (ADL's) improve the functions of the hand more effectively than just therapeutic activities such as range of motion, strength and modalities. This study suggests adding ADL simulated activities to treatment following hand injuries. (Guzelkucuk U et al, 2007)

**Joint Mobilization (Moderate level of evidence)**

- Joint mobilization techniques at the wrist in patients with limited range of motion following a distal radius fracture has been found to be an effective treatment.[19]

**Regular supervised therapy from a hand therapist versus home program with regular monitoring (Moderate evidence)**

- There were no statistically significant differences between the final scores of the PRWHE (patient rated wrist and hand evaluation), range of motion, pain, or grip strength between patients receiving regular therapy and those with a home program which was monitored. [42] It is suggested that clinic-based therapy may be preferable for patients with complications after a distal radius fracture with volar plate fixation. Patients with decreased finger motion and various comorbidities may also benefit more from therapy provided in a clinic versus just a home program.
- There is no evidence to support adding supervised exercises to a monitored home program after distal radius fracture is beneficial. There have been no statistically significant differences in any impairment or activity outcome measures between those with therapy versus those with a monitored home program.[7]

**Beginning therapy during immobilization leads to better short term results (Moderate level of evidence)**

- When therapy is started during the immobilization period, there are greater improvements in grip, pinch and ROM in the short term. There is no evidence of differences in these areas in the long term.[35]



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**Contrast baths to manage edema (Conflicting level of evidence)**

- Contrast baths may increase skin temperature and blood flow but the evidence on its effect of edema is conflicting. In addition, there is no clear determination of the relationship between the physiological effects of contrast baths and hand function.[5]

**Strength training of non-affected upper extremity during period of immobilization. (Low Level of Evidence)**

- There is low quality evidence of clinically marginal benefits for cross education involving strength training of the non-fractured upper extremity during period of immobilization with or without surgical repair. [20] One moderate quality randomized controlled trial found contralateral strengthening beginning during period of immobilization led to faster recovery of grip in the affected hand.[27]

**Ultrasound (Insufficient Evidence)**

- While a potential benefit of ultrasound in the treatment of acute fractures in adults cannot be ruled out, the currently available evidence is insufficient to support the routine use of this treatment.[18]

**Mirror Therapy (lacks evidence)**

- In one pilot randomized study of distal radius fractures, the use of mirror therapy along with conventional hand therapy versus hand therapy alone did not have any difference in patient pain level or their level of disability. (Bayon-Calatayud M, 2016) One moderate quality RCT found conventional therapy plus the use of mirror therapy along with a mirror therapy home program resulted in significantly improved range of motion and functional scores versus no mirror therapy.[34]

**Exercise and home program versus no intervention (Insufficient evidence):**

- There is preliminary evidence from a single trial that exercise combined with home program education improves upper limb activity and reduces pain in the short term after distal radius fracture. A single session of exercise and instruction compared to no intervention found improvements in upper limb activity and decreased pain at 3 and 6 weeks after cast removal. There were no statistically significant differences for range of motion or grip strength at the 3 and 6 week time.[7]

**Dynamic Splinting (No Evidence)**

- For contractures which develop after a distal radius fracture, there is no evidence to support dynamic splinting as superior to standard care in improving range of motion or occupational performance.[34]



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## PTOT-12.11.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[24]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[12,16]
- There is some evidence that attention is still changing up to approximately 17 years of age.
- There may be more impulsivity in approach to tasks, especially up to about age 15.
- Adolescents can complete progressive home programs that include self-manual techniques.[26]
- There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
- Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[13,14]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
- There is no evidence that physical therapy in general need to be more involved due to age
- Younger populations may require less/no treatment depending on presentation.[11,44]
- Immature tendon-bone attachment sites and physis are at risk for overuse injury.
- There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[29]



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**Overuse/Sport**

- Physeal injuries in youth are common and often related to overuse during sport participation.
- Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
- The most effective treatment after an overuse injury was extended periods of rest.[2]
- Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[44]

**Hypermobility**

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[38]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[43]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[10]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-12.11.10: Home Medical Equipment

- Cold packs/heat packs
- Resistance band/putty for therapeutic exercises
- Orthosis
- Compression glove/sleeve for edema control

### Self-Care Techniques

- Instruction in proper fit/purpose of any orthosis
- Home exercise program for edema control
- Cold pack/hot pack, if needed, to relieve discomfort
- ROM exercises
- Progression to therapeutic exercise - strengthening exercises
- Resumption of ADL's with affected hand

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# PTOT-12.12: Wrist Fracture Post-Open Reduction Internal Fixation

## PTOT-12.12.1: Diagnoses included

- Distal radius ORIF
- Distal ulna ORIF
- Both forearm bone ORIF
- Scaphoid ORIF

## PTOT-12.12.2: Definition

- A fracture is essentially a structural failure of bone. The nature of the fracture is determined by inherent properties of the bone, its structure, and type of forces applied to it.
  - Forces of tension, compression, bending, and torsion can load bone beyond its structural strength.
  - External forces may render a fracture displaced or no displaced, with two or more fragments.
  - Displaced fragments may be overriding one another, lateral to each other, extremely distracted from one another, angulated, or rotated out of alignment.
  - Displaced fractures may be open fractures with a fragment breaking through skin, exposing the fracture site to external environment and increases risk of infection.
  - In addition to bony involvement, fractures frequently result in associated injury of soft tissues attached to, or adjacent to, the bone.
  - Fractures may be treated by immobilization with casts, sling/immobilizer, ORIF, percutaneous pinning, or joint replacement.
  - Fracture of the distal radius is the most common wrist injury.
- The scaphoid is the most commonly fractured carpal bone. There is a high incidence of delayed healing, or non-union of scaphoid fractures, and are they are inherently unstable.
- Distal radius, scaphoid, and lunate fractures usually are the result of a fall on an outstretched hand. Wrist fractures may be also be caused by hyper flexion mechanisms and by direct blows to the wrist.

## PTOT-12.12.3: Clinical Presentation

- Impaired functional ability
- Wrist and finger stiffness, and possibly elbow stiffness
- Wrist and hand pain
- Decreased grip and pinch
- Wrist and finger swelling
- Surgical scar/wound



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### Special Considerations

- Rule out red flags (require medical management and/or referral to physician) See Table below.
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Ligament tear |
| Fever, severe pain | Infection |
| Loss of distal pulse | Compartment syndrome |
| Diabetes; paresthesias in stocking-glove distribution | Neuropathy; B12 deficiency, hypothyroidism, lead poisoning |
| Multiple joint involvement | Rheumatologic diseases |
| Unilateral edema | Deep vein thrombosis |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of wrist or hand | Arterial occlusion |
| Immune-compromised state | Infection |

## PTOT-12.12.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
- Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS) – with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points [19]) OR the DASH OR QuickDASH with a score of 11 or higher (Minimally Clinically Important Difference of 10 and 15 points respectively [16]). Other functional tool include: HAT (Hand Assessment Too)[37], PRWE (Patient Related Wrist Evaluation)[40,47]
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 50% of time
  - Neurological signs: altered reflexes and/or sensations
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - And response to treatment provided



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- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently

## PTOT-12.12.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-12.12.6: Section intentionally left blank

## PTOT-12.12.7: Section intentionally left blank



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## PTOT-12.12.8: Physical/Occupational Therapy Management/Intervention

- Initial therapy interventions are focused on decreasing inflammation, normalizing pain, managing scar, restoring motion and patient education. Proprioception needs to be maintained with eventual progression of exercises to return to maximal functional use of the affected upper extremity. There are widely used therapy protocols following wrist fractures treated with ORIF. However, there is no strong evidence supporting any specific protocol. The following treatment techniques have been studied and reported in the literature.

### Specific Rehabilitation Intervention (Insufficient evidence)

- There are widely accepted therapy treatments following wrist ORIF's. However, there is not enough evidence available to determine the best form of rehabilitation and what interventions should be used to optimize functional recovery. There is also not enough good quality evidence available to determine if results are better when interventions are started during immobilization period versus post immobilization. Nor is there enough good quality evidence supporting therapy vs home program in the long term outcomes of functional use of the upper extremity. In addition, no determination has been made on how frequent or how long care should be provided.[18]

### Edema Management (High level of evidence)

- One randomized clinical control study compared the effect of traditional edema control techniques (elevation, compression, coban wrap, isotoner gloves, functional activity) versus a modified manual edema mobilization technique (MEM) (deep breathing, terminus stimulation, axillary stimulation starting in the uninvolved side, MEM to trunk region and then stimulation of involved side). Neither method was superior in terms of edema reduction however, the modified MEM group needed fewer sessions to decrease edema vs the traditional edema control group.[23]

### Early motion following surgical treatment (Moderate level of Evidence)

- Beginning mobilization early in the postop rehabilitation process leads to less pain and edema. It also results in earlier return to work, less stiffness and better preserved range of motion. Mobilization should begin as soon as bone and joint stability are established.[2,35]

### Incorporate ADL activities in the treatment of hand injuries (Moderate level of evidence)

- One randomized, controlled study found high level of evidence supporting therapeutic activities that mimic ADL's improve the functions of the hand more effectively than just therapeutic activities such as range of motion, strength and modalities. This study suggests adding ADL simulated activities to treatment following hand injuries.[17]



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**Joint mobilization (Moderate level of evidence)**

- Joint mobilization techniques at the wrist in patients with limited range of motion following a distal radius fracture has been found to be an effective treatment technique.[35]

**Splint use (Moderate level of evidence)**

- Appropriate splinting can help increase ROM and reduce contractures after a joint injury.[29] Passive exercise (Moderate level of evidence)
- Passive range of motion is an effective way to increase ROM after a fracture, joint injury or period of immobilization.[29]

**Use of silicone gel sheeting to manage postop scars (Conflicting level of evidence)**

- Some studies report low level of evidence to support silicone gel use in preventing hypertrophic scaring in newly healed post-surgical wounds. (O'Brien L, et al, 2006) Other studies report silicone is effective, safe and is the gold standard of treatment to prevent hypertrophic scaring in clinical studies that have been done.[30] More randomized, controlled trials are needed in this area to determine sound evidence for the use of silicone gel in prevention of keloids following surgery.

**Contrast baths to manage edema (Conflicting level of evidence)**

- Contrast baths may increase skin temperature and blood flow but the evidence on its effect of edema is conflicting. In addition, there is no clear determination of the relationship between the physiological effects of contrast baths and hand function. [5]Therapy vs home program (Insufficient evidence)
- The effect of formal therapy following ORIF with volar plate fixation of the distal radius is uncertain. The average motion and disability was not significantly different with formal therapy vs surgeon directed independent exercises.[41]

**Strength training of non-affected upper extremity during period of immobilization. (Low level of evidence)**

- There is low quality evidence of clinically marginal benefits for cross education involving strength training of the non-fractured upper extremity during period of immobilization with or without surgical repair.[18]

**Mirror Therapy (lacks evidence)**

- In one pilot randomized study of distal radius fractures, the use of mirror therapy along with conventional hand therapy versus hand therapy alone did not have any difference in patient pain level or their level of disability. (Bayon-Calatayud M, 2016) One moderate quality RCT found conventional therapy plus the use of mirror therapy along with a mirror therapy home program resulted in significantly improved range of motion and functional scores versus no mirror therapy.[35]



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### Dynamic Splinting (No Evidence)

- For contractures which develop after a distal radius fracture, there is no evidence to support dynamic splinting as superior to standard care in improving range of motion or occupational performance.[35]

## PTOT-12.12.9: Section intentionally left blank

## PTOT-12.12.10: Home and Self-Care Techniques

It is necessary for patients to understand the importance of early motion while protecting the surgical repair. The home program for postop wrist ORIF conditions should include edema control techniques, use of protective orthosis, pain control techniques, range of motion and ADL's. The home program is central to the care of all patients. The teaching for this program should be started on the first day of therapy and continue throughout the formal therapy program with a planned transition.

### Home Medical Equipment

- Cold packs
- Compression glove/sleeve for edema control
- Orthosis
- Resistance band/putty for therapeutic exercises
- Heat packs

### Self-Care Techniques

- Instruction in proper fit/purpose of any orthosis
- Home exercise program for edema control
- Cold pack/hot pack, if needed, to relieve discomfort
- ROM exercises
- Progression to therapeutic exercise - strengthening exercises
- Resumption of ADL's with affected hand

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# PTOT-12.13: Wrist Neuropathy

## PTOT-12.13.1: Diagnoses included

Carpal Tunnel Syndrome With and Without Release

Guyon's canal syndrome with and without release

## PTOT-12.13.2: Definition

### Carpal Tunnel Syndrome With and Without Release

- Carpal tunnel syndrome (CTS) is a compression neuropathy affecting the median nerve in the carpal tunnel, leading to symptoms in the radial 3.5 digits, and possibly thenar muscle atrophy or fasciculation.

### Guyon's canal syndrome with and without release

- Guyon's canal syndrome is a compression neuropathy affecting the ulnar nerve at the Guyon canal of the wrist. Entrapment of the ulnar nerve at the wrist may cause purely motor, purely sensory, or a mixed lesion, depending on the site of compression.
- When non-operative treatment fails to relieve symptoms, or when significant electrodiagnostic studies occur, surgical intervention is the treatment of choice.

## PTOT-12.13.3: Clinical Presentation

- Subjective Findings
  - Weakness in grip or pinch which may result in dropping items
  - A feeling of incoordination, clumsiness
  - Symptoms are exacerbated with sustained activity
  - Many patients also report sensitivity to changes in temperature (particularly cold) and a difference in skin color.
  - Patients may report history of forceful wrist motion
  - Patients may report history of prolonged extreme wrist posture
- The following findings are more common with carpal tunnel syndrome:
  - Wrist pain, aching sensation over the ventral aspect of the wrist. This pain can radiate distally to the palm and fingers or, more commonly, extend proximally along the ventral forearm.
  - Numbness and tingling in the radial three and one half digits
  - Pain consisting of a "pins and needles" feeling at night, frequently awakening patient
- The following findings are more common with Guyon's canal syndrome:
  - Claw hand resulting from unopposed action of the extensor digitorum communis is in the 4th and 5th digits
  - Inability to extend the proximal and distal interphalangeal joints of any of the fingers
  - Inability to adduct or abduct the fingers, or to oppose all the fingertips



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- Inability to adduct the thumb
- Positive Froments sign
- Atrophy of the interosseous spaces, especially the first, and of the hypothenar eminence
- Loss of sensation on the ulnar side of the hand, the ring finger, and the entire little finger

### Special Considerations

- Rule out red flags (require medical management and/or referral to physician). See Table below.
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture |
| Fever, severe pain | Possible infection |
| Cancer history | Cause of symptoms (metastatic, primary or paraneoplastic) potential complications of chemotherapy |
| Unilateral edema | Upper extremity deep vein thrombosis |
| Immune-compromised state | Infection |
| Cold Intolerance, fatigue, constipation | Hypothyroidism |
| Multiple joint involvement, unusual skin rashes, other vascular involvement | Rheumatologic diseases (e.g., Rheumatoid arthritis, Sjogren's Syndrome, Systemic Lupus Erythematosis, Polyarteritis nodosa) |
| Stocking-glove neurological involvement | Diabetes, Alcoholism, B12 deficiency |
| Auto repair occupation, battery exposure | Lead poisoning |
| Hand/skull disproportionately large<br>Discoloration of hand/fingers | Acromegaly<br>Vascular occlusion, shunt emboli (dialysis patients) |



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## PTOT-12.13.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the **Patient Specific Functional Scale (PSFS)** – with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points [21]) OR **the DASH OR QuickDASH** with a score of 11 or higher (Minimally Clinically Important Difference of 10 and 15 points respectively[16]). Additional functional tools include: Hand Assessment Tool[39]
    Boston Carpal Tunnel Questionnaire[14,19]
    ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 for 50% of the time
  - Neurological signs: altered reflexes and/or sensations
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided
- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently



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## PTOT-12.13.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

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## PTOT-12.13.8: Management/Intervention

- Typical management strategies used when treating neuropathies include explanation and education, postural and ergonomic advice, joint mobilization, orthotics, soft tissue techniques, neural mobilization and exercise. Due to the lack of high level evidence, no specific treatment protocols or strong recommendations can be made. The following interventions have been studied and reported in literature.

**Splint use (high level of evidence)**

- The use of night wrist splints for CTS has been effective in decreasing the short term and mid-term effects of carpal tunnel syndrome. The most commonly used splint is one that keeps wrist in neutral. It has been found that night splinting alone is as effective as splinting the wrist all day.[18,23]Ultrasound treatment (high to moderate level of evidence)
- The use of ultrasound and electromagnetic field therapy has been helpful in the short term and moderate term relief of symptoms related to carpal tunnel syndrome.[18,23]

**Ergonomic keyboards (moderate level of evidence)**

- Changes to work stations to include ergonomic keyboards has been shown to have good results in decreasing symptoms of CTS.[18,23]Carpal Bone Mobilization (moderate level of evidence)
- Moderate level of evidence that carpal mobilization provides short term relief of CTS in patients with low to moderate symptoms of CTS.[32,35] Post-operative mobilization (Moderate level of evidence)
- There is moderate level of evidence to support early mobilization of the wrist following carpal tunnel release. Splinting postoperatively does not necessarily lead to improved strength, less bowstringing or improved patient satisfaction.[2]There is moderate evidence showing that postoperative splinting for 2 weeks leads to slower return of ADL's and strength. It also leads to more postoperative pain and scar sensitivity.



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**Clinical interventions lacking sufficient evidence.**

- Although it is a common treatment method, there is lacking evidence to support treatment of nonsurgical CTS with exercises and mobilization.[2,36]Tendon and Nerve Gliding exercises
- There is evidence supporting glides as an effective treatment for people with mild to moderate CTS. However, none of the studies done were using tendon and nerve glides alone. They all had varying levels and types of adjunct therapies in addition to the tendon and nerve gliding. Further studies are needed to understand the efficacy of standardized tendon and nerve gliding exercises to control CTS symptoms and improve functional status. (Kim SD, 2015). One MRI study showed that gentle nerve gliding did not aggravate the inflammatory process but rather decreased intraneural edema. Nerve and tendon gliding in a carpal tunnel study showed an immediate decrease in carpal tunnel pressure in patients with carpal tunnel syndrome.[41]There is not enough evidence either for or against using the following treatments:
- Activity modification, Graston technique, Iontophoresis and Strengthening.[2]
- There are widely accepted treatments following surgery which may include: manual physical therapy, exercise, desensitization, orthosis, scar management, edema management, modalities and ergonomic changes. The goals of postoperative treatment include managing edema, decreasing pain, regaining motion and strength and ultimately regaining functional use of hand.[34] Unfortunately, there are no randomized controlled trials to evaluate the efficacy of different treatments used in postoperative rehabilitation.[8]

**Exercise therapy with peripheral neuropathy (insufficient evidence)**

- Inadequate evidence from randomized controlled trials was found when trying to determine if exercises affected levels of disability in patients with peripheral neuropathy. There was evidence, however, that strengthening exercises moderately improve muscle strength in people with peripheral neuropathy.[47]
- It is agreed upon that patient instruction/education is necessary in the treatment of Guyon's canal syndrome. However, the treatment that is paired with the education varies.[20]



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## 12.13.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[25]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences.[11,17]
- There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[28]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[12,13]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[10,46]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[31]



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### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest. [4]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[46]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[42]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers. [45]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[9]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.

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## PTOT-12.13.10: Home and Self-Care Techniques

It is important to educate patients on their diagnosis. If the patient is non-operative, it is crucial that patients learn the benefits of splinting (especially with CTS) and may benefit from a short course of therapy. If patient is postoperative, resume motion with progressive return to activity. Whether operative or non-operative, the patient can be taught to manage a home program and patient education needs to begin on the first day of treatment.

- Home Medical Equipment
  - Cold packs/hot packs
  - Protective splint
  - Orthoses
  - Resistance putty
  - Compression glove/dermafit for edema control postop as needed
- Self-Care Techniques
  - Ergonomic advice, instruction in proper body mechanics
  - Reduce repetitive activities
  - Home ROM exercises
  - Tendon and nerve glides
  - Progression to therapeutic exercise—strengthening exercises
  - Cold packs, if needed, to relieve discomfort
  - Manual self-massage for scar management in the postoperative patient

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# PTOT-12.14: Wrist Nonspecific

## PTOT-12.14.1: Diagnoses included

- Extensor Carpi Ulnaris (ECU) injury
- Triangular fibrocartilage complex (TFCC) injury
- Ulnar impaction

## PTOT-12.14.2: Definition

**Extensor Carpi Ulnaris (ECU) injury:**

- The extensor carpi ulnaris function depends on the position of the wrist. In supination, the tendon lies dorsal to the center of rotation of the wrist and contributes to extension. The tension on the ECU is greatest during activity involving supination and holding the wrist in flexion and/or ulnar deviation. When in pronation, the tendon lies more palmar and ulnar to the center of rotation and contributes less to wrist extension. ECU pathology is more common in wrists with negative ulnar variance. Ulnar sided wrist pain can be the result of an unstable ECU which is usually caused by an acute event or a tendinopathy which is usually a more insidious onset.[15]

**TFCC/DRUJ:**

- The TFCC is responsible for stability across the distal radioulnar joint (DRUJ). The TFCC has rich blood supply at the outer articular disc and very poor blood supply in the disc lying between the ulnar head, lunate and triquetrum. Therefore, injury to the central and radial portion of the TFCC has significant limited ability to heal following an injury. Surgical intervention for a TFCC injury that does not respond to conservative treatment depends on where the lesion is located. If it is in the highly vascularized area it is often repaired and if it is in the poorly vascularized area it is most often debrided.[25]
- In the case of TFCC and DRUJ pathology, there may be a specific traumatic injury (usually affecting the peripheral disc) or in chronic cases of ulnar sided wrist pain, there may be degenerative injuries (usually affecting the central disc). Pain is generally localized to ulnar wrist and increases with activities that load the wrist or with pronation/supination motion.



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**Ulnar impaction:**

- This condition results from impaction between the ulnar carpal bones and the ulnar head. The condition tends to occur where there is a positive ulnar variance and degenerative/osteoarthritic conditions in the wrist. (Watanabe et al, 2010). Symptoms are more pronounced in pronation.[1]
- Acute traumatic injury usually results from a notable traumatic event. Most injuries involve hyperextension and ulnar deviation, although ulnar sided lesions may also be caused by direct blows and flexion injuries. Patient may report hearing a pop with immediate swelling and pain.
- Chronic overuse injuries can be the result of repetitive ulnar loading and may present with vague ulnar sided pain without a specific injury. Professions including mechanics and plumbers may be more likely to have a chronic injury with ulnar sided wrist pain.
- Chronic degenerative problems can be secondary to prior traumatic events including previous injuries that have altered the anatomy of the wrist (ie, malunioned distal radius fracture or radial shortening following a radial head fracture).

## PTOT-12.14.3: Clinical Presentation

- Ulnar sided wrist pain
- Pain with ulnar deviation and loading of the wrist
- Pain with hyperextension of the wrist
- Patient may report clicking or catching in the wrist
- Pain with pronated ulnar deviation and grip (ulnar impaction)
- Pain with supination/pronation



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### Special Considerations

- Rule out red flags (require medical management and/or referral to physician. See Table below).
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Ligament tear |
| Fever, severe pain | Infection |
| Loss of distal pulse | Compartment syndrome |
| Diabetes | Neuropathy |
| Multiple joint involvement | Rheumatologic diseases |
| Unilateral edema | Deep vein thrombosis |
| Cancer | Cause of symptoms (metastatic or primary) |
| Discoloration of wrist or hand; delayed capillary refill | Arterial occlusion; arterial insufficiency |
| Immune-compromised state | Infection |

## PTOT-12.14.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS) – with combined average score of 7/10 or less for 3 items (Minimum detectable change (90%CI) for average score = 2 points[10]) OR the DASH OR QuickDASH with a score of 11 or higher (Minimally Clinically Important Difference of 10 and 15 points respectively[9]). Additional functional tools include: PRWE (Patient Related Wrist Evaluation)[20,24]
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10 50% of time
  - Neurological signs: altered reflexes and/or sensations
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors,
  - Natural history and chronicity of condition,
  - Expectation for functional improvement with skilled intervention,
  - And response to treatment provided



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- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently

## PTOT-12.14.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

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## PTOT-12.14.7: Section intentionally left blank



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## PTOT-12.14.8: Physical/Occupational Therapy Management/interventions

- No specific research was found with moderate to high levels of evidence to help determine specifics for treatment of patients with ulnar sided wrist pain. In addition, no research was found on the level of functional improvements with therapy.
- Literature reports the common conservative approach with patients having ulnar sided wrist pain include initial treatment of rest/splint to painful wrist. (Time of immobilization varies from 4-8 weeks). Following immobilization, therapy progresses with ROM, pain control, edema control and then eventual progression to strengthening and finally to resumption of sports if patient is an athlete. No specific timelines have been found for the progression of therapy. The clinician must use their professional skills to modify progression as indicated. If non-operative treatment does not relieve the symptoms, surgery may need to be considered.

### ECU Splint

- Conservative management for ECU subluxation consists of splinting to restrict supination and ulnar deviation as these motions are what lead to subluxation in the injured ECU. (Altman, 2014) In one case study of a female college athlete with ECU subluxation, a short arm cast for 4 weeks was not effective in stabilizing the ECU. However, a long arm cast with the wrist in slight extension, radial deviation and pronation for 4 weeks followed by splinting and rehab, was effective in stabilizing the ECU and resolving symptoms.[16]

### DRUJ instability Splint

- Circumferential bracing that attempt to maintain the relationship between the distal radius and ulna with forearm rotation can be effective for people with chronic DRUJ instability without arthrosis.[1]

### TFCC splint

- Preventing forearm pronation/supination and wrist motion with splinting may help with TFCC injuries.[1]



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## PTOT-12.14.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

- There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

### Activity of Daily Living

- Children need to play and explore their environment including:
  - Participation in recess
  - Physical education
  - Play and other physical activities similar to peers
  - Navigating school hallways
  - Socializing with peers
  - Employment for adolescents[11]
  - Sport participation is not a required daily activity at any age

### Attention/Task Completion

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences. [5,8]
  - There is some evidence that attention is still changing up to approximately 17 years of age.
  - There may be more impulsivity in approach to tasks, especially up to about age 15.
  - Adolescents can complete progressive home programs that include self-manual techniques.[12]
  - There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
  - Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[6,7]

### Growth/Maturation

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
  - There is no evidence that physical therapy in general need to be more involved due to age
  - Younger populations may require less/no treatment depending on presentation.[4,23]
  - Immature tendon-bone attachment sites and physis are at risk for overuse injury.
  - There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development.[13]



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### Overuse/Sport

- Physeal injuries in youth are common and often related to overuse during sport participation.
  - Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
  - The most effective treatment after an overuse injury was extended periods of rest.[2]
  - Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[23]

### Hypermobility

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without.[18]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers.[22]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility:[3]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.



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## PTOT-12.14.10: Home and Self-Care Techniques

The home program is central to the care of all patients. The teaching for this program should be started on the first day of therapy and continue throughout the formal therapy program with a planned transition. It is crucial for patients to understand the need for initial rest/immobilization with slow progression back to functional use of wrist and hand.

### Home Medical Equipment

- Cold packs/heat packs
- Orthosis
- Theraband/theraputty for therapeutic exercises

### Self-Care Techniques

- Instruction in proper fit/purpose of any orthosis
- Cold pack/hot pack, if needed, to relieve discomfort
- ROM exercises
- Progression to therapeutic exercise - strengthening exercises
- Resumption of ADL's with affected hand

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# PTOT-12.15: Wrist Tenosynovitis

## PTOT-12.15.1: Diagnoses Included

- DeQuervain's Tenosynovitis
- DeQuervain's Tendinosis
- Wrist Tenosynovitis
- Radial Styloid Tenosynovitis
- Tenovaginitis
- Nicknamed "blackberry thumb" or "texting thumb"

## PTOT-12.15.2: Definition

Tenosynovitis is inflammation of the synovial sheath surrounding the tendon. It gives rise to pain that is aggravated by active movements of the tendon or by passive stretching. In de Quervain's disease, the tendons of the abductor pollicis longus and the extensor pollicis brevis at the styloid of the radius pass through a thick tendon sheath that frequently becomes stenosed and inflamed and produces symptoms. It is a relatively common, uncomplicated, and noncontroversial musculoskeletal disorder of the wrist.

## PTOT-12.15.3: Clinical Presentation

- Complains of loss of function
- Localized tenderness at the radial styloid
- Proximal radiating symptoms may be present
- Pain may radiate distally along the thumb
- Women (particularly postpartum) are more likely affected than men.
- There may be palpable thickening of the sheath present, with crepitation on movement(Hand Assessment Tool (Sanjiv HN, 2009))



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### Special Considerations

- Rule out red flags (require medical management and/or referral to physician).See Table below
- Identify co-morbidities requiring medical management, and those that affect therapy management.
- Determine if trauma-related; determine nature and extent of traumatic event.

| Red Flag | Possible Consequence or Cause |
|---|---|
| Severe trauma | Fracture, ligament tear |
| Fever, severe pain | Infection |
| Diabetes | Neuropathy |
| Multiple joint involvement | Rheumatologic diseases, gout |
| Cancer | Cause of symptoms (metastatic or primary) |
| Unilateral edema | Upper extremity deep vein thrombosis |
| Discoloration of arm or hand | Arterial occlusion |
| Immune-compromised state | Infection |

## PTOT-12.15.4: Requirements for Physical/Occupational Therapy Visits

- Two or more of the following findings must be present to establish medical necessity. At least one of the findings must address functional limitation. Degree of abnormality should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Functional Outcome Measurements showing significant functional limitations using the Patient Specific Functional Scale (PSFS)– with combined average score of 7/10 or less for 3 items (Minimally Clinical Important Difference (90%CI) for average score = 1.2 points [17]) OR DASH (Disability of arm, shoulder, hand) with a score of 11 or higher (Minimally Clinical Important Difference of 11 points) OR quick DASH with a score of 11 or higher (Minimally Clinical Important Difference of 15 points)[16]OR Hand Assessment Tool [35]
  - ROM: < than functional motion (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Pain: limiting function and at least 3/10
  - Neurological signs: altered reflexes and/or sensations
- Treatment frequency and duration must be based on:
  - Severity of objective clinical findings,
  - Presence of and number of complicating factors,
  - Natural history and chronicity of condition, and
  - Expectation for functional improvement with skilled intervention,
  - Response to treatment provided



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- A request for continued services may be considered reasonable and necessary when 1 or more of these conditions are met:
  - Minimally Clinical Important Difference has been met in the Functional Outcome Measure and the score meets medically necessary threshold
  - The Numeric Pain Rating Scale is reduced by 2 or more points but remains above 3/10 for 50% of the time
  - Range of Motion remains below what is required for personal care or essential employment requirements (refer to **Maximal Complex Motion Necessary for Functional Activities**)
  - Reduction in complicating factors (such as positive neurological signs)
  - The patient is unable to maintain progress independently

## PTOT-12.15.5: Discharge Criteria

- The patient, or with help from a care-giver, can continue management of symptoms with an independent home program.
- The patient, or with help from a care-giver, can continue to make functional progress with an independent home program.
- Achievable goals that are related to activities of daily living have been met.
- Therapy services have become routine or repetitive in nature, indicating they are not of a skilled nature.
- No objective clinical improvement (as outlined above) is shown for the condition being treated with respect to pain, function, or complexity after 6 weeks of initial treatment intervention.
- A skilled therapy service is proven to be ineffective and is unable to maintain or prevent deterioration in function.
- If, or when, the member has been non-compliant with the treatment plan.
- Therapy services are for pain mediation alone.
- Services provided are elective and do not meet the minimum thresholds to qualify for continuing care.
- Therapy services are being provided for returning to, or maintaining participation in, recreational activities only.
- Therapy services are for sports performance enhancement only.

## PTOT-12.15.6: Section intentionally left blank

## PTOT-12.15.7: Section intentionally left blank



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## PTOT-12.15.8: Physical/Occupational Therapy Management/Intervention

**Treatment with moderate level of evidence:**

- Splinting: moderate level of evidence and documentation to support the use of orthosis to manage tenosynovitis. Most recommended splint is one that immobilizes wrist in neutral, 30 degrees of CMC joint flexion and 30 degrees of thumb abduction with thumb IP free.[20,33]
- Splinting for pain control: There is moderate level of evidence that splints help control the pain associated with tenosynovitis however, there is no definitive evidence on whether or not the splint should be used full time, at night only, or only with painful activity.[19]
- Cortisone injection: Moderate evidence supports cortisone injection as a treatment of choice for DeQuervains.[29,32]
- Cryotherapy provides acute relief of tendinopathies. The most effective use of cold is melting ice water through a wet towel for 10 minutes (moderate evidence).[41]Clinical Interventions lacking sufficient evidence.
- There is no gold standard on the treatment of DeQuervain's. Research is lacking in the study of specific treatments and the results of such treatments. Some of the commonly used and widely accepted treatments include: Ultrasound, icing, splinting, stretches, eccentric strengthening, friction massage, and activity modification.
- One study found that kinesiotaping was more effective than physical therapy treatment of paraffin, ultrasound and friction massage. [22]
- One study found that Graston Technique and eccentric training decreased pain and increased DASH scores. More studies need to be done on this treatment.[28]

## PTOT-12.15.9: Pediatric and Adolescent Considerations – Orthopedic/Musculoskeletal

There is limited evidence specific to general rehabilitation of musculoskeletal issues in children and adolescents versus adults. This section refers to general orthopedics and does not include significant issues due to developmental delay. The following may guide review decisions in regards to younger patient care:

**Activity of Daily Living**

- Children need to play and explore their environment including:
  - participation in recess,
  - physical education,
  - play and other physical activities similar to peers,
  - navigating school hallways,
  - socializing with peers,
  - employment for adolescents [21]
  - Sport participation is not a required daily activity at any age.



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**Attention/Task Completion**

- Some minor allowance with highly structured programs for young children/teens may be needed due to attention span differences. [9,15]
- There is some evidence that attention is still changing up to approximately 17 years of age.
- There may be more impulsivity in approach to tasks, especially up to about age 15.
- Adolescents can complete progressive home programs that include self-manual techniques.[24]
- There is moderate evidence that adherence to medical self-care programs may be higher in pediatric/adolescent populations than in adults.
- Adherence does not appear to be a function of illness severity, age, or gender, but likely more on socioeconomic and psychological issues.[10,11]

**Growth/Maturation**

- Youth have shown similar results, as adults, to adult rehabilitation programs in skilled care of patello-femoral pain, ACL reconstruction, ankle sprain and spondylolisthesis, among others.
- There is no evidence that physical therapy in general need to be more involved due to age
- Younger populations may require less/no treatment depending on presentation.[8,40]
- Immature tendon-bone attachment sites and physis are at risk for overuse injury.
- There is no evidence to indicate additional treatment is needed due to a growth spurt as long as the patient is making progress. Adolescent tendon development can be out of balance with muscle development. [26]

**Overuse/Sport**

- Physeal injuries in youth are common and often related to overuse during sport participation.
- Risk factors include periods of accelerated growth, age, body size, training volume and previous injury.
- The most effective treatment after an overuse injury was extended periods of rest. [2]
- Structural abnormalities seen in patello-femoral pain appear similar in adolescents and adults; as does clinical presentation.[40]



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**Hypermobility**

- Adolescent athletes with hypermobility did not appear to have more injury frequency or lower muscle function than those without. [36]
- Adolescents with hypermobility do not appear to have more pain-related fear or perceived disability compared to non-hypermobile peers. [39]
- There does not appear to be evidence that patients with hypermobility require more intensive treatment.
- Recommendations (based mostly on level 4-5 evidence) from Cincinnati Children's Hospital Medical Center on the care of youth with hypermobility.[7]
  - Focus on return to function with management vs. resolution of pain
  - Provide a more targeted approach on self-management.
  - Select activity that does not exacerbate symptoms.
  - Home programs are continuous, progressive and part of daily routine.
  - Use of habitual physical activity that promotes neuromuscular control in a pain-free way (swimming, yoga, tai chi).
  - Visits are scheduled using a periodic model that allows enough time for the patient to establish regular HEP performance and make mild improvement prior to being seen again.
  - More therapy may be recommended during pubertal changes if decline in function is shown.

**Home and Self-Care Techniques**

Instruct patient on avoiding pain provoking activities. The patient can be taught self-stretching, use of thumb spica orthosis, cross friction massage and progressive strengthening. It is also important to educate patients in proper ergonomics. Patients should understand the need to minimize forceful exertions and repetition.

## PTOT-12.15.10: Home Medical Equipment

- Cold packs
- Heat packs
- Theraband for strengthening
- Theraputty for strengthening
- Thumb spica orthosis

**Self-Care Techniques**

- In acute phase, reduce strenuous activity. Cold packs and orthosis
- Instruction in home exercise program for ROM and stretching
- Progress strengthening exercises as tolerated
- Proper work station set up, proper body mechanics
- Cold packs/hot packs, if needed, to relieve discomfort



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# PTOT-13.1: Autism Spectrum Disorder

## PTOT-13.1.1: Section intentionally left blank

## PTOT-13.1.2: Definition

In 2013, the American Psychiatric Association (APA) revised the criteria for Autism spectrum disorders (ASD) in the *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition: DSM-5 to include Autistic Disorder, Asperger's disorder, childhood disintegrative disorder, and pervasive developmental disorders – not otherwise specified.[1-9] ASD is a complex neurodevelopmental disorder described in the DSM 5, as being characterized by having persistent impairments in social communication and interaction, along with the presence of restricted, repetitive behavior patterns.[1-3, 6, 10] Individuals with ASD may not be diagnosed until later in life, but must have had symptoms from early childhood and present at 8 years of age.[5]

**Target Populations**
**Inclusions**
Members diagnosed with Autism spectrum disorder meeting two criteria: deficits in social communication/social interaction and restrictive and repetitive behaviors as defined in the DSM-5.1-9

- Members of the following subgroups:
  - Pervasive developmental disorders (PDD)
  - Classical autism
  - Asperger syndrome
  - PDD-NOS (Pervasive Developmental Disorders Not Otherwise Specified)

**Exclusions**

- Rett syndrome

**Target Users**

- Occupational Therapists and Assistants
- Physical Therapists and Assistants
- Health Care Providers
- Complementary and Alternative providers
- Parents, Guardians and/or Caregivers

**Overview of Autism Spectrum Disorder (ASD)**
**Prevalence**

- Autism spectrum disorder currently affects approximately 1 in 68 children in the United States, with an overall estimate of 1 in 160 individuals worldwide.[1, 3, 11] There is a higher prevalence of autism in boys versus girls (4 to 1).[4] Risk factors include both genetic and environmental factors. The critical window for environmental exposure is uncertain, however evidence suggests the prenatal period is significant.[4]



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## PTOT-13.1.3: Clinical Presentation

- Children with ASD vary widely in their presentation. Autism is a complex, pervasive, heterogeneous condition with multiple etiologies, sub-types, and developmental trajectories. Due to this, high level clinical research is challenging as there is extensive variability in presentation and response to intervention.[12, 13] Therapy practitioners work collaboratively with individuals on the autism spectrum, their families, other professionals, organizations, and community members. Treatment of ASD is usually multidisciplinary, involving physicians, speech, occupational, and physical therapists, behavioral and developmental specialists, and other disciplines to address core symptoms and related developmental and functional deficits.[13]

### Lifespan Considerations

- ASD symptoms persist and their individual needs change throughout the lifespan. Research has shown that early detection and treatment along with periodic reassessment and intervention throughout the lifespan leads to better outcomes and quality of life.
- Therapy services for members with autism should include individualized assessments and intervention plans that promote collaboration among the therapist(s), family, and additional caregivers throughout the lifespan to achieve best results.[2] Services can be provided to the patient at the person, group, and community levels and may include direct service, consultation, education, and advocacy to support the person, family members, health professionals, educational staff, and community agencies.[1] Research shows that age of entry into services is a key factor in predicting outcomes.[4, 14]

### Early Intervention

- Early intervention (EI) programs are provided to children between the ages of 0 and 3 years. Symptoms, such as sensory and motor impairments, and atypical brain development and function are apparent in the first 12 months and may precede behavioral symptoms.[9, 14]
- At this age, therapy services should be intensive, comprehensive and facilitate active engagement of the individual. The literature provides support for the use of developmental and behavioral approaches to intervention, particularly for young children.[14]
- Interestingly, siblings of children already diagnosed with ASD are being studied beginning in infancy (these infants are considered to have a higher risk of being diagnosed with ASD in the future) to provide real time opportunities for studying the neurobiology and development.[4] By following these infants, the presence of the defining characteristics of ASD have been observed by 12 to 18 months of age.[4, 14] However, longer delays may occur between parents' concerns being stated and confirmation of the diagnosis. [4, 14] Parents are often aware of differences in their child in the first 12-18 months of life and diagnosis is taking until 3 or 4 years of age.[4, 14]



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- Research has found that children with ASD who receive therapy prior to age 4 have demonstrated the ability to be enrolled in regular education classrooms, whereas children that initiated services after age 4 remained in special education programs.[9] Emphasis on early intervention and support for caregivers will lower healthcare costs in the long term.[15]

**Childhood and Pre-teen**

- As the child ages, therapy services move from a focus on non-verbal communication and play skills to involving higher level communication and behavior skills. Motor and coordination needs are addressed as appropriate.

**Teenage and Young Adult**

- As the child reaches school age, services may address needs for active participation and education-based performance.[3] Therapy intervention for adults with autism focuses on education and training of the client, parents and additional care providers to include vocational training and management of day to day activities.[3, 16]

## PTOT-13.1.4: Components of Evaluation and Management

- The examination process and procedures must be tailored to the child's age, medical status, diagnosis, child and caregiver goals and priorities. The *International Classification of Functioning, Disability and Health for Children and Youth* (ICF-CY) model focuses on an individual's health rather than disability.[17] ICF uses four domains:[17]
  - Body function – psychological and physiological functions of body systems,
  - Body structure – anatomical parts of the body,
  - Activity – task or action performed by the child, and
  - Participation – involvement in life and social situations.
- ICF-CY considers how a child's body structures and functions interact dynamically with the environment to result in disability, which is defined as limitations in activity and participation.[17]
- Areas of Potential Impairments:
  - ADLs[1]
  - IADLs[3]
  - Sleep[3]
  - Play/Leisure[18]
  - Social/communication[18]
  - Education[3]
  - Work performance[3]
  - Sensory integration & modulation[19]
  - Behavior[18]
  - Cognition[20]
  - Handwriting[21]
  - Motor planning & coordination[22]
  - Strength[22]

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- Postural Control[6]
- Balance[23]
- Ambulate on tip toes[9]
- Developmental milestones[9]
- Visual attention[19]

### Objective Findings

- Standardized Pediatric Tests
  - The body of evidence for the use of standardized tests with children who have a diagnosis of ASD is low. In addition, the value of standardized testing is questionable with children who have ASD. Performance may be above or below their usual abilities depending on the client's level of interest and/or motivation; test procedures may need to be modified to increase child's motivation and comprehension.[24, 25] Therefore, a standardized testing process does not play to the strengths of individuals with autism and, consequently, the testing process often is not well tolerated, nor does it result in an accurate reflection of the individual's abilities.[26]
- If standardized testing of motor and self-care skills is warranted, one of the following assessment tools is recommended:[9, 24]
  - 0 through 5 years of age: Peabody Developmental Motor Scales 2 (PDMS-2)
  - 4 years through 9 years: Bruininks-Oseretsky Test of Motor Proficiency -2 (BOT2)
  - 6 months through 7.5 years of age: Pediatric Evaluation of Disability Inventory (PEDI)
- If sensory testing is warranted, one of the following tools is recommended:[2, 26]
  - Sensory Processing Measure for children age 5 to12 years
  - Short Sensory Profile for children 37 months up to age 9 years
  - Infant/Toddler Sensory Profile for children between 7 and 36 months of age
  - Sensory Integration and Praxis Test for children age 4 years to 8 years 11 months of age

### Admission Criteria

- Medical diagnosis of ASD or child is deemed at risk.
- For those aspects of sensorimotor function for which there are standardized tests, significant dysfunction is commonly indicated by performance that is moderately to severely delayed or 1.5 standard deviations or more below the mean. Some states (Florida, Nebraska and Illinois) allow care for 1.0 standard deviation below the mean.
- Medical diagnosis; however, presence of a medical diagnosis alone does not warrant admission.
- Findings indicate a periodic functional skills issue, in which a specific goal is likely to be obtained in a generally predictable time frame.
- Impaired motor skills/motor planning affecting functional ability.



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- Identified deficit can be measured and progress demonstrated throughout the treatment plan.
- Home program development, education and training.
- Patient or caregiver training in medical, functional or adaptive equipment.

## PTOT-13.1.5: Discharge Criteria

- Discontinuation, termination, discharge or change to skilled maintenance should occur when:
  - The family's goals of treatment have been attained.
  - No measurable improvement towards the goals of treatment have occurred in one to six months depending on the frequency of treatment and individual's needs.
  - The degree of improvement is no longer functionally significant. Functional significance requires:
    - the progression of skills occurs during and outside of therapy sessions,
    - comprise a direct component of a functional task that was a goal of treatment; and,
    - indicate improvement in comparison to age norms.
    - Improvements are attributed to intrinsic growth and development rather than therapeutic intervention.
  - When serious medical, psychological and behavioral conditions are limiting tolerance/participation to treatment, therapy services should be postponed if efforts to address the issues are unsuccessful.
  - Following discharge, a child may be re-evaluated due to growth changes or new problems or concerns.

## PTOT-13.1.6: Section intentionally left blank

## PTOT-13.1.7: Section intentionally left blank

## PTOT-13.1.8: Physical/Occupational Therapy Management/Intervention

**Evidence Supports:**

- Clinicians need to be able to move from a bottom-up approach (addressing client factors/ deficits) to a top-down approach (building on strengths) fluidly when treating children with ASD.[5] Common approaches used with ASD include: sensory integrative therapy (SIT) and multi-sensory based interventions (mSBIs), relationship-based interventions, developmental skill-based programs, social cognitive skill training, parent-directed or -mediated approaches, and intensive behavioral intervention. Skilled services include the child, family, and others that play a role in the child's life. Therapy outcomes are best if they are family centered and attend to family occupations, daily activities, routines, rituals, and client factors of the child and family.[2, 11, 27] Interventions that incorporate applied behavior analysis (ABA) techniques are beneficial for improving work skills, self-care, play/leisure, and peer engagement and in minimizing the disruption of sensory behaviors.[18, 28]

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**Inconclusive and Low-level Evidence:**

- Research for complementary and alternative medicine (CAM) treatments for Autism is inconclusive.[29] Initial results are indicating they are not effective. The following treatments for ASD are not supported by evidence: acupuncture, auditory integration training, and hyperbaric oxygen therapy. Low evidence is noted for early intensive behavioral intervention, music therapy, social skills groups, parent-mediated early intervention and the Theory of Mind cognitive model.[7]

**Treatment Areas**

- Behavior Domain
  - Early (0-6 years) intensive (direct and indirect services of 20-40 hours per week) behavioral interventions that occurred over 14-36-month durations showed benefits for adaptive behavior, cognitive performance, expressive language, receptive language, daily communication skills, socializing and daily living skills.[7, 8] Applied behavior analysis (ABA) principles can be applied with sensory-based strategies for better outcomes. Examples of behavior interventions: discrete trial training, Early Intensive Behavioral Intervention, incidental teaching, Picture Exchange Communication System (PECS), pivotal response training, and Treatment and Education of Autistic and related Communication Handicapped Children (TEACCH), and cognitive–behavioral therapy.[2] The evidences supports:
  - A blend of behavior-based and sensory-based interventions can improve feeding skills and behaviors.[3]
  - There is moderate evidence to support behavioral techniques to address restricted and repetitive behaviors.[18]
  - Children with ASD (with or without intellectual disability) and co-occurring psychiatric conditions, when compared with children with ASD and no psychiatric conditions, were more likely to have unmet developmental needs—both in terms of receiving all necessary treatment and services as well as in seeing all necessary providers. Special considerations should be given for further service and treatment options that address their distinct behavioral and emotional challenges.[30]
  - Behavioral interventions have been shown to improve parental self-efficacy, confidence and competence. Behavioral interventions, relaxation and mindfulness training show weak/insufficient evidence to improve parental stress and family coping.[24]
- Cognitive Domain
  - Children with autism may present with cognitive deficits. Therapy services address deficits in functional cognition that enable individuals to participate more fully in self-care, work, leisure, and community activities which enhances quality of life while reducing the burden on caregivers and societal resources.[31] Cognitive interventions had significant positive effects for attention, working memory, and memory tasks.[20] Research supports interventions for cognitive therapy predominantly in the home and school.[20, 32] One of the strategies that may be used to address functional cognitive deficits is the Cognitive-Functional intervention.[33] Cognitive-Functional intervention focuses on acquiring executive



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strategies in occupational performance for important occupations, such as play, self-care, and social participation.[33] This intervention encourages participation by teaching specific strategies and using games and activities to challenge the executive components necessary for success in areas of occupation.[33]
- Computerized training was supervised by parents in children's homes. The number of sessions ranged from 12 to 102 (median 25), with sessions ranging in length from 20 min to 2–3 hours (median 45 minutes). The duration of the interventions ranged from 25 days to 20 weeks (median 6 weeks).[20]

- Sensory Experiences Domain
  - Sensory features (i.e. hand flapping, spinning, ear covering, etc.) affect daily functioning and are seen in 80- 95% of children with autism.[34] Children with autism do not demonstrate the expected improvement in these skills as with typical development. As supported by two separate systematic reviews by Case-Smith and Watling: clinic based sensory integrative therapy (SIT) and multi-sensory based interventions (mSBIs) show improvement in sleep, eating, sensory behaviors, attention, ADLs, relaxed content state, and social skills.[19, 35] However, conflicting evidence states that the use of SIT to improve sleep, adaptive skills, autism features and sensory processing is weak or insufficient.[26] Single sensory based intervention (sSBI) are shown not to be effective.[19 3, 26, 35]
  - SIT, developed by Ayres, provides play-based activities with enhanced sensation to elicit and reinforce the child's adaptive responses. SBI: structured, adult-directed sensory strategies that are integrated into the child's daily routine to improve behavioral regulation. SIT for children (3x/week for 6-10 weeks) with ASD and sensory processing problems demonstrates positive effects on the child's individualized goals (per parent and teacher report) and sSBIs have almost no evidence of positive effects.[35]
  - Weighted vests and auditory integration training when used as a single strategy (sSBI), do not have evidence documenting their effectiveness.[19, 26]
  - Clinic-based mSBI included enhanced vestibular, proprioceptive, and tactile sensory experiences. Active participation in mSBIs demonstrated increases in sustained focus, decreases in self-injurious behavior, and increased perceived relaxation and happiness were found after independent participation in a multisensory center.[19]

- Motor Skills Domain
  - Motor skills are generally more advanced than language or social skills in children with ASD. However, motor problems can also be significant. Gross and fine motor skills such as gait, ball skills, balance, dexterity, motor imitation, handwriting, cutting with scissors and sense of rhythm may be delayed. Children with ASD often present with motor and coordination deficits that would benefit from therapeutic intervention. These motor deficits are evident at an early age for children who are at risk for autism, and these motor deficits may persist through to adulthood. The early detection and treatment of these deficits leads to better outcomes. Children with autism learn best through self-exploration and play. They should be taught new motor skills by being given one demonstration followed by open play and problem solving of the task.[5, 22] Children with ASD



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utilize proprioceptive information rather than visual feedback when learning new motor tasks. However, they use visual feedback information to maintain appropriate force.[6, 23]

- Studies have shown an observable difference in motor development trajectory between ages 2 and 6 months in high risk and low risk individuals for autism.[36]
- Early detection and intervention of motor impairments including: strength, motor speed, and bringing hands to midline, support acquisition of later cognitive, language and gestural skills in infants at high risk for ASD.[22, 36]
- The fine motor task that dominates a child's school day is handwriting. Children on the autism spectrum often have poor handwriting legibility, which hinders their academic achievement.[21]
- Deficits in strength strongly impact functional and age appropriate motor skills in individuals with ASD. Deficits are apparent from a young age and persist through adolescence and early adulthood. Strength may initially be addressed with direct services and then transitioned in a short period of time to indirect services with a home program.
  - Improvement of grip strength may lead to greater independence in functional activities involving self-care, school tasks, and play.[22]
  - Decreased grip strength negatively impacts pencil control in ASD. Pinch strength does not affect pencil control. In ASD, grip and pinch strength (or pencil control) does not affect handwriting legibility. Grip and lateral pinch only (not neat, pinch or tripod pinch) has a significant impact on functional skills (ADLs).[21]

- Activities of Daily Living Domain
  - Intervention is effective for children and adolescents with ASD to improve self-care and play. Interventions include the use of activities that promote social interaction, problem solving, and pivotal behaviors (e.g., joint attention, initiative, persistence, executive functioning, and cooperation) and address specific skill acquisition. Effective interventions also address contextual factors such as structure, consistency of routine, sensory environments that optimize attention and arousal, and caregiver skills that contribute to occupational performance.[1] Cognitive–behavioral approaches have been shown to improve ADLs and IADLs. Technology-enhanced interventions have been shown to have insufficient evidence to improve ADL performance.[26]
  - ADLs such as feeding, dressing, and personal hygiene are often priorities for parents of children with ASD because they increase a child's ability to live independently and decrease the need for one-on-one assistance in the home and community.[3]
  - IADLs such as meal preparation, shopping, home maintenance (e.g. chores, cleaning), health management (e.g. fitness), and communication management (e.g. telephones) are relevant to independent living and community engagement.[3]
  - Foundational skills in ADLS and IADLs allow people to participate in other critical activities such as education and work.[3]



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- Social Domain
  - Group based social skills training programs that take place in the clinic and in the community setting show effective results in people with autism. The most beneficial format included a 1-hour session for at least 8 sessions.[18] To increase social communication skills, the use of Picture Exchange Communication System (PECS), joint attention, activity-based intervention, parent-mediated strategies, computer-based interventions, are the most effective techniques. Social stories, classroom-based interventions and peer mediated interventions are not proven to be effective in improving social skills.[18, 26]
- Sleep Domain
  - Research indicates that between 50% and 80% of children with ASD are estimated to have sleeping difficulties. Sleep and rest are important for optimal functioning in ADLs, IADLs, education, and work.[3] Therefore, it is important to address these issues to improve overall outcomes.
- Play/Leisure Domain
  - There is moderate evidence of being able to improve leisure participation. Strategies include recess time at school and exposure to social stories. Occupational therapy has shown improvement in self-care and play. Interventions that address contextual factors such as structure, consistency of routine, sensory environments that optimize attention and arousal, and caregiver skills contribute to occupational performance.[1, 18]
- Education Domain
  - School readiness and successful participation in formal education creates opportunities for children to develop life skills and become active members of the community. Specialized support and strategies may be necessary to facilitate a meaningful and effective academic experience.[3]
    - Brief physical exercise before academic tasks can help with accuracy but not with attention or stereotypic behaviors.[3]
- Work Domain
  - Research supports that when individuals with ASD can participate in work and ADLs, they achieve a higher quality of life and improved self-efficacy and self-sufficiency. Therapists have the skills and expertise to address vocational skills and employment during the middle and high school transition points. Implementing effective interventions will be critical to the economy and workforce as a growing number of young adults with ASD seek postsecondary options.[3]
    - Supported self-management, video prompting, video modeling, and supported employment interventions result in moderate effects on work performance.[3]
    - Use of mobile and tablet technology to teach vocational tasks is one of the most studied and effective strategies for increasing functional performance and independence in work among people with ASD.[3]
    - Supported employment to improve quality of life and work retention have weak/insufficient evidence.[26]



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## Therapy Frequency, Intensity and Duration

- The overall frequency, intensity, and duration of skilled therapy services for children with autism will vary widely based on their presentation of multiple factors: age, severity of deficits, potential for progress, support system, cognitive level, developmental level, temperament and personality. Therefore, intervention may include direct services ranging from periodic maintenance to three times per week. Brief episodes of care may be needed throughout the lifespan.
- Treatment intensity is associated with the potential for improvement, required skill level of the person delivering the intervention, and the amount of clinical decision making necessary to implement the intervention.[37] Briefly, the four treatment models for a pediatric setting include:
  - *Intensive therapy model*. Patient has potential for rapid progress towards goals. Rapid changes in condition necessitate frequent changes in treatment. Appropriate for patients in an extremely critical period for skill acquisition related to development or medical condition.[37]
  - *Weekly/frequent therapy model*. Patient demonstrates continuous progress towards established goals. Requires frequent intervention for a limited duration to achieve functional skills or requires frequent revisions or updates of home program. Treatment may be 1-2 times per week or 2-3 times per month.[37]
  - *Periodic/monthly therapy model*. Appropriate for patients not in a critical period for skill acquisition or at risk of regression.[37]
  - *Consultative therapy model*. Appropriate when expertise is needed to identify problems or recommend a solution for a specific issue.[37]
- Expected Outcomes
  - Therapy resources are most responsibly allocated when they are driven by their potential to improve function and not simply by the existence of a diagnosis. Best practice PT and OT avoids learned helplessness and dependence on therapy. Therefore, it is recommended that individualized outcome measures be completed for each member with ASD as an important component of a comprehensive assessment to ensure therapy is patient and family centered.[38] Such measures are:
    - Goal Attainment Scaling (GAS)[33, 39]
    - Canadian Occupational Performance Measure[33, 38]
- Reassessment
  - To support ongoing treatment:
  - Re-evaluation should be completed every 6 months and must indicate a continued functional deficit.
  - Measurable functional progress must be documented. The therapist should be reassessing the effectiveness of the treatment strategies within each skilled session and modifying them as indicated.
  - Plan of care consists of functional SMART (specific, measurable, achievable, realistic, and time related) goals.
  - Goals must be updated for the next authorization period and should include new or higher-level skills that require skilled intervention to achieve.



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- The child must demonstrate active engagement in the therapeutic activities.[1]
- Parent compliance and carryover with the home program.

## PTOT-13.1.9: Autism Mandates

- Many state legislatures have enacted autism-specific insurance mandates that require for-profit, commercial, health maintenance organization (HMO), and nonprofit health insurance companies regulated by the state to pay for medically necessary and evidence-based autism treatments for certain groups of people. Most state mandates require coverage until the patient reaches a certain age, usually in the range of 19 through 21 years.[15]
- Eighty-six percent of Americans live in a state with some ASD reform statutes or administrative regulations.[15]
- For the good of families, patients, and the country's fiscal situation, we must continue to encourage family member involvement in caring for people with ASD, promote home or community-based care and, as appropriate, reduce reliance on overburdened Medicaid state plan and waiver programs.[15]

## PTOT-13.1.10: Home Medical Equipment

- Safety items and equipment
- Orthotics
- Augmentative communication devices
- Environmental control units
- Sensory equipment
- Feeding equipment

### Self-Management Techniques

- Family/caregiver training in adaptive strategies, therapeutic interventions, and equipment management.
- Parent instruction for children with autism is varied. However, it consistently promotes enhanced communication and interaction–play between the caregiver and the child, a decrease in problem behaviors in the child, and the establishment of effective routines.[2]
- Parent education and coaching provided in a center is valuable to establish an initial and comprehensive home program.[2]



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## PTOT-13.1.11: Adjuncts to Physical/Occupational Therapy Management

- AAC Specialist
- Audiologist
- Behavioral Therapist
- Educational and community-based programs
- Family/caregiver
- Nursing
- Nutritionist
- Psychologists
- Respite care
- Social worker
- Specialty physicians
- Speech-Language Pathologist
- Teacher
- Vocational services

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# PTOT-13.2: Adolescent Idiopathic Scoliosis (AIS)

## PTOT-13.2.1: Definition

Adolescent idiopathic scoliosis (AIS) is a type of scoliosis which is defined as a three-dimensional deformity of the spine.[1-9] It occurs in individuals between the ages of 10 and 18 years who have a lateral curvature of the spine with a Cobb angle of ≥ 10°.[2,3,10-12]

## PTOT-13.2.2: Target Populations

### Inclusions

- 10 years of age and older
- Cobb Angle greater than 10°
- Up to Risser sign 5 (Skeletal Maturity)

### Exclusions

- Infantile scoliosis
- Juvenile scoliosis
- Diagnosable cause of scoliosis
- Leg length discrepancy of > 1 cm by means of physical examination
- Lower limb deformities interfering with spinal posture
- Other disease processes (i.e. Muscular Dystrophy, Ehlers-Danlos Syndrome, etc)

### Target Users

- Physical Therapists
- Occupational Therapists
- Physicians
- Patients or Caregivers

### Differential Diagnosis

- Infantile Scoliosis
- Juvenile Scoliosis
- Congenital Scoliosis
- Neuromuscular Scoliosis
- Connective tissue abnormalities



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## PTOT-13.2.3: Clinical Presentation

### Overview of Adolescent Idiopathic Scoliosis

- Adolescent idiopathic scoliosis (AIS) is a type of scoliosis that occurs around the age of 10 years and has an unknown cause.[1-3,6,11,12] Other forms of idiopathic scoliosis are juvenile idiopathic scoliosis and infantile idiopathic scoliosis.[4] Other types of scoliosis with known causes include neuromuscular scoliosis (neuromuscular disturbances such as those seen in people who have Muscular dystrophy), congenital scoliosis (failure of formation/segmentation of vertebrae and ribs during development), neurofibromatosis and connective tissue abnormalities, such as Ehlers-Danlos syndrome.[4,11]
- Prevalence of AIS is 1-3%.[1,3,6,7,12,13] AIS may bring about limitations in spinal movement, weakening of spinal musculature, back pain, difficulty in respiratory/pulmonary function, cosmetic deformities, and reduced quality of life.[1,5,6,9,11]

### Normal Development

- Gross motor development is generally normal. If there are neuromuscular concerns, the patient most likely does not have Adolescent Idiopathic Scoliosis.

### Management and Intervention

- The primary goal for rehabilitation for people with AIS is to decrease the progression of the curves which will result in preventing respiratory dysfunction, easing back pain and improving cosmetic deformities. [1,10]
- The treatment methods are somewhat controversial. Treatment is generally determined by the Cobb angle and the skeletal maturity of a person with AIS.
- Treatment methods and approaches:
  - "Wait and See"/Observation:
    - Cobb angle 10-25° in Anglo-Saxon countries [2,9,10]
  - Scoliosis specific exercise (Schroth Method):
    - Cobb angle 15-25° in non-Anglo-Saxon countries (may become more popular in Anglo-Saxon countries due to increased evidence supporting)[1]
    - Cobb angle of 15-25° with Risser sign 3 or less (growth)[7]
    - Cobb angle of 11-45° with Risser sign of 4 or 5 (skeletal maturity)[7]
  - Scoliosis specific exercise (Schroth Method) and Brace:
    - Cobb angle 25-45°.[1,2]
  - Brace only:
    - Cobb angle 25-45° [7,9,10]
  - Surgery:
    - Cobb angle greater than 45°. [2,5,7-10]

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**Interventions supported by evidence:**

- Core stabilization (Exercises performed in Ko and Kang study include: pelvic tilts, cat-camel, crunches, bridges, superman, arm/leg raises in supine, prone and quadruped, and hand walkouts. Three sets of 12 repetitions were performed for each exercise.
- Schroth method of Scoliosis-Specific exercises
- Active Self-correction and task-oriented exercises
- Bracing
- Surgery

**Interventions not supported by evidence:**

- Electrical stimulation[7]
- Spinal manipulation[2,7]
- General physiotherapy exercises[7]

**Critical Periods or Lifespan Considerations**

- After age of 10 years
- Gender (female more likely to have increased progression of curve)
- Cobb Angle (angle >25° at presentation, likely to have larger curve)
- Risser sign (0-1 skeletal immaturity; 4-5 skeletal maturity)
- Periods of rapid growth in adolescence
- Absence of menarche
- Family history of AIS
- Surgery for curvatures > 50° at skeletal maturity is beneficial due to the progression of the curvature over the next 30-40 years by 20-30.° [8]
- Curvatures which are < 30° are less likely to progress after skeletal maturity, however, those > 30° after skeletal maturity, tend to progress into adulthood resulting in health and social issues.[7,9,10]

**Goals of intervention are:**

- Decrease pain
- Maintain/prevent respiratory dysfunction through reduction of curvature
- Spinal musculature/core strengthening
- Improve awareness, posture, and body mechanics during functional activities to reduce additional musculoskeletal strain and prevent worsening of curvature



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**Assessment:**

- Posture
- Breathing pattern
- Respiratory deficits
- Lumbar strength
- Lumbar flexibility

**Objective Findings**

- Cobb angle via X-ray in anterior-posterior direction in standing
- Risser sign via anteroposterior X-ray
- Scoliometer measurement of trunk rotation angle
- Measurement of rib hump via Adams forward bend test with use of two rigid rulers
- Waist asymmetry assessed in standing

**Tests Specific to Diagnosis**

| Assessment | Significance |
|---|---|
| Cobb Angle | Measures lateral curvature; if progressing more likely to need a brace or surgery. Depends on Risser sign |
| Risser sign | Skeletal maturity- high angle with low skeletal maturity more likely to require surgery. Cobb angle less than 30° with complete skeletal maturity, less likely to need surgical intervention |

## PTOT-13.2.4: Initiation of Physical Therapy Treatment Criteria

- Cobb angle between 10 and 25° will either observe until angle greater than 25° or will begin exercises (Core stabilization, Scoliosis Specific Exercises, Active Self-Correction and Task oriented exercises).
- Cobb angle between 10 and 45° exercises (in conjunction with use of bracing between 25 and 45°).

## PTOT-13.2.5: Discharge Criteria

- Termination of therapy services should occur when:
  - Patient and/or family is independent with home program.
  - Respiratory function is optimized.
  - Curvature is progressing (refer back to physician as patient may require surgical consultation or more aggressive treatment/bracing)

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## PTOT-13.2.8: Physical/Occupational Therapy Management/Intervention

The duration and frequency is determined at the initial session and is dependent on the exercise program, patient compliance with exercise program, patient progress, and patient compliance with brace wear.

- **Schroth method** (Scoliosis Specific Exercises – other names include The Schroth method, Scoliologic® 'Best Practice' and Physiologic®):
  - Literature has varied frequency and duration for these exercises:
  - Schroth intervention for 5 one-hour sessions with physical therapist for two weeks, then weekly one-hour sessions in group session, along with 30-45 minutes of home program for 6 months. (10-18 years of age, Cobb angle 10-45°, Risser 0-5, Brace or no brace)[9]
  - Another group's treatment program included three times a week for (1.5 hour sessions) for 6 weeks as outpatients with their caregivers being instructed in the program in order for them to carryover the program after the 6 weeks of outpatient visits were completed. They were to incorporate their exercises in to their activities of daily living until the end of a six month period.(10-18 years of age, Cobb angle 10-60°, Risser 0-3, no other treatment for scoliosis) [14]
  - Four sessions per week for 2 hours each for a duration of 2 months.(11-19 years of age, Cobb angle 6-56°, no brace wear during study)[15]
- Core stabilization:
  - Two times a week for 10 weeks being provided core stabilization exercises compared to other group receiving traditional exercises. These patients were all to wear braces 22 hours a day.(10-16 years old, referred for a spinal brace)[12] Resulted in improved Apical Vertebral Rotation.
  - Core stabilization for 12 weeks: 3 times a week for 60 minutes each session for 12 weeks.(Cobb angle between 10 and 20°)[11] Resulted in decreased Cobb Angle.
- **Active Self Correction and Task-oriented exercises:** This group had Cobb angles less than 25° and did not receive any other treatments for their scoliosis, attended weekly one hour outpatient physical therapy appointments and performed home program for 30 minutes twice a week. Intervention lasted until skeletal maturity.[6]
  - Episodic care may be indicated when changes to the angle occurs and to ensure patients are independent with home program.

| Goal/Outcome | Examples of Interventions |
|---|---|
| Decrease pain | Schroth method exercises, core stabilization, Scoliosis specific exercises, kinesiotaping, spinal stabilization exercises |
| Optimize respiratory function | Schroth method exercises with focused breathing |
| Decrease/maintain Cobb angle | Schroth method exercises, core stabilization |
| Improve awareness, posture, and body mechanics during functional activities to reduce additional musculoskeletal strain and prevent worsening of curvature | Schroth method exercises, core stabilization, Scoliosis specific exercises, kinesiotaping, spinal stabilization exercises, education |



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## PTOT-13.2.9: Section intentionally left blank

## PTOT-13.2.10: Self-Management Techniques

- Home exercise programs developed with Schroth method techniques.

## PTOT-13.2.11: Adjuncts to Physical/Occupational Therapy Management

- Bracing

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# PTOT-13.3: Congenital Muscular Torticollis

### Synonyms

- Wry neck[1-3]
- Twisted neck[1, 2]
- Fibromatosis colli[1, 2]

## PTOT-13.3.1: Definition

- Congenital muscular torticollis (CMT) is a condition where an infant displays head tilting to one side and turning of the head to the opposite side, primarily resulting from unilateral shortening or fibrosis of the sternocleidomastoid (SCM) muscle.[1, 2, 4-10] CMT is discovered at birth or shortly after birth and identified as one of the most common infant musculoskeletal conditions with a postural deformity.[5, 8, 9, 11] A sternocleidomastoid mass may or may not be palpable and may not appear until the infant is 2-4 weeks old.[6, 7]

## Target Populations

### Inclusions

- Infants birth to 12 months
- Greater than 5 degrees of cervical range of motion variation from uninvolved side
- Diagnosis of congenital muscular torticollis

### Exclusions

- Spinal cord injury[3]
- Cervical fracture[3]
- Klippel- Feil Syndrome[3]
- Sandifer Syndrome[3, 12]
- CNS tumor[3]
- Ocular torticollis[3]

## PTOT-13.3.2: Target Users

- Physical Therapists
- Occupational Therapists
- Physicians
- Advanced Nurse Practitioners
- Parents or Caregivers

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### Differential Diagnoses

- Clavicle Fracture
- Brachial plexus injury
- Sandifer Syndrome (involves GERD and torticollis type of posture)
- Osseous torticollis (Klippel-Feil Syndrome, C1-C2 rotary subluxation)[12]
- Cervical scoliosis
- Hemi vertebrae
- Ocular dysfunction
- CNS tumor
- Osteoblastoma

### Co-morbidities[1-5, 12]

- Hip dysplasia
- Plagiocephaly
- Talipes equinovarus
- Developmental delay
- Facial asymmetry
- Mandibular asymmetry
- Gastroesophageal Reflux Disorder (GERD) peaks at 4 to 6 months

## PTOT-13.3.3: Clinical Presentation

### Overview of Congenital Muscular Torticollis

- The pathogenesis of CMT is unknown, however, it is thought to occur following birth trauma, intrauterine crowding, compression of soft tissue and/or abnormalities in the sternocleidomastoid muscle tissue itself.[6, 10]
- The incidence rate is 3.92% however, it may be as high as 19.7% (720, 000) of live births per year. Approximately 86% go untreated leading to long term and irreversible changes. Insert Fenton and Gaetani 2019 reference.
- Neurological or musculoskeletal disorders often accompany CMT.[1] The disorder is the third most common congenital musculoskeletal disorder, behind congenital hip dysplasia and congenital talipes equinovarus.[4, 5, 7]
- The classification of CMT is generally divided into three subgroups:
  - Mass- palpable mass within the SCM resulting in limitations in passive cervical mobility
  - Muscular- passive mobility limitations with no palpable mass present in SCM
  - Postural (positional)- postural preference, however, no palpable mass and no limitations in passive range of motion[1, 5]



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- A severity classification has been developed by the American Physical Therapy Association (APTA) Academy of Pediatric Physical Therapy. Based on:
  - the age of the infant when the asymmetry is noticed
  - age of referral to physical therapy
  - type of CMT
  - degree of muscle tightness.[1]
- Referrals for CMT to physical therapists have increased due to the "Back to Sleep" campaign.[1, 10-12] Infants are sleeping on their backs. Parents are afraid to place the infants on their tummies even when the infant is awake. Infants are being kept in car seats, swings, and other positioning devices where they are positioned on the back of their heads, which increases the frequency of torticollis and plagiocephaly.[1]

**Congenital Muscular Torticollis Severity Classification System (CMT_SCS)**

| CMT-SCS: Description | Grade 1 Early Mild | Grade 2 Early Moderate | Grade 3 Early Severe | Grade 4 Late Mild | Grade 5 Late moderate | Grade 6 Late Severe | Grade 7 Late Extreme | Grade 8 Very Late |
|---|---|---|---|---|---|---|---|---|
| Age at the time of presentation | 0-6 months | 0-6 months | 0-6 months | 7-9 months | 10-12 months | 7-12 months | 7-12 months | >12 months |
| Degree of Cervical Rotation Tightness | <15 degrees | 15-30 degrees | >30 degrees | <15 degrees | <15 degrees | >15 degrees | > 7 months with SCM mass or >30 degrees | Any asymmetry due to postural preference, Difference between sides in cervical rotation PROM or SCM mass |

**Critical Periods**

- Newborn identification of cervical, head or facial asymmetry within first 2 days of birth
- 0-3 months of age is best time to perform stretches on infant and able to achieve full cervical range of motion fastest [13]
- Refer to physician or physical therapist as soon as identified to have positional preference, facial asymmetry, mass on SCM, decreased cervical mobility, and/or plagiocephaly;
- 3-12 months after discharge from treatment for CMT or when begins walking for follow up to assess for positional preference, asymmetries, and developmental delays[1, 4]

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## PTOT-13.3.4: Management/Intervention

- Treatment of the infant with torticollis is guided by the age of the infant, the severity of the torticollis, the abilities of the parents to perform the exercises and repositioning procedures, the diagnosis of plagiocephaly, and the presence of associated neuromuscular or orthopedic impairments. Passive stretching has been most effective in correcting the cervical range of motion deficits.
- The earlier physical therapy treatment begins the better the results.[1, 2, 4, 7, 8, 13] If a child is referred to physical therapy services at less than one month of age, by the time the infant is 2.5 months old, the CMT has been shown to be 98% resolved.[4]
- The more severe the torticollis and the longer the delay in initiation of physical therapy treatment results in increased time in physical therapy and increases the likelihood of the need for surgery.[1, 4, 7, 8]
- Effective treatments for Grade 8 include 1 time per week for 10 weeks consisting of stretching, strengthening, massage, postural reeducation, frequency-specific microcurrent and parent education.
- Those who undergo surgery to correct the CMT will need intensive physical therapy intervention for 3-4 months following the procedure.[3]
- Referrals to physical therapy should be made as soon as any clinician or family member recognizes tightness in the neck, a mass in sternocleidomastoid muscle, flattening of head and preference for keeping head to one side. [1, 8]

## PTOT-13.3.4.1: Components of Evaluation

### Subjective

- Birth History
- Positioning during feeding
- Sleep position
- Time spent on tummy
- Time spent in equipment/positioning devices

### Objective Findings[1]

- Posture
- Acceptance to positioning in supine, prone, sitting and standing with support as needed based on age appropriate level
- Bilateral passive cervical rotation and lateral flexion
- Bilateral active cervical rotation and lateral flexion
- Passive range of motion in upper and lower extremities (screening for hip dysplasia and spine asymmetry)
- Active range of motion in upper and lower extremities



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- Pain or discomfort
- Skin integrity, skin folds at neck and hip, presence of SCM mass
- Craniofacial asymmetries
- Head/skull shape

**Specific Considerations**

- Rule out red flags (require medical management).[1, 4]
  - Ocular motor asymmetry
  - Palpable extramuscular masses
  - Asymmetrical head positioning with abnormal muscle tone (not consistent with CMT)
  - Suspected hip dysplasia
  - Absence of movement in any extremity
  - Spinal anomalies
- Identify co-morbidities requiring medical management, and those that affect therapy management[1-4, 9, 12]
  - hip dysplasia
  - talipes equinovarus
  - brachial plexus injury
  - early developmental delay
  - facial asymmetry
  - plagiocephaly
  - Gastroesophageal reflux disorder (GERD) occurs at a higher rate in infants with CMT
- Determine if trauma-related; determine nature and extent of traumatic event.
- Refer to MD[1, 4]
  - Presence of Red Flag
  - Little to no progress after 4 to 6 weeks of initial intense intervention

**Recommended Frequency of Treatment[1, 5, 9]**

- No specific recommendation of intensity of treatment is appropriate for all cases.
- The earlier physical therapy treatment begins, the better the results will be.
- Longer treatment durations are most associated with breech presentation, low birth weight and functional motor asymmetry
- Passive stretching and active positioning should be frequently performed throughout each day by the parent/caregiver.
- Responses to treatment regularly evaluated for effectiveness.
- The episode of care Vary depending on age that treatment is initiated

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| Age of infant that treatment is initiated: | Average direct treatment duration: | Percent of infants achieving excellent outcomes (no head tilt and full cervical PROM): |
|---|---|---|
| ➢ Before 1 month of age | ➢ 1.5 months | ➢ 99% |
| ➢ Between 1 to 3 months | ➢ 6 months | ➢ 89% |
| ➢ Between 3 to 6 months | ➢ 7 months | ➢ 62% |
| ➢ Between 6 to 12 months | ➢ 10 months | ➢ 19% |

- Physical therapy intervention three times a week has been shown to produce better/faster results than parents performing home program.
- Another study showed performing manual stretches100 times (10 sessions per day of 10 stretches) vs. 50 times a day for 4 to 8 weeks improved head tilt and cervical passive range of motion more.

## PTOT-13.3.5: Discharge Criteria

- Full passive range of motion within 5 degrees of the uninvolved side
- Active symmetrical movement patterns throughout the passive range
- Motor development is age appropriate
- No visible head tilt
- Parent/caregivers verbalize understanding of what to monitor as the child grows
- Patient is discharged when the parent/care-giver can continue management of symptoms with an independent home program.
- Patient is unable to progress towards improved outcomes because of medical complications, or other personal circumstances.
- Patient is no longer objectively demonstrating benefit from therapy; and/or
- Family chooses not to continue therapy

### Follow-up Screening[1, 4, 10]

- 3-12 months following discharge or when patient is beginning to ambulate to evaluate positional preference, the structural and movement symmetry of the neck, face, head, and trunk, hips, upper and lower extremities, and developmental milestones.
- 3-6 months following discharge if the patient was discharged between 4 and 6 months of age

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## PTOT-13.3.8: Physical/Occupational Therapy Management and Intervention

### First-Choice Interventions[1, 3, 4, 13]

The primary intervention for infants with CMT includes passive stretching of the shortened SCM, passively rotating the head to the shortened side and tilting the head in the opposite direction with shoulders stabilized. The intervention should address:

- Cervical passive and active range of motion (manual and passive stretching and strengthening through active movements against gravity)
- Trunk active range of motion and mobility (active movements while in developmental positions and handling)
- Symmetrical movement throughout extremities (active engagement of the infant in weight bearing activities, functional mobility, and reaching activities)
- Environmental adaptations to ensure position changes and promote active cervical rotation (change direction of infant placement in crib or on changing table to promote turning of head to other side, decrease time spent in swing and car seat, place toys so patient turns to tighter side)
- Promote parent/caregiver education (educate on importance of tummy time, adaptations that can be made to environment and in how parents/caregivers feed and interact with infant in order to encourage full bilateral cervical rotation). Educate parents on how CMT may affect the infant's future function.
- Also, the therapist should be cognizant of the infant's motor development.[1, 4, 5, 13]

### Supplemental Interventions[1]

#### Interventions with Level I Evidence

- Microcurrent to involved SCM, three times a week for two weeks, has been shown to improve head tilt, ROM and less crying during therapy.
- **Soft Tissue Mobilization** home program applied in 3 phases: passive mobilization, mobilization with stretching and mobilization with active cervical rotation
- Myokinetic Stretching consisting of overpressure to involved SCM at 60 repetitions for 30 minutes, 5 times per week for 1.7 months
- **Kinesiological taping (KT)** does not add value alone or in conjunction with other treatments

#### Intervention with level IV Evidence

- The Tscharnuter Akademie for Motor Organization (TAMO) approach is based on the dynamic theories of motor control.



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### Interventions with Level V Evidence

- The Tubular Orthosis for Torticollis (TOT) collar
- Soft foam collar
- Custom-fabricated cervical orthoses

### Interventions without Evidence of Efficacy

- The following approaches are reported in the literature, but have been shown not to provide any additional benefit or have not been studied systematically:
  - Manual therapy
  - Soft Tissue Massage provided as a single intervention
  - Craniosacral Therapy
  - Total Motion Release
  - Feldenkrais

### Other interventions

- Botulinum toxin (Botox) could enhance the effectiveness of stretching on the side of the contracture and allow strengthening of overstretched and weakened muscles on the opposite side of the neck.
- Surgery:
  - Unresolved CMT signs and symptoms after one year of age.
  - Greater than 15 degrees of cervical rotation deficit after 6 months of therapy treatment.
  - Infant older than 12 months of age with SCM mass[3, 9]
- Postoperative physical therapy consisting of range-of-motion exercises is recommended after surgical release of the SCM. A cervical collar could also be included in the postoperative management.

### Goals/Outcomes[2, 4, 6, 13]

- Age-appropriate active and passive range of motion of cervical and trunk movements
- Prevention of contractures or further loss of motion in infants with SCM nodules or significant fibrosis;
- Symmetry of shape in the face, head, and neck
- Development of postural reactions in all directions
- Midline upright posture of the head and neck without persistent tilt to the involved side; and
- Symmetry of gross motor patterns throughout development.



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**Tests Specific to Diagnosis**

| Assessment | Significance |
|---|---|
| Cervical Active ROM with arthrodial goniometer | ➢ Degree and difference between sides are indicative of severity[5, 6, 9] |
| Cervical Passive ROM with arthrodial goniometer | ➢ Degree and difference between sides are indicative of severity |
| Muscle Function Scale (MFS) | ➢ Effective in determining lateral flexor muscle function using lateral head righting |
| Still photography | ➢ Effective in measuring habitual head tilt in supine using lines drawn through the eyes and acromion processes to determine angle |
| Palpation | ➢ Mass present in SCM muscle indicative of more severe CMT which will require more treatment time and possible surgical procedure[1] |
| Muscle Function Scale | ➢ Describes muscle function in the lateral flexors of an infant's neck through ordered categorical scores (for patients greater than 4 months of age)[5, 6, 9] |
| Ultrasound | ➢ Assess muscle tissue for cysts and tissue integrity<br>➢ Identify location and presence of a mass[3, 13] |
| X-ray | ➢ May identify C1-C2 subluxation[3, 4] |

## PTOT-13.3.9: Section intentionally left blank

## PTOT-13.3.10: Home and Self-Care Techniques

- Parents can be taught to perform gentle passive stretches, cervical passive and active range of motion, trunk active range of motion and ways to adapt the infant's environment, (such as bed positioning and feeding), encouraging looking the opposite direction than preferred and maintaining the infant's head in midline.
- Parental compliance is extremely important for successful outcomes.
- Parents must be understand how CMT may affect child's future development

**Self-Care Techniques**

- Passive stretching exercises
- Parent holding positions
- Positioning
- Environmental adaptations
- Strengthening activities

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# PTOT-13.4: Concussion in Children and Adolescents

## PTOT-13.4.1: Definition

Concussion is an alteration of brain function caused by a direct or indirect impulsive force to the body or skull with or without loss of consciousness.[1] An injury of this type results in changes to the brain at the cellular level which cannot be identified by diagnostic tests such as Magnetic Resonance Imagery (MRI), Computed Tomography (CT) or Radiograph (X-ray). Concussion causes decreases in blood flow to the brain and molecular changes that are not well defined in either clinical or research contexts.[2] The terms *concussion* and *mild traumatic brain injury (mTBI)* are often used interchangeably with concussion being the more common term in sports.[3] Symptoms that result from a concussion can vary widely and may include loss of consciousness, amnesia of events before or after the injury, and confusion or disorientation.[4] As a result, concussion is categorized based on the resulting symptoms and clinical presentation.[5]

## PTOT-13.4.2: Target Populations

- Inclusion ICD-10 Codes:
  - S06.0X0D Concussion without loss of consciousness, subsequent encounter
  - S06.0X9 Concussion with loss of consciousness of unspecified duration
  - S06.0X9D Concussion with loss of consciousness of unspecified duration, subsequent encounter
  - S06.0X9S Concussion with loss of consciousness of unspecified duration, sequela
  - F07.2 Postconcussional syndrome
- Exclusions:
  - Moderate to severe traumatic brain injury

### Target Users

- Physical Therapists
- Occupational Therapists
- Parents of members

### Overview of Concussion in Children and Adolescents

Concussion in children is considered to be common, although the true incidence is not known. It has been suggested that about 33 million children worldwide sustain a concussion annually,[6] with a slightly higher rate among boys than girls.[7] Concussion due to sports participation is estimated to represent only 12% of that number.[8] Because the pediatric brain is still developing, a concussion is considered more dangerous than concussion with similar brain injuries in the mature brain[9] and increasing evidence indicates that children take longer to recover from concussion than adults.[6] Growing evidence has been contributory to the refinement of concussion assessment and the development of a child-specific tool for children aged 5-12 years.[10] Additionally, younger

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children (age 5-7 years) are more likely to show more severe symptoms of concussion than older children (11-13 years).[10]

## PTOT-13.4.3: Clinical Presentation

- The *International Classification of Functioning, Disability and Health for Children and Youth* (ICF-CY) model stresses health and functioning, rather than disability and limitations.[11] ICF uses four domains:
  - Body function – psychological and physiological functions of body systems,
  - Body structure – anatomical parts of the body,
  - Activity – execution of a task or action by an individual, and
  - Participation – involvement in life and social situations.
- ICF-CY considers how a child's body structures and functions interact dynamically with the environment to result in disability, which is defined as limitations in activity and participation. The diagnosis of acute concussion usually involves the assessment of a range of domains including clinical symptoms, physical signs, cognitive impairment, neurobehavioral features and sleep disturbance. It can be difficult to diagnose concussion due to lack of witnesses to the event and/or the individual's own awareness of being unconscious or for how long. Because focal neurologic deficits may not be apparent on medical testing and are not apparent on medical imaging, it is often the case that evidence of concussion may come from symptoms (physical, cognitive and behavioral) that alone or in combination may produce functional disability. These symptoms, indicated in Table 1, contribute to primary impairment following concussion.



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***Table 1: Body Structures and Functions impacted in Concussion***

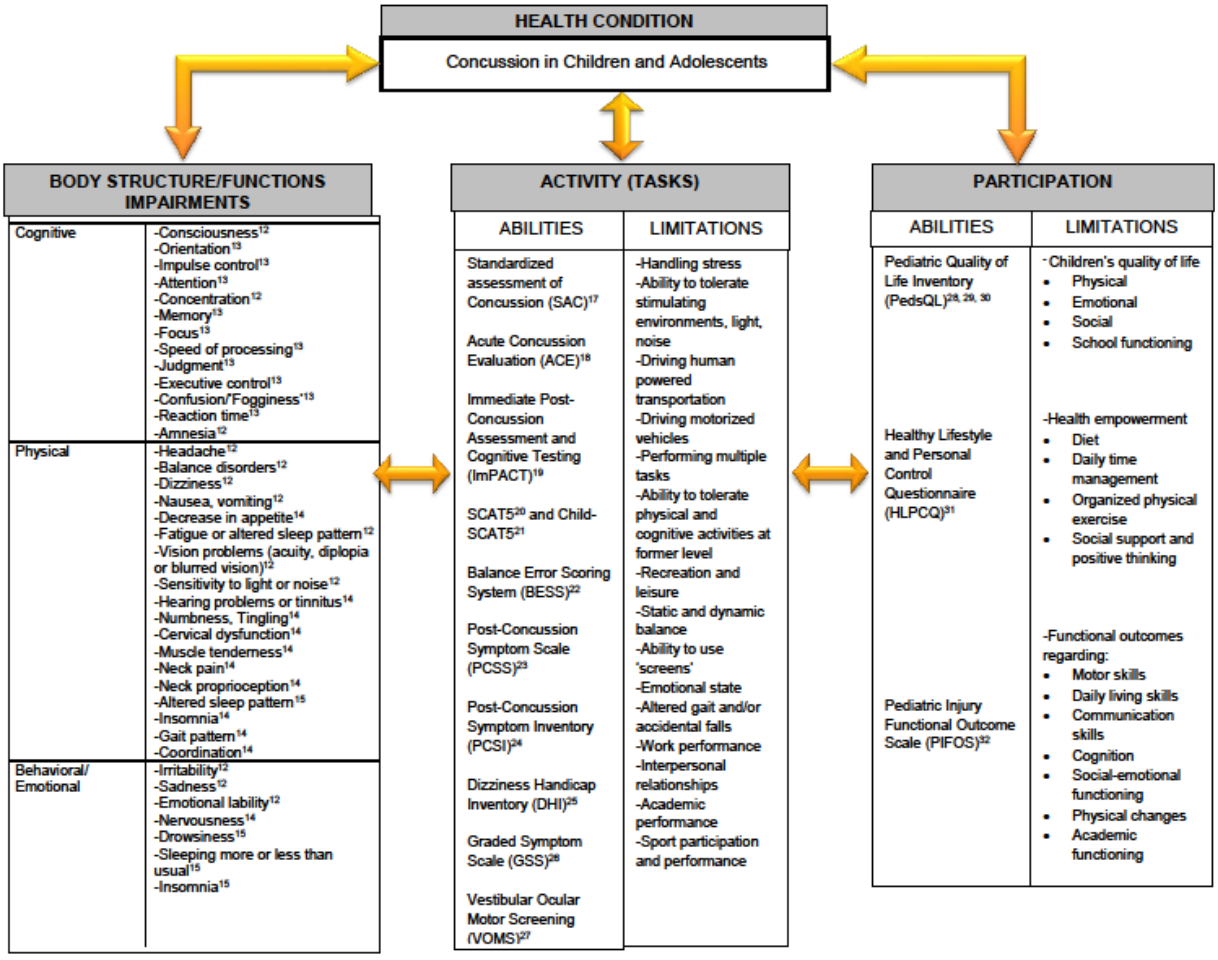
| | |
|---|---|
| Cognitive | ➢ Consciousness[12]<br>➢ Orientation[13]<br>➢ Impulse control[13]<br>➢ Attention[13]<br>➢ Concentration[12]<br>➢ Memory[13]<br>➢ Focus[13]<br>➢ Amnesia[12]<br>➢ Speed of processing[13]<br>➢ Judgment[13]<br>➢ Executive control[13]<br>➢ Confusion/'Fogginess'[13]<br>➢ Reaction time[13] |
| Physical | ➢ Headache[12]<br>➢ Balance disorders[12]<br>➢ Dizziness[12]<br>➢ Nausea, vomiting[12]<br>➢ Decrease in appetite[14]<br>➢ Fatigue or altered sleep pattern[12]<br>➢ Vision problems (acuity, diplopia or blurred vision)[12]<br>➢ Sensitivity to light or noise[12]<br>➢ Hearing problems or tinnitus[14]<br>➢ Numbness, Tingling[14]<br>➢ Cervical dysfunction[14]<br>➢ Muscle tenderness[14]<br>➢ Neck pain[14]<br>➢ Neck proprioception[14]<br>➢ Altered sleep pattern[15]<br>➢ Insomnia[14]<br>➢ Gait pattern[14]<br>➢ Coordination[14] |
| Behavioral/Emotional | ➢ Irritability[12]<br>➢ Sadness[12]<br>➢ Emotional lability[12]<br>➢ Nervousness[14]<br>➢ Drowsiness[15]<br>➢ Sleeping more or less than usual[15]<br>➢ Insomnia[15] |

- In the majority of cases, symptoms of the primary impairment resolve following concussion. In a small subset of cases, primary impairments lead to secondary impairments which limit activity and participation. Limitations in activity and participation are directly related to quality of life.[16] Concussion is marked by heterogeneity, so secondary impairments which are manifested are unique to each individual and should be considered in determining a remediation plan. Identification of limitations in activities and participation domains should also be used to guide appropriate utilization management. The ICF model, with activity and participation domains for concussion in children and adolescents, appears in Table 2.

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### *Table 2: ICF Model of Concussion*




## Potential Complications and Predictors of Delayed Recovery

- Although 80-90% of concussions resolve on their own within a short period, the recovery time frame may be longer in children and adolescents.[1, 33] When symptoms persist beyond the expected time frame for clinical recovery and remain for one month or longer post-injury, the injury is classified as *post-concussion syndrome*.[34] The World Health Organization diagnostic criteria for post-concussion syndrome require that three or more symptoms of headache, dizziness, fatigue, irritability, difficulty with concentration and mental tasks, memory impairment, sleep disturbances, heightened emotional responses, and poor stress tolerance must be present and interfering with the ability to participate in life activities.[34] Estimates of post-concussive symptom duration in children range widely[35] with some children symptomatic at 1 month, a smaller proportion at 3 months and less than 5% at 1 year.[36, 37]



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- Children with delayed recovery can develop significant disability with longer-lasting symptoms and cognitive impairment, which may interfere with school, sport and social participation. Inability to return to previous activity level may contribute to the development of more persistent symptoms, including concentration and memory problems, reduced quality of life, mental health problems and family distress.[12] At this time, it is not possible to predict which children and adolescents with concussion will go on to develop short- or long-term sequelae.[38]
- Specific intrinsic risk factors can increase the risk for concussion in children and adolescents. Comorbidities such as attention-deficit/hyperactivity disorder, seizures, depression, documented learning disability, and anxiety and mood disorders place children and adolescents at increased risk for more severe injury.[39] A previous concussion is probably the most important influence on risk for future injury, particularly within 10 days after initial concussion.[13] Predictors of recovery from concussion include pre-injury severity indicators such as genetics, ex: APOE $\varepsilon$4 genotype, sex differences, age, neurodevelopmental factors such as learning difficulties, history of migraine headaches, and mental health problems.[40]
- Second impact syndrome is a controversial condition where repeated head injury over a period of days to a few weeks, typically in sport, leads to non-survivable massive cerebral edema.[41] Most information comes from case reports which lack sufficient clinical detail to make definitive statements. Postural orthostatic tachycardia syndrome, POTS, has been recognized as a complication affecting recovery from concussion.[42] Children and adolescents with POTS exhibit refractory dizziness, lightheadedness, cognitive dysfunction, fatigue, headache, chronic pain, nausea and gastrointestinal dysmotility, activity and exercise intolerance, syncope and tachycardia. If on-going medical assessment does not continue following concussion or clinical reasoning skills are not astute, the subtle presentation of POTS can be mistaken for underlying anxiety, conversion disorder or lack of motivation for recovery.
- Chronic traumatic encephalopathy, CTE, refers to permanent changes in mood, behavior, cognition, somatic symptoms, and, in severe cases, dementia or Parkinsonian symptoms occurring in individuals with multiple concussions.[13] Based on animal studies and post-mortem analysis from adult athletes, concern exists that young athletes who sustain repetitive head impacts and multiple concussions may be at risk for neurodegenerative disease such as CTE or Alzheimer's disease later in life.[13]



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## Medical Management and Considerations

- For children and adolescents who sustain a concussion, initial management focuses on avoidance of additional head injury through removal from sport or recreational activity, along with a brief period of cognitive and physical rest.[12] Timing for return to school and return to sport may vary for each individual, depending on symptoms, injury severity and treatments. Specific and detailed education and instruction of patients, parents and/or legal guardians regarding concussion, including signs and symptoms, effects on cognition and typical duration of recovery is an integral component of clinical management and significantly improves patient follow-up and management.[43]
- While strict rest was previously recommended following concussion, recent evidence suggests that prescribed rest may actually be contraindicated.[44] Children and adolescents with concussion should adhere to a period of physical rest lasting only 24 to 48 hours followed by a gradual and progressive return to non-contact, non-risk physical activity designed to avoid symptom exacerbation until symptoms resolve.[45] If symptoms are worsened by light physical activity, then further activity should be deferred until it can be initiated without worsening of symptoms. Although briefly prescribed medications for symptomatic treatment may be helpful, there is weak evidence for pharmaceutical management following concussion.[46]
- The American Academy of Pediatrics has outlined academic adjustments to assist with symptom management for children and adolescents returning to school following concussion.[47] Physical therapists and occupational therapists who treat children and adolescents following concussion are encouraged to communicate with parents and patients to assess whether academic adjustments are occurring to minimize worsening of students' symptoms during their early recovery. These concussion signs/symptoms and potential adjustments in the school setting, can be found in Table 3.



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***Table 3: Academic Adjustments, American Academy of Pediatrics[47]***

| Signs and Symptoms of a Concussion and the Strategies to Help in the School Setting | |
|---|---|
| **Sign/Symptom** | **Potential Adjustments in School Setting** |
| Headache | Frequent breaks<br>Identifying aggravators and reducing exposure to them<br>Rests, planned or as needed, in nurses office or quiet area |
| Dizziness | Allow student to put head down if symptoms worsen<br>Give student early dismissal from class and extra time to get from class to class to avoid crowded hallways<br>Reduce exposure to computers, smart boards, videos |
| Visual symptoms: light sensitivity, double vision, blurry vision | Reduce brightness on screens<br>Allow the student to wear a hat or sunglasses in school<br>Consider use of audiotapes of books<br>Turn off fluorescent lights as needed<br>Seat student closer to the center of classroom activities (blurry vision)<br>Cover one eye with patch or tape one lens if glasses are worn (double vision) |
| Noise sensitivity | Allow the student to have lunch in quiet area with a classmate<br>Limit or avoid band, choir, or shop classes<br>Avoid noisy gyms and organized sports practices/games<br>Consideration of the use of earplugs |
| Difficulty concentrating or remembering | Give student early dismissal from class and extra time to get from class to class to avoid crowded hallways during pass time<br>Avoid testing or completion of major projects during recovery when possible<br>Provide extra time to complete non-standardized tests<br>Postpone standardized testing (may require that a 504 plan is in place)<br>Consider one test per day during exam periods<br>Consider the use of preprinted notes, 'notetaker', scribe, or reader for oral test taking |
| Sleep disturbances | Allow for late start or shortened school day to catch up on sleep<br>Allow rest breaks |

- In 2010, the American Academy of Pediatrics officially adopted the recommended return to play guidelines proposed by the International Conference on Concussion in Sport.[48] These guidelines include a six-step process that provides structure to guide children and adolescents who are recovering from a concussion. The protocol endorses a gradual return to play by allowing participation in increasingly difficult physical activities. While these guidelines do not take into account the variability of each sport and the challenges medical professionals face in making sure each athlete is able to withstand the rigors of his/her specific sport, physical and occupational therapists are trained in the evaluation and management of concussion and can customize an individualized plan for children and adolescents following

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concussion.[49] The graded return to play protocol advances through the following rehabilitation stages: light aerobic exercise, more intensive training, sports-specific exercises, non-contact participation, full practice, and ultimately, game play as shown in Table 4.[50]

***Table 4: Graduated Return-to-Play Protocol50***

| Graduated Return-to-Play Protocol | | |
|---|---|---|
| **Rehabilitation stage** | **Functional exercise at each stage of rehabilitation** | **Objective of each stage** |
| No activity | Symptom limited physical and cognitive rest | Recovery |
| Light aerobic exercise | Walking, swimming or stationary cycling keeping intensity <70% maximum permitted heart rate<br>No resistance training | Increase heart rate |
| Sport-specific exercise | Skating drills in ice hockey, running drills in soccer<br><br>No head impact activities | Add movement |
| Non-contact training drills | Progression to more complex training drills, ex: passing drills in football and ice hockey<br><br>May start progressive resistance training | Exercise, coordination and cognitive load |
| Full-contact practice | Following medical clearance, participate in normal training activities | Restore confidence and assess functional skills by coaching staff |
| Return to play | Normal game play | |

- For children and adolescents with symptoms beyond the expected time frame for clinical recovery, a multidisciplinary team approach is warranted to address the heterogeneous clinical presentation of concussion. In addition to a coordinating healthcare provider, typically a physician, other specialties may be involved, including a physical therapist, occupational therapist, athletic trainer, ophthalmologist, speech and language pathologist, and clinical or sport psychology professional.[46]

## PTOT-13.4.4: Physical/Occupational Therapy Management and Intervention

- Physical and occupational therapists are uniquely qualified to evaluate and assist in the recovery of children and adolescents with concussion. The most frequently cited complaints after a concussion are physical in nature (headache, dizziness, postural/balance disturbance and neck pain), but emotional, cognitive and sleep disturbances are also widely reported.[51, 52] Therapists with dual expertise in vestibular therapy and orthopedic therapy are particularly well-suited to work with children and adolescents following concussion to resolve balance and visual issues that limit activity and participation. Skilled therapy is indicated for headaches that are the result of cervical spine dysfunction. Further guidance for evidence-based practice of cervicalgia can be found in eviCore's clinical practice guideline: Musculoskeletal, Physical Therapy/Occupational Therapy, Cervical Non-Specific, page 163, Cervicalgia with or without Headache.[53]



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- The direct symptoms of concussion, in addition to the emotional stress related to restriction placed on activity during recovery, can combine to contribute to psychological or emotional symptoms in children and adolescents following concussion. Prolonged periods of physical and cognitive inactivity can result in symptoms such as irritability, sadness, anxiety, emotional lability, depression, fatigue, headache, decreased energy, and altered sleep patterns.[13] Indeed, many of these symptoms overlap with those of concussion, making it difficult at times to distinguish between symptoms directly attributable to concussion and those attributable to physical and cognitive restrictions during the course of treatment. Attention to somatic, vestibular, psychological, and sleep symptoms associated with prolonged concussion can contribute to secondarily improve cognitive symptoms.[54] Carefully monitored physical exercise and return to learning may also help to normalize the child's schedule and positively impact sleep.
- While physical and cognitive rest until symptoms subside has been the accepted management strategy, emerging evidence suggests that concussion is treatable through active approaches involving earlier activity, aerobic exertion, vestibular and vision therapies.[46] These studies demonstrate that active treatments are more effective than rest-based approaches. A rapid return to vigorous exertion is likely to exacerbate symptoms and, for most children, should be avoided.[45] Despite these recent findings, referral to a physical therapist is not recommended by previously accepted consensus guidelines until symptoms become chronic.[51] Few, high-quality studies have examined the feasibility and effectiveness of an active, medically prescribed and supervised physical therapy intervention in the acute phase of recovery as compared to physical and cognitive rest.
- While there is no single clinical test to determine whether concussion has occurred, increasing evidence points to the dual-task paradigm to distinguish individuals with and without concussion.[55] Observing people during a gait or balance task while they perform a secondary task is an accepted way to assess the interaction between cognition and mobility, *dual-task paradigm.* Individuals with concussion have been shown to exhibit decreased gait velocity, increased medial-lateral displacement and more cognitive errors with dual-task testing. However, a specific dual-task protocol that may be used to assess individuals with a suspected concussion has yet to be determined. Because concussion is categorized based on the resulting symptoms and clinical presentation, a battery of tests is commonly used to measure disability with and recovery from concussion. Commonly used concussion tests and measures, as categorized by ICF domain, can be found in Table 5.



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***Table 5: Commonly Used Concussion Tests and Measures by ICF Domain***

| Assessment | Description |
|---|---|
| **Body Structure/Function** | |
| Basic therapy assessments | Examples: ROM, strength, BMI, blood pressure, pain, various joint integrity tests, etc. |
| Standard Assessment of Concussion (SAC)[17] | Multi-domain:<br>provides immediate mental status assessment of children and adolescents who may have incurred a concussion<br>contains questions to assess orientation, immediate memory, concentration and delayed memory<br>takes approximately 5 minutes to administer and does not require a neuropsychologist to evaluate test scores<br>valid and reliable for use with children ages 6 and older[56] |
| Acute Concussion Evaluation (ACE)[18] | Multi-domain:<br>physician/clinical form used to evaluate individuals for a concussion<br>includes questions about concussion characteristics, 22 concussion symptoms and risk factors for protracted recovery<br>can be used serially to track symptom recovery over time to inform clinical management decisions<br>valid and reliable for use with children ages 3-18 (with parent informants)[18] |
| Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT)[19] | ➢ Multi-domain:<br>◆ computerized concussion management program designed and validated to provide a guideline for evaluation, inform treatment and recommend return to activity<br>◆ consists of baseline and post-injury assessments for children ages 5-11 years and ages 12 years and older<br>◆ evaluates multiple aspects of neuropsychological function, including:<br>◆ health history and concussion-related symptoms<br>◆ attention span<br>◆ working memory<br>◆ motor processing speed<br>◆ reaction time<br>◆ non-verbal problem-solving<br>◆ impulse control |

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| Assessment | Description |
|---|---|
| SCAT 5[20] | ➢ Multi-domain:<br>◆ standardized concussion screening tool designed for licensed healthcare professionals to assess individuals ages 13 and older for mental and physical changes following a concussion<br>◆ evaluates the following areas:<br>◆ red flags<br>◆ observable signs of concussion<br>◆ immediate memory<br>◆ Glasgow Coma Scale (GCS)<br>◆ Cervical spine assessment<br>◆ Athlete history<br>◆ Symptom evaluation<br>◆ Cognitive screening<br>◆ Neurological screen<br>◆ Delayed memory<br>◆ Valid and reliable test for concussion evaluation<br>◆ Supersedes the SCAT, SCAT 2 and SCAT 3 published previously |
| Child SCAT5[21] | ➢ Multi-domain:<br>◆ Standardized concussion screen tool designed for licensed healthcare profession to evaluate children ages 5-12 years<br>◆ Similar to the SCAT 5 except that tests such as the SAC and Maddocks questions are age appropriate for younger children<br>◆ Includes the following:<br>◆ Versions of the SAC and Maddocks questions<br>◆ Glasgow Coma Scale (GCS)<br>◆ Medical history completed by the parent<br>◆ Child and parent concussion symptom scales<br>◆ Neck evaluation<br>◆ Balance assessment<br>◆ Supersedes the Child-SCAT 3 |
| **Activity (Tasks)** | |
| Balance Error Scoring System[22] | ➢ Posture/Balance:<br>◆ Quantifiable version of a modified Romberg test for balance which measures postural stability and balance<br>◆ Consists of single, double and tandem stance assessment on firm and foam (unstable) surfaces<br>◆ Most widely used balance assessment tool for concussion evaluation and management<br>◆ Reliable and valid clinical tool without evidence of a learning effect for children even as young as age 5 years[57]<br>◆ One of the measures used in the Concussion Assessment & Response™: Sport Version mobile app (CARE SPORT) for healthcare professionals[58] |

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| Assessment | Description |
|---|---|
| Post-Concussion Symptom Scale (PCSS)[23] | ➢ Multi-domain:<br>◆ Symptom inventory developed as part of the Pittsburgh Steelers concussion program<br>◆ Self-reported symptoms, ex: headache, fogginess, dizziness, are rated on a Likert scale of 0 to 6, with 0 meaning 'none' and 6 meaning 'severe'<br>◆ Total score ranges from 0 to 132<br>◆ Valid and reliable for use with pediatric populations[59] |
| Post-Concussion Symptom Inventory (PCSI)[24] | ➢ Multi-domain:<br>◆ self-reported measure for youth ages 5-7 years (13 items), 8 to 12 years (25 items) and 13 to 18 years (26 items), as well as reports for parents and teachers (26 items)<br>◆ symptoms are reported in the cognitive, emotional, sleep and physical domains<br>◆ reliable, with predictive and discriminant validity[60] |
| Dizziness Handicap Inventory[25] | ➢ Multi-domain:<br>◆ assesses an individual's handicap because of his/her dizziness using 25 items relating to physical, emotional and functional domains<br>◆ highest overall score on the test is 100 with higher scores indicating greater handicap resulting from dizziness<br>◆ 18-point change is considered clinically meaningful |
| Graded Symptom Scale (GSS)[26] | ➢ Multi-domain:<br>◆ Self-report measures of concussion symptoms derived from the Head Injury Scale<br>◆ 20 symptoms are rated on their severity<br>◆ Evidence is stronger to support the use of self-report measures in youth ages 13 and older<br>◆ One of the measures used in the Concussion Assessment & Response™: Sport Version mobile app (CARE SPORT) for healthcare professionals[58] |
| Vestibular Ocular Motor Screening (VOMS)[61] | ➢ Vestibular/Balance:<br>◆ Screening tool used to detect signs and symptoms of a concussion<br>◆ Assesses the systems responsible for integrating balance, vision and movement<br>◆ 90% accuracy in identifying patients with concussion<br>◆ Assists in determining the type of concussion suffered<br>◆ Requires 5-10 minutes to conduct using simple tools<br>◆ Designed for use with individuals ages 9-40<br>◆ Tests five areas of vestibular and ocular motor impairment:<br>◆ Smooth pursuits<br>◆ Saccadic or rapid eye movements<br>◆ Near point convergence<br>◆ Vestibular ocular reflex<br>◆ Visual motion sensitivity |



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| Assessment | Description |
|---|---|
| **Participation Measures** | |
| Pediatric Quality of Life Inventory (PedsQL)[28, 29, 30] | ➢ A multi-dimensional instrument for measuring health-related qualify of life in children and adolescents ages 2 to 18.<br>➢ Consists of 23 items applicable for healthy school and community populations, as well as pediatric populations with acute and chronic health conditions.<br>➢ The literature supports the use of PedsQL for research, clinical practice, school health settings and community populations; it is reliable and valid.[30] |
| Healthy Lifestyle and Personal Control Questionnaire (HLPCQ)[31] | ➢ 26-item tool in which the respondent is asked to indicate the frequency of adopting 26 positively stated lifestyle habits using a Likert-type scale<br>➢ Questionnaire detects and quantifies lifestyle patterns that reflect health empowerment<br>➢ Includes domains of diet, daily time management, organized physical exercise and social support/positive thinking |
| Pediatric Injury Functional Outcome (PIFOS)[32] | ➢ Measures capability and performance of functional activities in self-care, mobility, social function as well as caregiver assistance and environmental modifications necessary for successful performance.<br>➢ Ages 6 months to 7.5 years |

**Admission Criteria**

- Degree of dysfunction should be specified at initiation of therapy, and periodically, to establish an objective response to therapy:
  - Presence of physical, vestibular, cognitive and behavioral/emotion signs, ex: headache, dizziness, postural/balance disturbance, neck pain
- Treatment frequency and duration must be based on:
  - Severity of clinical findings
  - Presence of complicating factors
  - Risk factors or predictors of delayed recovery
  - Natural history of condition
  - Expectation for functional improvement
  - Response to treatment
- Home program development, education and training

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## PTOT-13.4.5: Discharge Criteria

- Discontinuation or discharge should occur when:
- The patient and family's goals of treatment have been attained
- No measurable improvement toward the goals of treatment have occurred, depending on the frequency of treatment and the patient's needs
- The patient's symptoms have resolved
- Reasonable functional goals and expected outcomes have been achieved
- The patient is unable to progress toward outcomes because of secondary impairments, psychosocial factors or other personal circumstances
- Services become routine or repetitive in nature, indicating that they are not of a skilled nature
- The patient is no longer objectively demonstrating benefit from therapy and improvements are attributed to the natural history of the condition rather than therapeutic intervention
- The member has been non-compliant with therapy as evidenced by clinical documentation, and/or a lack of demonstrated progress

## PTOT-13.4.6: Referral Guidelines

- The patient should be referred to his/her primary care provider or doctor for evaluation of alternative treatment options if:
  - Improvement does not meet established guidelines or improvement reaches a plateau
  - The patient fails to respond to treatment resulting in the need for further assessment to address new or developing issues
  - Signs/symptoms of concussion have increased, ex: headache is prolonged or has intensified
- Physical therapy and occupational therapy intervention is directly beneficial for children and adolescents following concussion and has been described in Table 6.

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***Table 6: Literature Summary of Interventions for Children and Adolescents following Concussion in Physical and Occupational Therapy***

| Reference and Study Design | Oxford Level of Evidence | Intervention or Recommendation | Dosage |
|---|---|---|---|
| Reneker JC et al, 2016[62]<br>Double-blind randomized clinical trial<br>n=41 | 1 | Physiological, Vestibulo-ocular and Cervicogenic Intervention:<br>Patient specific treatment consisting of manual therapy, vestibular rehabilitation, oculomotor rehabilitation, and neuromotor training for individuals ages 10-23 years of age. Treatment group was medically released a median of 10.5 days sooner than the control group on average and recovery was a median of 3.5 days sooner than control group. | 2x/week for a total of 8 visits or until return to play clearance, beginning at day 10 post-concussion; sessions were 30-60 minutes; included a home program |
| Reneker JC et al, 201662<br>Double-blind randomized clinical trial<br>n=41 | 1 | Physiological, Vestibulo-ocular and Cervicogenic Intervention:<br>Patient specific treatment consisting of manual therapy, vestibular rehabilitation, oculomotor rehabilitation, and neuromotor training for individuals ages 10-23 years of age. Treatment group was medically released a median of 10.5 days sooner than the control group on average and recovery was a median of 3.5 days sooner than control group. | 2x/week for a total of 8 visits or until return to play clearance, beginning at day 10 post-concussion; sessions were 30-60 minutes; included a home program |
| Schneider et al, 2014[63]<br>Randomized Control Trial | 1 | Physiological, Vestibulo-ocular and Cervicogenic Intervention:<br>A combination of vestibular rehabilitation, cervical spine manual therapy, range of motion exercises, stretching and graded exercise progression decreased the time until medical clearance for athletes ages 12-30 as compared to a control group receiving the local standard of care. | 1x/week for 8 weeks or until medical clearance for return to sport |
| Makdissi M et al, 2017[64]<br>Systematic Review | 1 | Physiological Intervention:<br>Low grade exercise in adolescents with slow recovery or persistent symptoms following concussion are effective in the reduction of symptoms and improvement in exercise tolerance | Timing of exercise initiation unclear |
| Lal A et al, 2018[65]<br>Systematic Review and Meta-analysis | 1 | Physiological Intervention:<br>Exercise significantly decreased Post-Concussion Symptom Scale (PCSS) score, improved the reaction time component of the ImPACT score and reduced symptom duration in patients with concussion. | Exercise dosing variable |

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| Reference and Study Design | Oxford Level of Evidence | Intervention or Recommendation | Dosage |
|---|---|---|---|
| Thomas et al, 2016[66]<br>Randomized Control Trial<br>n=370 | 2 | Physical Activity:<br>Strict physical and cognitive rest for 5 days following concussion for individuals age 12-15 as compared to usual activity were associated with delayed recovery, more daily post-concussive symptoms and emotional symptoms throughout recovery. | n/a |
| Kurowski BG, et al 2016[67]<br>Randomized Control Trial<br>n=30 | 2 | Physiological Intervention:<br>An individualized sub-symptom threshold aerobic exercise program for adolescents ages 12-17 is recommended over a full-body stretching program to reduce concussion symptoms, improve exercise tolerance and return to normal lifestyle and sport participation. | 5-6x/week at home for 6 weeks; continued until week 9 if symptoms persist |
| Zuckerbraun NS, et al, 2014[43]<br>Multi-center observational study, n=354 | 2 | Patient and Family Education:<br>Specific and detailed concussion discharge instructions from an emergency room visit improve patient follow-up and outcomes following concussion. | n/a |
| Quatman-Yates C, et al 2016[68]<br>Systematic Review | 2 | Cervicogenic Intervention:<br>Manual therapy, mobilization and muscle energy techniques are effective to identify areas of hypomobility, normalize cervical and thoracic spine mobility and reduce symptoms from headache and dizziness | Two treatments with follow-up 5 weeks later |
| Park K et al, 2018[69]<br>Systematic Review | 2 | Vestibular Intervention:<br>Vestibular rehabilitation is more effective than continued cognitive and physical rest for adolescents (12-18 years) with persistent symptoms of dizziness, unsteadiness, and imbalance following sport concussion. | Parameters for dosing were unclear; some studies included a home program |
| Leddy JJ et al, 2013[70]<br>n=15 | 3 | Physiological and Cognitive Intervention:<br>A controlled and progressive aerobic exercise program improved reaction time for individuals 17-52 years of age with postconcussion syndrome as compared to a stretching placebo group and healthy control subjects as measured with functional MRI. | 20 minutes/day, 6 days/week for 12 weeks |

Pediatric

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| Reference and Study Design | Oxford Level of Evidence | Intervention or Recommendation | Dosage |
|---|---|---|---|
| Dobney D et al 2017[71]<br>Retrospective Cohort Study<br>n=277 | 3 | Physiological and Vestibulo-Ocular Intervention:<br>An active rehabilitation program consisting of aerobic activity, coordination/skill practice, visualization and education for children and adolescents (mean age=14 years) slow to recover from concussion is associated with decreased post-concussion symptoms | Duration and frequency not reported, but protocol initiated 3-4 weeks post-injury |
| Storey EP et al, 2018[72]<br>Retrospective Cohort Study<br>n=109 | 3 | Vestibulo-Ocular Intervention:<br>Children ages 5-18 years with visuovestibular dysfunction and balance dysfunction showed significant improvement on all visuovestibular tasks except for near point of convergence and had significant improvement in balance. | 1-4 visits a median of 24 days after concussion |
| Alsalaheen et al, 2010[73]<br>Case series, n=114 | 4 | Vestibulo-Ocular Intervention:<br>Vestibular rehabilitation for dizziness and balance disorders after concussion in children (age 8-18 years) and adults reduced dizziness report, improved gait and improved balance function. | 1-4 visits |

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# PTOT-13.5: Down Syndrome

## PTOT-13.5.1: Definition

Down syndrome (DS) is the most common genetic disorder, occurring 1 in every 824 live births.[1] Down syndrome, or Trisomy 21, results from partial or full extra copies of the gene on chromosome 21 in all of the body's cells.[2] DS may be classified according to karyotype or number and appearance of chromosomes. Nondisjunction, results from an error in cell division where the embryo has full 3 copies of chromosome 21, accounts for 95% of cases and is called trisomy 21.[3] Translocation is due to a partial or full copy of chromosome 21 that attaches to another, usually chromosome 14, and represents 4% of cases of DS.[3] Mosaicism is a mixture of 2 types of cells with some containing the normal 46 chromosomes and some containing extra 47 chromosomes and accounts for only 1% of all DS cases.[3]

## PTOT-13.5.2: Target Populations

### Inclusion ICD-10 Codes

- Q90.9 Down syndrome
  - Q90.0 trisomy 21, meiotic nondisjunction
  - Q90.1 trisomy 21, mosaicism (mitotic nondisjunction)
  - Q90.2 trisomy 21, translocation
  - Q90.9 Down syndrome, unspecified

### Exclusions

- Trisomy 18 or Edward syndrome
- Trisomy 13 or Patau syndrome
- Trisomy 9
- Trisomy X
- Klinefelter syndrome

### Target Populations

- Physical Therapists
- Occupational Therapists
- Parents of members



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### Overview of Down syndrome

- The genetic overexpression in Down syndrome results in changes to physical and cognitive development due to decreased brain volume and number of central nervous system neurons, delay of myelination and overproduction of protein precursors causing neurotransmission abnormalities.[2] This results in motor delays, muscle hypotonia, ligament laxity, poor postural control and balance, cognitive impairments, deficits in expressive language and verbal short-term memory.[3] Additional medical problems may include congenital heart defects, joint disease, digestive malformations, auto-immune and endocrine disorders, metabolic disorders, leukemia, earlier aging and Alzheimer's disease.[2] The median life expectancy for people with DS is 58 years; this longer life expectancy places the number of people living with DS to 1 in 1499 people in the USA.[1]

## PTOT-13.5.3: Clinical Presentation

- The *International Classification of Functioning, Disability and Health for Children and Youth* (ICF-CY) model focuses on an individual's health rather than disability. [4] ICF uses four domains: [4]
  - Body function – psychological and physiological functions of body systems,
  - Body structure – anatomical parts of the body,
  - Activity – task or action performed by the child, and
  - Participation – involvement in life and social situations.
- ICF-CY considers how a child's body structures and functions interact dynamically with the environment to result in disability, which is defined as limitations in activity and participation.[5] Children with DS have multiple primary impairments that affect their movement system: cognitive, language, neurological, sensory, cardio-pulmonary, musculoskeletal as indicated in Table 1 below.



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***Table 1:***

| Body Structures and Functions which impact the Movement System in DS | |
|---|---|
| Cognitive<br>Language<br>Neurological | ➢ Intellectual disability [6]<br>➢ Difficulty with expressive language [6]<br>➢ Decreased verbal memory skills and verbal processing [6]<br>➢ Microcephaly [2]<br>➢ Seizures [6] |
| Sensory | ➢ Visual deficits [6]<br>➢ Hearing (mild to moderate hearing loss) [6] |
| Cardio-Pulmonary | ➢ Congenital heart defects [6]<br>➢ Risk for restrictive pulmonary disease with decreased lung volumes and weak cough [7] |
| Musculoskeletal | ➢ Hypotonia [6]<br>➢ Delayed gross and fine motor skills [8]<br>➢ Linear growth deficits (>6-24 mo) [8]<br>➢ Small stature (feet, hands, fingers) [7]<br>➢ Low bone mineral density [9]<br>➢ Absent palmar crease [10]<br>➢ Craniofacial anomalies [11]<br>➢ Joint and Ligamentous laxity: [12]<br>◆ Pes planus<br>◆ Patellar instability<br>◆ Hip subluxation<br>◆ Scoliosis-mild to moderate<br>◆ Atlantoaxial instability |
| Secondary Impairments | ➢ Impaired motor planning [12]<br>➢ Muscle weakness, especially hip abductors and quads [13]<br>➢ Impaired dexterity [10]<br>➢ Inefficient/poor quality motor skills [14]<br>➢ Decreased muscle force production [15]<br>➢ Decreased balance/equilibrium [12]<br>➢ Decreased postural control [12]<br>➢ Decreased endurance [13]<br>➢ Decreased coordination [14]<br>➢ Difficulty with reciprocal movement due to co-contraction for stability[15]<br>➢ Immature gait pattern [15]<br>➢ Impaired sensory processing [16]<br>➢ Reduced proprioception [16]<br>➢ Oral–motor difficulties impacting feeding [11]<br>➢ Behavior issues [16]<br>➢ Obesity [17] |

- Primary impairments lead to secondary impairments which limit activity and participation. Limitations in activity and participation are directly related to quality of life.[18]

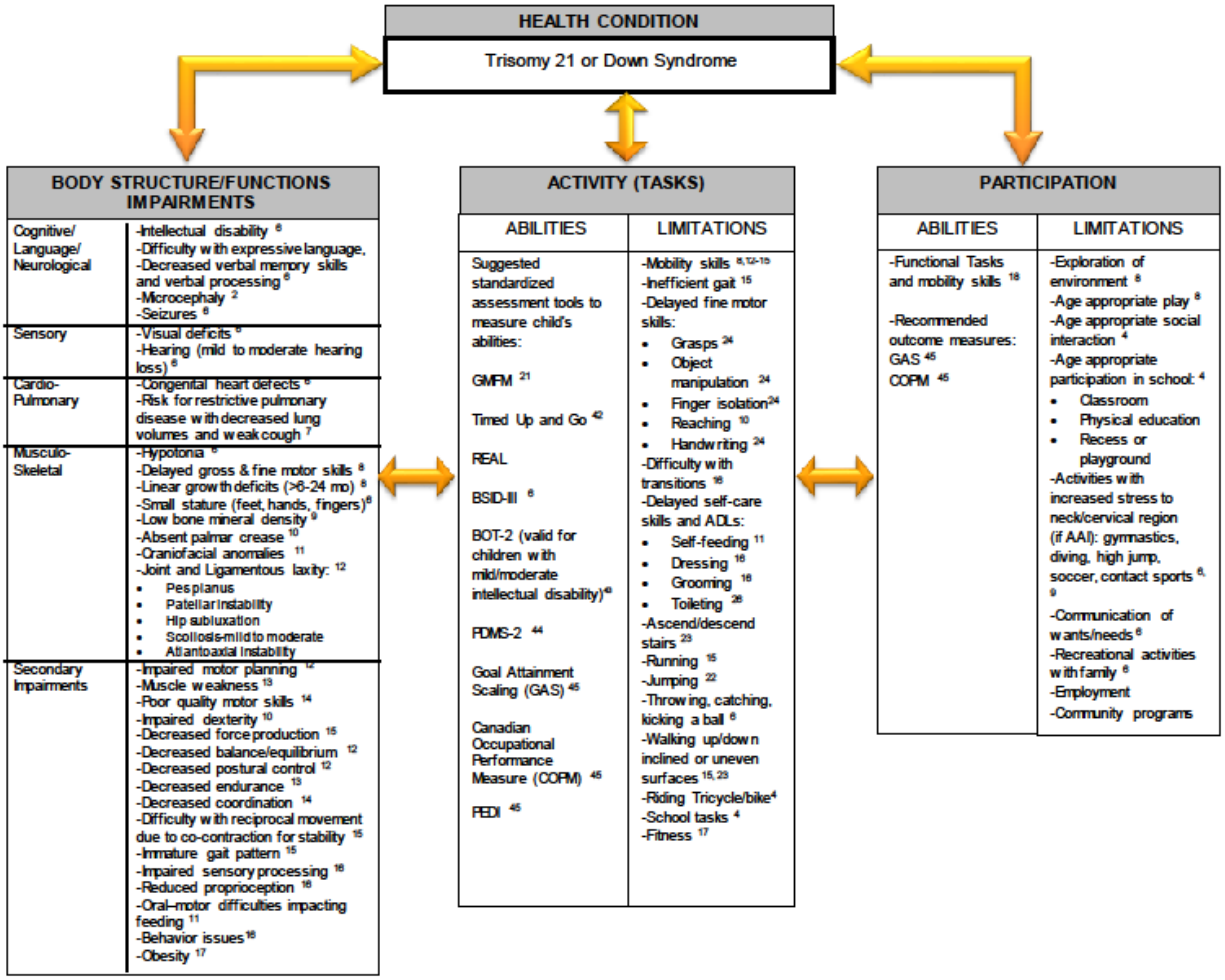
Strong evidence indicates treatment which is focused only on body structure and function does not carry over to activities and participation domains.[4, 14, 19]

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- Therefore, it is important to identify limitations in activities and participation domains and the natural course of Down syndrome to guide appropriate utilization management. The ICF model, with activity and participation domains for children with Down syndrome, appears in Table 2.

**Table 2: ICF Model for children with Down syndrome**




## Lifespan Considerations in Down syndrome

- Development of Motor Skill
  - Children with DS *will* attain developmental milestones, but it takes them nearly twice as much time.[2] During infancy, motor skills that require midline behaviors and vertical posture are delayed.[8] These early skills contribute to ongoing delay of more complex motor skills.[8]



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- Tables 3 and 4 are composed of various research regarding attainment ages and ranges for gross motor and fine motor/activity of daily living developmental milestone. *These tables should be used with caution since children with DS will achieve milestones on their own timetable.*[20] Developmental outcomes at age 2 years of age are predictive of later function.[6] Research indicates that infantile spasms, central nervous system disease, surgery or and hospitalizations lasting more than 11 days will increase developmental delays. [2, 6]

***Table 3: Gross motor milestones – age for attainment summary of evidence***

| Gross Motor Developmental Milestones | Kim et al (2017) [2] | Winders (1997) [20] | | Berry et al (1980) [20] | | Cunningham & Sloper (1978) [20] | |
|---|---|---|---|---|---|---|---|
| Attainment | Average Age (mos) | Age range (mos) | Average age (mos) | Age range (mos) | Average age (mos) | Age range (mos) | Average age (mos) |
| Head control | 6.1 | | | | | | |
| Rolling | 8.76 | 2 to 10 | 5 | 2 to 12 | 6-7 | 4 to 11 | 8 |
| Independent sitting | 12.0 | 5 to 9 | 7 | 7 to 16 | 11 | 8 to 16 | 11 |
| Belly crawl | 14.0 | | | | | | |
| Creeping | 18.1 | | | | | | |
| Pull to stand | | 7 to 12 | 8 | 8 to > 28 | 17 | 10 to 24 | 17 |
| Cruising | 22.3 | | | | | | |
| Stands alone | | 9 to 16 | 11 | | 21 | 16 to 36 | 22 |
| Walks without support 3 steps or more | | 9 to 17 | 13 | 14 to 36 | 26 | 16 to 42 | 24 |
| Independent walking | 28.0 | | | | | | |
| Walk up/down stairs 1 foot at a time with rail | 30 months – 5 years of age [21] | | | | | | |
| Walk up/down stairs reciprocally using rail | 3.25 years – 8.5 years of age [21] (descending occurs before ascending) [23] | | | | | | |
| Jumping | 3 years – 5 years of age [21] | | | | | | |
| Running | 4 years – 7 years of age [21] | | | | | | |
| Ride tricycle | 4 years – 6 years of age [4] | | | | | | |
| Hopping | Emerges at age 7 years and remains delayed until at least 11 years of age [22] | | | | | | |



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***Table 4: Fine motor and ADL milestones – age for attainment evidence summary***

| Fine Motor and ADL Milestones | Age Range for 75-95% of children [20, 24] | Fine Motor and ADL Milestones | Age Range for 75-95% of children [20, 24] |
|---|---|---|---|
| Fine motor: | | Handwriting skills: | |
| Raking grasp | 9 – 12 mos | Scribble with crayon | 22 – 36 mos |
| Transfers objects | 12 – 18 mos | Traces shapes | 5 – 10 yrs |
| Pincer grasp | 22 – 66 mos | Traces letters in name | 9 – 12 yrs |
| Intentional drop/release | 22 – 36 mos | Copies sequence of letters | 10 – 12 yrs |
| String beads | 6 – 12 yrs | Writes name independently | 10 – 18 yrs |
| Self-feeding skills: | | Dressing skills: | |
| Holds bottle | 16 – 27 mos | Dress/Undress no fastener | 14 – 16 yrs |
| Self-feed with fingers | 20 – 22 mos | Independent zipper | 18 yrs |
| Feeds with spoon | 3.5 – 6 yrs | Independent button | 18 yrs |
| Drinks from straw cup | 3 – 5 yrs | Tie shoes | 18 yrs |
| Drinks from open cup | 5.5 – 7.5 yrs | Toilet skills: | |
| Feeds with fork | 5.5 – 7.5 yrs | Interest in toilet training occurs at 3.8 years old and takes 1.9 years of training. Average age of toilet training is 5.5 years old.[26] Accidental wetting may occur until 11.1 years old.[26] | |

- Ambulation and Balance skills
  - Mobility skills improve most rapidly at younger ages and then level off as the child approaches the upper limit of function.[21] Children with DS have greater difficulty with postural control, reciprocal movements and variability of spontaneous movement.[8] Early ambulation is characterized by high co-contractions to compensate for joint laxity, resulting in poor quality mobility skills.[8] Supported treadmill training initiated around 10 months facilitates earlier onset of walking in children with DS. [14] By pre-adolescence, ambulation skills are at peak performance to navigate variable conditions or perturbations and then start to decline with age.[15] Strong evidence supports gait training for new walkers and adults. [14-15]



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- Children with DS do not develop balance strategies before age 6 years old and postural stability does not reach maximum potential until age 13-14 years of age in typically developing children.[12] A recent systematic review determined that it is impossible to conclude that children with DS have significantly lower static postural control than typically developing children.[12] Hopping does not emerge until age 7 years old and remains delayed until at least 11 years of age. [22] Children and adults with DS have difficulty with stair negotiation because of underdeveloped anticipatory locomotion skills, difficulty with variable step length, decrease toe clearance and require a longer pause to step over obstacles.[23] Often, compensatory postural adjustments, such as excessive trunk inclination when ascending stairs, persists throughout their lifetime.[8]

- Fine Motor and Activity of Daily Living Skills
  - Fine motor skills, which are developed through neuropsychomotor coordination, are responsible for hand movement and dexterity.[10] Children with DS experience delays in fine motor skills, which lead to delays in activities of daily living (ADLs) and independence.[10, 20, 24] Fine motor skills require coordination of muscle strength, joint range of motion, dexterity, speed and efficiency of movement to perform a task.[10] Children with DS demonstrate muscle weakness and joint laxity. A study found that children between the ages of 9 to 16 years old have 60% less grip strength, 33% less palmar pinch strength and 22% less key pinch strength than typically developing children.[25]
  - In addition, children with DS have sensory processing problems that negatively impact ADLs.[16] A study of children with DS, between 3 to 10 years of age, used the Short Sensory Profile and found that half have atypical sensory responses.[16] The most prevalent problems are sensory seeking, auditory filtering, low energy and low registration.[16] Parents in the study reported difficulty with activity transitions, distractibility, sensitivity to noise and touch, and difficulty with hygiene routines.[16]
  - Nearly 80% of children with DS, who are less than 7 years old, have problems with eating.[11] Many of the feeding difficulties begin during the neonatal period and continue into childhood due to small mouth cavity, smaller upper jaw, weak lip tension and persistent tongue thrust.[11] Spoon feeding is more difficult due to sucking response remaining present.[11] A study found that in children with DS, 57% demonstrate pharyngeal dysphagia, 45% refuse foods based on texture, and 55% have negative behaviors associated with feeding.[11]
  - In addition to ADLs of dressing, feeding and grooming, toilet training is delayed.[26] The average age of toilet awareness begins at 3.8 years old and takes 1.9 years to complete toilet training.[25] Incontinence in previously trained children occurs in nearly half of children with DS up to approximately 11.1 years of age.[25] Voiding issues are further delayed by co-morbid problems such as: sleep disturbances, seizures, attention deficit hyperactivity disorder (ADHD), and lower cognitive function.[25]



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### Medical Considerations

- Additional medical considerations for children with Down syndrome:[27]
  - Intellectual disability ranging from mild to profound 100%
  - Hearing problems 75%
  - Vision problems 60%
  - Congenital heart disease 40–50%
  - Pulmonary arterial hypertension (with or without congenital heart disease) [28]
  - Obstructive sleep apnea [28]
  - Gastrointestinal atresias 12%
  - Thyroid disease 4–18%
  - Seizures 1–13%
  - Leukemia 1%
  - Atlantoaxial instability 1–2%
  - Autism 1%

## PTOT-13.5.4: Physical/Occupational Therapy Management and Intervention

- Medically based therapy is recommended to improve function, manage impairments and/or complex medical needs. Improvements in function lead to improved activity and participation. The age of the child, period of brain, bone, and muscle plasticity, type of interventions, dosage and participation have the greatest effect on outcomes.[29] Intensive, goal-directed or task-oriented interventions provided during critical periods of neuroplasticity are supported by current evidence.[30-35] Episodic based care is recommended when treatment is focused on reducing secondary impairments or occurs outside critical periods for progress or regression.[33, 36] Key definitions as defined by current evidence are:
  - Critical period is defined as a period when biological or physiological conditions make the client especially sensitive to certain environmental stimuli and when development of a new or lost skill is most likely. Critical periods for gross and fine motor development or skill acquisition following injury and surgeries are well established in the scientific literature. Current evidence supports that the period from birth to toddler years are a critical period for neuroplasticity and overall development.[29, 30, 32, 34, 37]
  - Episodic based care is a specific period of intervention targeting a patient's specific need with a definite beginning and an end date.[33, 38] Children with DS may require multiple episodes of care throughout their lifespan.[33, 38] Each episode should have a meaningful outcome and not simply be a continuation of goal setting.[39] "Researchers have found that short-duration, intensive, and episodic physical therapy models followed by rest periods resulted in higher adherence and improvement in motor performance, as well as both parents and therapists perceiving that the child attained their goals more rapidly. An episodic care approach also may be more amenable to parents of children with chronic conditions, who may prefer breaks between episodes of therapy to allow for a rest period and to participate in other community activities as opposed to receiving therapy for an indefinite length of time."[38]



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- Complex needs occur with an illness or disability that requires considerable external support to manage usual daily tasks; these complex needs may result from birth, illness or injury. Complex needs may include management of complex behaviors, monitoring equipment splints/orthotics/serial casting, external fixation devices, and monitoring of the client's health status related to oxygen monitoring, cardiac devices, enteral feeding devices, colostomy bags, intravenous catheters, dialysis, tracheostomy tubes, urinary catheters, skin integrity and augmentative communication devices.
- Progress is change that extends beyond measured quantity and its true value (i.e. measurement error), but rather on the identification of functional changes that make a real difference in the lives of patients and families.[40]
- Regression is the loss of an acquired function or failure to progress after a period of relatively typical development as the result of a recognized event, illness or environmental change.

**Commonly Used Pediatric Tests and Measures by ICF Domain**

| Assessment | Description |
|---|---|
| **Body Structure/Function** | |
| Basic therapy assessments | Examples: ROM, strength, BMI, blood pressure, pain, various joint integrity tests, etc. |
| Sensory | Infant/Toddler Sensory Profile - ages 7 to 36 months<br>Short Sensory Profile - ages 37 months to 9 years<br>Sensory Processing Measure - ages 5 to 12 years |
| Visual | Beery-Buktenica Developmental Test of Visual-Motor Integration (Beery VMI) – ages 2 to 18 years |
| Balance | Pediatric Balance Scale |
| **Activity** | |
| Gross Motor Function Measure – 88 (GMFM-88) [41] | ➢ Criterion-referenced test that has been specifically validated for Down syndrome<br>➢ Consists of 5 subscales, often identified by letters:<br>➢ Lying and rolling<br>➢ Sitting<br>➢ Crawling and kneeling<br>➢ Standing (> 3 yo only)<br>➢ Walking, Running and jumping (> 3 yo only)<br>➢ Test is sensitive to small changes and can determine if skills are advanced, age-appropriate or delayed compared to expected gross motor skills for a child with DS.<br>➢ Ages 5 months to 16 years |
| Timed Up and Go (TUG) [42] | ➢ Measures mobility, static and dynamic balance<br>➢ Times the amount of time it takes for child to rise from chair, walk 3 meters, return to chair and sit.<br>➢ Validated for children and adolescents with DS<br>➢ Minimal Detectable Change is 1.26 seconds [42] |
| Roll Evaluation of Daily Life (REAL) | ➢ Tests ADL and IADL in home, school, community<br>➢ Ages 2 to 18.11 years |

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| Assessment | Description |
|---|---|
| Bayley Scales of Infant Motor Development – III (BSID-III) [6] | ➢ Standardized, norm-referenced developmental assessment tool of adaptive behavior (communication, self-care, self-direction), cognitive, language, gross/fine motor and social-emotional skills<br>➢ Ages 1 to 42 months |
| Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT-2) [43] | ➢ Standardized, norm-referenced test of gross and fine motor proficiency in 8 subtests:<br>◆ fine motor precision<br>◆ fine motor integration<br>◆ manual dexterity<br>◆ bilateral coordination<br>◆ balance<br>◆ running speed and agility<br>◆ upper-limb coordination<br>◆ strength<br>➢ Provides 6 composite scores and one comprehensive measure of overall motor proficiency:<br>◆ Fine Manual Control<br>◆ Manual Coordination<br>◆ Body Coordination<br>◆ Strength and Agility<br>◆ Total Motor Composite<br>◆ Gross Motor Composite<br>◆ Fine Motor Composite<br>➢ BOT-2 is for children ages 4 to 21 years with none or mild to moderate intellectual disability |
| Peabody Developmental Motor Scales, Second Edition (PDMS-2)[44] | ➢ Standardized, norm-referenced test of early childhood motor development program.<br>➢ Assesses 6 subtests<br>◆ Reflexes<br>◆ Stationary<br>◆ Locomotion<br>◆ object manipulation<br>◆ grasping<br>■ visual-motor integration<br>➢ Ages birth up to 6 years |
| **Activity and Participation Measures** | |
| Goal Attainment Scaling (GAS)[45] | ➢ Is an individualized, goal-based, outcome tool for measuring change in performance and is more sensitive than standardized testing.[46]<br>➢ The literature supports the use of GAS in all pediatric settings for multiple reasons: it is client-centered, applicable to all health conditions and abilities, reliable, valid, and feasible.[47, 48] |
| Canadian Occupational Performance Measure (COPM)[45] | ➢ Patient and family centered outcome measure that identifies and prioritizes concerns encountered in everyday living.<br>➢ Includes domains of self-care, productivity and leisure in all settings (home, school, community)<br>➢ Measures performance and satisfaction |

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| Assessment | Description |
|---|---|
| Pediatric Evaluation of Disability Inventory (PEDI)[45] | ➢ Measures capability and performance of functional activities in self-care, mobility, social function as well as caregiver assistance and environmental modifications necessary for successful performance.<br>➢ Ages 6 months to 7.5 years |

**Admission Criteria**

- For those aspects of sensorimotor function for which there are standardized tests, significant dysfunction is commonly indicated by performance that is moderately to severely delayed or 1.5 standard deviations or more below the mean. Some states (Florida, Nebraska and Illinois) allow care for 1.0 standard deviation below the mean.
- Medical diagnosis; however presence of a medical diagnosis alone does not warrant admission.
- Findings indicate a periodic functional skills issue, in which a specific goal is likely to be obtained in a generally predictable time frame.
- Impaired motor skills/motor planning affecting functional ability.
- Identified deficit can be measured and progress demonstrated throughout the treatment plan.
- Home program development, education and training.
- Patient or caregiver training in medical, functional or adaptive equipment.

## PTOT-13.5.5: Discharge Criteria

- Discontinuation, termination, discharge or change to skilled maintenance should occur when:
  - The family's goals of treatment have been attained.
  - No measurable improvement towards the goals of treatment have occurred in one to six months depending on the frequency of treatment and individual's needs.
  - The degree of improvement is no longer functionally significant; or, when there is less than a 30% deficit on standardized testing. Functional significance requires:
    - the progression of skills occur during and outside of therapy sessions,
    - comprise a direct component of a functional task that was a goal of treatment; and,
    - indicate improvement in comparison to age norms.
  - Improvements are attributed to intrinsic growth and development rather than therapeutic intervention.



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## PTOT-13.5.4.2: Treatment Intensity and Frequency Guidelines

- Treatment intensity is associated with the potential for improvement, required skill level of the person delivering the intervention, and the amount of clinical decision making necessary to implement the intervention. [33] Briefly, the four treatment models for a pediatric setting include:
  - *Intensive therapy model*. Patient has potential for rapid progress towards goals. Rapid changes in condition necessitate frequent changes in treatment. Appropriate for patients in an extremely critical period for skill acquisition related to development or medical condition.
  - *Weekly/frequent therapy model*. Patient demonstrates continuous progress towards established goals. Requires frequent intervention for a limited duration to achieve functional skills or requires frequent revisions or updates of home program. Treatment may be 1-2 times per week or 2-3 times per month.
  - *Periodic/monthly therapy model*. Appropriate for patients not in a critical period for skill acquisition or at risk of regression.
  - *Consultative therapy model*. Appropriate when expertise is needed to identify problems or recommend a solution for a specific issue.

**Literature Summary of Interventions for children with Down syndrome in Physical and Occupational Therapy**

| Reference and Study Design | Oxford Level of Evidence | Intervention or Recommendation | Dosage |
|---|---|---|---|
| Valentin-Gudiol et al, 2017 Cochrane Systematic Review | 1 | **Treadmill Training:** It is strongly recommended that children with DS receive home-based treadmill training (provided by parent under instruction from therapist) at an early age to facilitate an earlier onset of walking. High intensity for 2-4 hours per week improves alternating steps and stepping over obstacles. Orthotics worn before walking onset and/or during treadmill training may hinder overall gross motor progress.[14] | Begin at 10 months of age and discontinue when child can take 3 independent steps |
| Lucas et al, 2016 Systematic review of RCT articles with meta-analysis | 1 | **Method of Intervention Delivery:** It is strongly recommended that interventions that are task-oriented and reinforced with a home exercise program are most effective for improving motor outcomes. Task-oriented are superior to traditional, process-oriented approaches.[34] | Varied between 1-3x/week for 6-12 weeks |
| Saquetto et al, 2018 Systematic review | 1 | **Whole-Body Vibration:** It is strongly recommended that children with low bone mineral density receive whole body vibration (WBV) which has positive effects on bone mineral density, body composition and balance.[9] | 3x/week for 5-10 minutes for 20 weeks |
| Sugimoto et al, 2016 Systematic review and meta-analysis | 1 | **Neuromuscular Training:** Neuromuscular training provided through physical exercises has large to moderate effects on general strength, moderate to small effects on maximal strength and small nonsignificant effect on functional mobility tasks in children with Down syndrome.[19] | Majority of articles utilized 2x/week for 10 weeks |

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| Reference and Study Design | Oxford Level of Evidence | Intervention or Recommendation | Dosage |
|---|---|---|---|
| Lopes et al, 2018 Systematic review | 1 | **Upper Extremity and Function testing:** Children with DS have underdeveloped learning processes which compromises developmental motor skills. This delay leads to delays in ADLs and functional independence. There is no consensus for the best method to objectively analyze upper extremity movement.[10] | n/a |
| Case-Smith et al, 2013 Systematic review | 1 | **OT – developmental (0-3yo) and visual-motor (3-5yo) interventions:** Effective occupational therapy interventions are well-specified protocols using dynamic systems theory and motor learning. Developmental and visual motor interventions result in small short-term effects and there is limited evidence for long-term effects. NDT – inconclusive evidence. When OTs use the child's and family's goals as focus of intervention, results are significant.[50] | n/a |
| Hardee & Fetters, 2017 Systematic review | 1 | **Exercise for ADLs:** Exercise is supported for ADLs and participation. Types of exercises included progressive resistive exercises, aerobic, individual/group classes. Intervention provided at the body structure/function level does not necessarily improve activity and participation.[4] | Majority of articles utilized 2x/week for 6, 8 or 10 weeks |
| Maïano et al, 2018 Systematic review | 1 | **Postural Control:** Children with DS may have less lower body static postural control than typically developing children. Visual and plantar cutaneous inputs affect static postural control more than hypotonia. It is recommended to determine the source of postural control issues, visual and plantar cutaneous inputs.[12] | n/a |
| Bertapelli et al, 2016 Systematic review | 1 | **Obesity:** Children with DS have higher rates of overweight and obesity than typically developing children. Exercise interventions for obesity prevention and control are insufficient to achieve weight or fat loss. It is strongly recommended that weight loss programs be multi-factorial interventions including parent support, family behavior, and physical activity education.[17] | Consultative visits over 6 months |
| Bishop et al, 2018 Scoping Review | 2 | **Family involvement:** It is strongly recommended that family engagement be encouraged in intervention delivery.[49] | n/a |
| Marchal et al, 2016 RCT n of 123 | 2 | **Developmental Testing:** Children with DS will attain developmental milestones, but it takes them nearly twice long. Development at age 2 yo is predictive of later function. It is recommended to perform developmental testing at ages: 6, 12 and 24 months. It is recommended to assess intelligence and adaptive function and motor skills at age 10.7 years.[6] | n/a |

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| Reference and Study Design | Oxford Level of Evidence | Intervention or Recommendation | Dosage |
|---|---|---|---|
| Gupta et al, 2011<br>RCT n of 23 | 2 | **Strengthening for balance:**<br>Children with DS receive who receive lower extremity progressive resistive strengthening training may improve strength and balance scores. Six weeks was sufficient to produce statistically significant difference through enhanced neural recruitment; however, 12 weeks are needed to increase muscle fiber size.[13] | 3x a week for 6-12 weeks |
| Smith et al, 2011<br>Mixed method n of 58 | 3 | **Gait Training:**<br>Pre-adolescent children with DS are more adaptive in their gait strategies and demonstrate closer to optimal walking than new walkers and adults. It is strongly recommended that gait training for new walkers include variability in speed, direction and terrain to promote adaptive use of gait variability.[15] | n/a |
| Bruni et al, 2010<br>Cross-sectional n of 75 | 3 | **Sensory Processing:**<br>It is recommended that children with suspected sensory processing difficulties have an appropriate sensory profile completed. It is recommended to teach parents strategies for managing sensory issues that impact ADLs. Strategies include: use of music to distract or calm, avoid environmental triggers, and use of visual schedule to help with transitions.[16] | n/a |
| Cardoso et al, 2015<br>Longitudinal study n of 32 | 4 | **Gross Motor Training:**<br>Gross motor skills decline with activities that require speed and dynamic postural adjustments. Children with DS are responsive to specific gross motor training. However, it is strongly recommended that these children are given opportunities to practice the activity in the community, school or recreation.[8] | n/a |

### Adjuncts to Physical/Occupational Therapy Management

- Educational and community-based programs
- Respite Care
- Behavioral intervention
- Vocational services
- Nutritionists
- Psychologists
- Speech-Language Pathologists
- Audiologists



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## PTOT-13.5.6: Transition to Adulthood

- Adolescents with DS experience disparity in transitioning to adult based services. A recent study indicates that that only 11% of adolescents with DS receive appropriate transition planning.[52] Transitioning includes shifting to an adult provider and empowering one to take responsibility for their care.[52] Transitioning discussions and process are recommended to start occurring at age 13 years.[52] This empowerment has been shown to lead to improved educational outcomes, participation in community, employment and quality of life.[52]

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# PTOT-13.6: Feeding Aversion

## PTOT-13.6.1: Definition

A patient, with adequate feeding/swallowing abilities, chooses to refuse oral consumption of food or liquids. Learned feeding avoidance behaviors that may have been related to a prior organic/ medical issue.[11]

## PTOT-13.6.2: Section intentionally left blank

## PTOT-13.6.3: Clinical Presentation

| Symptomatology | Possible consequence or cause |
|---|---|
| A feeding/swallowing evaluation reports swallowing abilities to be within normal limits, yet the patient is unable to consume appropriate foods/liquids for age and development<br>➢ Refusal by verbalizing/turning away/closing & covering mouth/refusal to swallow.<br>➢ Selectivity by food type/ flavor, color or texture<br>➢ Able to eat in one setting but not another<br>➢ Extreme gagging or vomiting during or after meals<br>➢ Spitting out food/ pocketing/ Emesis<br>➢ Behavior outbursts such as screaming, tantrums, or attempts to escape the feeding environment<br>➢ Throwing food/shut down | ➢ Autism[14,23]<br>➢ Cardiac Disease<br>➢ Cerebral Palsy<br>➢ Cleft Palate/Structural abnormalities<br>➢ Congenital Heart Disease<br>➢ Constipation<br>➢ Cystic Fibrosis<br>➢ Delayed Gastric Emptying<br>➢ Developmental Delays<br>➢ Down Syndrome<br>➢ Gastroesophageal Reflux Disease (GERD)<br>➢ Genetic Syndromes<br>➢ Hearing related difficulties<br>➢ History of Dysphagia resulting in a fear of feeding/swallowing<br>➢ Premature Birth<br>➢ Previous placement of a Tracheotomy<br>➢ Pulmonary Disease<br>➢ Respiratory Difficulties<br>➢ Sensory Disorder[12]<br>➢ Surgical procedures affecting swallowing<br>➢ Oral Motor Dysfunction<br>➢ Behavioral Disorder (accounts for 43% of feeding disorders)[22]<br>➢ Cardiorespiratory (accounts for 34% of feeding disorders)[22]<br>➢ Mechanical/ Structural (accounts for 53% of feeding disorders)[22]<br>➢ Metabolic Disorders (accounts for 12% of feeding disorders)[22]<br>➢ Neurological Disorders (accounts for 62% of feeding disorders)[22]<br>➢ Serious feeding difficulties requiring medical intervention occur in 3–10% of children[22] |
| Extreme gagging or vomiting during or after meals | ➢ Delayed Gastric Emptying<br>➢ Food Allergies (including Celiac Disease)<br>➢ Gastroesophageal Reflux Disease (GERD)<br>➢ Sensory Disorder |

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| Symptomatology | Possible consequence or cause |
|---|---|
| Behavior outbursts such as screaming, tantrums, or attempts to escape the feeding environment | ➢ Food Neophobia<br>➢ Sensory Disorder |
| Low percentile for weight on the chart for the National Academy of Pediatrics | ➢ Nutritional Effects<br>➢ Ongoing need for enteral or parenteral nutrition<br>➢ Prolonged status of inadequate caloric intake |
| Growth Deficiency | ➢ Dehydration<br>➢ Growth Hormone Deficiency<br>➢ Nutritional effects<br>➢ Ongoing need for enteral or parenteral nutrition<br>➢ Prolonged status of inadequate caloric intake |
| Failure to Thrive | ➢ Caregiver abuse or neglect<br>➢ Primary or secondary caused by limited food exposure in early development |
| Food Allergies/ Associated Pain with Eating | ➢ Celiac Disease<br>➢ Eosinophilic Esophagitis (EoE)<br>➢ Food Protein-Induced Enterocolitis Syndrome (FPIES)<br>➢ GERD<br>➢ H. Pylori (Bacterial Infection)<br>➢ Short Gut Syndrome |
| Sensory | ➢ Autism Spectrum Disorder (ASD)<br>➢ Intellectual Deficits with difficulty with motor planning & flexibility[14]<br>➢ Muscle weakness in face and/or neck<br>➢ Neurological/Sensory Memory with past experiences<br>➢ Over-respond to presence of foods that trigger avoidance<br>➢ Sensory processing deficits: Auditory/ visual/ gustatory/ olfactory/tactile/ vestibular/ proprioceptive. Research showed tactile and taste/ smell were main factors.[22] Sensory deficits affect pre-oral phase/ swallow.[12]<br>➢ TBI |
| Social/ Emotional/ Environmental | ➢ Avoidant Restrictive Food Intake Disorder (ARFID)<br>➢ Child that experiences a trauma such as: infantile anorexia<br>➢ possibly secondary to force feeding/anxiety<br>➢ Difficult parent-child interactions at meal times<br>➢ Food Neophobia[23]<br>➢ Peer/Social Influence[23] |
| Medication Side Effects | ➢ Lethargy/Decreased Appetite |



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## Typical vs Atypical Characteristics

| Typical (Picky Eater) | Feeding Aversions |
|---|---|
| ➢ Limitations in number of foods; likes specific foods but will eat at least one food from most food texture or nutrition groups | ➢ Restricted range or variety of foods<br>➢ Significantly reduced food repertoire – refuses to eat entire categories of food types or textures (Less than 20) |
| ➢ Slow to try new foods | ➢ Avoids one or more food groups<br>➢ May avoid all vegetables which may be perceived as having a bitter flavor (genetic difference in ability to detect bitter flavor)23 |
| ➢ Like some food in particular ways (brand specific/ restaurant specific) | ➢ Unusual aversions or fear surrounding foods |
| ➢ Food jag (eats one particular food/ or small group of food preferences at each meal). The food jag will end on its own after a short period of time. Following food jag, will return to previously eaten foods. (ASHA Leader Blog 6/12/14 Melanie Potock-Preventing Food Jags what's a parent to do) http://blog.asha.org/2014/06/12/preventing-food-jags-whats-a-parent-to-do/) | ➢ Foods lost to food jags are NOT regained after taking a break |
| ➢ Can tolerate new food on their plate (may be reluctant and/or respond with negative behaviors | ➢ Demonstrates sensory aversion to new/ non-preferred foods on plate or table<br>➢ (Complete refusal/ "cries & falls apart") |
| ➢ Can usually touch or taste new foods | ➢ Will not tolerate sensory input related to new foods |
| ➢ Will not typically starve themselves or make themselves ill | ➢ May starve themselves or make themselves ill, may find comfort in a hungry state11 |
| ➢ May eat different foods than family but will eat with the family | ➢ May refuse to eat meals with family and almost always eats different foods than the family. Altered eating schedule or patterns |

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**Normal Development:**

- **Swallowing Phases:** (http://www.asha.org/Practice-Portal/Clinical-Topics/Pediatric-Dysphagia/)
  - Oral Preparation Stage—preparing the food or liquid in the oral cavity to form a bolus including sucking liquids, manipulating soft boluses, and chewing solid food.
  - Oral Transit Phase—moving or propelling the bolus posteriorly through the oral cavity.
  - Pharyngeal Phase—initiating the swallow; moving the bolus through the pharynx.
  - Esophageal Phase—moving the bolus through the cervical and thoracic esophagus and into the stomach via esophageal peristalsis.
- Dysphagia can occur in any phase of the swallow. Although there are differences in the relationships between anatomical structures and in the physiology of the swallowing mechanism across the age range (i.e., infants, young children, adults).

**Three developmental feeding periods: [23]**

1. Nursing period
2. Transitional feeding period
3. Modified adult feeding period

**General Feeding Information:**

- "Feeding and swallowing disorders (also known as **dysphagia**) include difficulty with any step of the feeding process—from accepting foods and liquids into the mouth to the entry of food into the stomach and intestines. A **feeding** or **swallowing disorder** includes developmentally atypical eating and drinking behaviors, such as not accepting age-appropriate liquids or foods, being unable to use age-appropriate feeding devices and utensils, or being unable to self-feed. A child with dysphagia may refuse food, accept only a restricted variety or quantity of foods and liquids, or display mealtime behaviors that are inappropriate for his or her age." (http://www.asha.org/Practice-Portal/Clinical-Topics/Pediatric-Dysphagia/)
- "In the second year, toddlers consume a diet that resembles their families' preferences. Introduction of a variety of nutritious foods and flavors is important during both the transitional and modified adult periods as younger toddlers are initially more accepting of novel foods compared to preschool children, who may be reluctant to try new foods. The **reluctance to try new foods is low at weaning and rapidly rises to a peak between 2 and 6 years,** with considerable variability."[23]
- "The most important phase for learning food preferences and appetite control may be the beginning of complementary feeding (CF). Infants discover the sensory (texture, taste and flavor) and nutritional properties (energy density) of foods that will ultimately compose their adult diet."[13]



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- "Learning to eat has to occur quickly, in particular because the mode of feeding evolves dramatically during the **first thousand days (3 years) of life**, from "tube" feeding through the cord in utero, through oral feeding with milk after birth, complementary feeding (CF) around mid-course of the first year, until eating family foods by the end of the first year. After this period, Neophobia/ fussiness start peaking and introduction of new foods becomes more difficult."[13]
- "About a quarter of infants experience difficulties with pieces in foods, but such difficulties should not drive parents to delay introduction of more solid textures, since **delaying introduction to lumpy foods beyond 10 months is associated with texture acceptance problems at later ages."[13]**
- "Mild feeding difficulties occur in up to 25–45% of healthy children and 80% of children with developmental delays or chronic disease. Serious feeding difficulties requiring medical intervention occur in 3–10% of children."[22]

**Findings**

- Goals of a Feeding Aversion Evaluation
  - Examination for possible causes or contributing factors to the complaint. A referral to appropriate medical professional if the patient presents with signs or symptoms of behavioral or physiological factors that impact the patient's swallowing/ feeding status. Common diagnoses are Gastroesophageal Reflux Disease, Developmental Delays, Sensory Disorders, and Surgeries or procedures affecting swallowing such as a tracheotomy.
  - To determine how feeding aversion impacts the patient's ability to maintain adequate nutrition and hydration.
- Scope of a Feeding Aversion Evaluation
  - The evaluation and subsequent treatment must be conducted by a licensed Occupational Therapist.
    - Case/Feeding History including reports from a team approach of family members, teachers, and medical professionals involved in the patient's care. Case history should also include if inadequate caloric intake was reported by a treating physician.
    - Observation of the patient eating and drinking with age appropriate or developmentally appropriate utensils. A narrative including strengths and weaknesses of the observed feeding/swallowing skills should be included.
    - Oral motor assessment including an assessment of muscles and structures needed for appropriate feeding/swallowing skills to determine if oral motor deficiencies are present.
    - Collect detailed information about home environment and various factors related to feeding.
    - Consultation from a registered dietician/nutritionist as needed to determine nutrition and hydration needs.



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| | |
|---|---|
| **Objective Measures** | ➢ Mealtime Behavior Questionnaire*<br>➢ About Your Child's Eating -R*<br>➢ Child Development Inventory<br>➢ Pediatric Symptom Checklist<br>➢ The Behavioral Pediatrics Feeding Assessment Scale (BPFAS)<br>➢ The Child Eating Behavior Inventory (CEBI)<br>➢ The Children's Feeding Assessment Questionnaire (CFAQ)<br>➢ The Feeding Scale<br>➢ Mealtime Observation Schedule (MOS)<br>➢ Brief Autism Mealtime Behavior Inventory (*BAMBI)*<br>➢ Examples of parent-friendly feeding checklists can be found in Bahr's (2010) parent book, Nobody Ever Told Me (or My Mother) That!: Everything from Bottles and Breathing to Healthy Speech Development.<br>➢ The Developmental Pre-Feeding Checklist (Morris & Klein, 2000, pp. 697–711) is widely used by feeding specialists. It is research-based and reflects typical feeding development from birth to 2-years of age<br>➢ Sensory Profile<br>➢ PEDI<br>➢ REAL |
| **Feeding Observation** | ➢ Type of food presented<br>➢ Quantity of solids & liquids consumed daily<br>➢ Method of presentation<br>➢ Meal process/structure<br>➢ Child reaction to food presentation<br>➢ Parent response to feeding behaviors<br>➢ Outcome of feeding behaviors |
| **Team Collaboration** | ➢ Pediatrician, Developmental Pediatrician<br>➢ Speech Language Pathologist<br>➢ Gastroenterologist, Otolaryngologist, ENT/Allergist/Pulmonologist<br>➢ Behavioral Therapist, Psychologist<br>➢ Nutritionist, Dietician<br>➢ Nursing, Social Workers<br>➢ Teachers, Paraprofessionals<br>➢ **Parent Participation**- Key factor for progress & carryover[16] |



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## PTOT-13.6.3: Admission Criteria

### Birth to 6 years[16]

- If the caloric intake is not sufficient, the following factors should be considered:
  - Oral motor weakness or structural impairment
  - Conditions that may cause consistent loss of calories through vomiting
  - Conditions that may cause muscle weakness
- If the patient's caloric intake is sufficient, but growth deficiency is still evident, the following factors should be considered:
  - Medical conditions that affect caloric absorption
  - Not consuming a balanced diet
- If caloric intake is sufficient, and growth is appropriate for development, one or more the following conditions must be present for approval of feeding/ swallowing therapy:
  - The patient currently has a G-tube or is participating in a G-tube weaning program
  - The patient is at risk for placement of a G-tube secondary to falling below the 10th percentile on the Growth Chart for the National Academy of Pediatrics
  - The patient currently consumes supplemental nutrition
  - Chronic food refusal with limited variety of food group consumption[15]
  - Failure to advance textures[15]
  - Inappropriate mealtime behaviors (ex: throwing food, grazing patterns of eating, etc.)[15]
  - Sensory disorders that affect typical developmental feeding progression or swallowing phases[12]

### 7 - 18 years[16]

- Indication for skilled intervention is dependent on multiple documented factors:
  - Prior treatment received: Duration, intensity, progress, carry over, number of episodes of treatment, gaps in episodes of treatment, etc.
  - Severity of the nutritional deficit, as documented by a physician or dietician
  - Current potential for progress: Rationale that indicates client potential for progress that differs from prior status
  - Patient commitment/ desire to participate
  - Family participation and carryover
  - Community support



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## PTOT-13.6.4: Management

- Management of this condition will vary depending upon the patient's individual need.
  - Development of a treatment plan to increase the types, textures, and amounts of food and liquids accepted by the patient.
  - Development of age appropriate feeding skills/ mealtime routines in the least restrictive environment possible.
  - Behavior and sensory modification techniques to extinguish unwanted behavioral responses toward feeding.
  - Team collaboration between a variety of disciplines including Speech Language Pathologist, Behavioral Therapist, Nutritionist/Dietician, primary care physician, Gastroenterologist, and other treating providers.
  - The provider MUST clearly document extensive caregiver training, participation, and carryover into the patient's daily living activities. (Food intake journal, environmental adaptations, behavioral response chart, etc).

| Treatment Options | Approaches to Treatment |
|---|---|
| **Evidence Based Techniques** | ➢ Pre-Chaining and Food Chaining© Therapy Programs<br>➢ Pre-chaining focuses on a treatment program to keep the child as close to the developmental progression of oral skills as possible during the first year of life<br>➢ Food chaining© is a systematic method for the treatment of children with food selectivity and aversive eating behaviors<br>➢ Sequential Oral Sensory Approach to Feeding (The S.O.S. Approach): Children proceed hierarchically, tolerating, interacting with, smelling, touching, tasting, and eventually eating novel foods<br>➢ Talk Tools Oral Placement Therapy®: focuses on techniques to add a tactile component to feeding and therapy, enabling clients to "feel" the movements necessary for the development of feeding and speech clarity [35]<br>➢ The Transdisciplinary Effect Assessment and Treatment (TR-eat™) model: a collaborative treatment model for children with complex feeding problems that blend behavioral principles with oral motor therapeutic skills to address difficult feeding problems [36] |

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| Treatment Options | Approaches to Treatment |
|---|---|
| **Intervention Strategies** | ➢ Provide visuals<br>➢ Reduce linguistic load<br>➢ Offer choices<br>➢ Address sensory processing concerns<br>➢ Offer reinforcers to increase motivation<br>➢ Behavior Strategies: Differential attention, Positive reinforcement, Escape extinction/ escape prevention, Stimulus fading, Simultaneous presentation, Differential reinforcement of alternative behavior (DRA), Use of a flipped spoon as a presentation method,[15] shaping, modeling, first/ then token system. Research shows that escape extinction and differential reinforcement significantly increase acceptance of non-preferred food[16]<br>➢ Oral motor and oral placement strategies[15]<br>➢ Repeated exposure to novel/non-preferred food.[15] Being exposed repeatedly to a food is the primary factor that determines its acceptance.[13] It is recommended that a child be exposed 10 to 15 times to a previously unfamiliar or non-preferred food to increase intake for children with feeding difficulties.[15] |

## Considerations

- A proactive, family-centered approach (particularly in the first three years[5] could prevent many feeding disorders because parents, caregivers, and professionals will know what skills to encourage, when to encourage them, when a child is going "off track," and when to refer a child to a feeding specialist.[13]
- Research indicates that the optimal time for feeding aversion intervention is by age 6.[16]
- Treatment should be:
  - Multi-disciplinary approach. The Speech and OT treatment plans must focus on different aspects of care.
  - Episodic & periodic in nature
  - Progress should be reported at least every 3 months
  - Typical duration of up to 1 year. (If has G-tube status with no prior oral intake may take up to 2 years).
  - Ongoing parent involvement is required
  - Frequency and intensity of skilled services should vary along with care moving from direct to indirect services over the continuum of care



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## PTOT-13.6.5: Discharge Criteria

- The patient has acquired age appropriate feeding/swallowing skills. Patient is consuming adequate amount and variety of food groups to support developmentally appropriate growth.
- The patient has not shown progress towards reasonable goals, and has reached a plateau.
- Caregivers are able to independently carryover the treatment plan in the home environment to support continued progress.
- The goals do not require the skills of a certified therapist. (The strategies are now repetitive in nature without needing ongoing changes to the treatment plan).
- The goals are duplicative in a nature to another therapist's current treatment plan.

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# PTOT-13.7: Idiopathic Toe Walking

## PTOT-13.7.1: Definition

Idiopathic toe walking (ITW) is a pathological gait pattern, due to unknown cause, for children who persistently ambulate on bilateral tiptoes after age 2 years.[1] ITW applies to children who have no signs of neurological or orthopedic conditions.[2] Toe walking, habitual toe walking, achilles tendon tightness and congenital short tendon calcaneus may be used to describe ITW.[3] ITW is characterized by an absent or limited initial contact (heel strike) during gait and weight bearing occurring only on the forefoot.[1]

## PTOT-13.7.2: Target Populations

**Inclusions:**[1,4-7]

- Ages 2-21 years
- Toe walking for at least 6 months
- Toe walking for more than 25% of the time
- No signs or evidence of underlying neurological or orthopedic conditions
- May have neuropsychiatric comorbidities such as ADHD, sensory processing disorder, cognitive and/or language delays

**Exclusions:**
Although many conditions are associated with toe walking, ITW specifically excludes:[3,8]

- Autism Spectrum Disorder
- Cerebral Palsy
- Congenital talipes equinovarus (clubfoot)
- Muscular Dystrophy
- Spinal Muscular Atrophy
- Spina Bifida
- Unilateral toe walking from injury or trauma

**Target Users:**

- Physical Therapists
- Occupational Therapists

**Physicians**

- Parents or Caregivers

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### Differential Diagnosis[1]

- Genetic Sensorial Neuropathy Type I
- McArdle Disease
- Autism Spectrum Disorder

## PTOT-13.7.3: Clinical Presentation

### Overview of ITW

Toe walking may develop temporarily in early ambulation, but it is considered abnormal in healthy children after the age of two years.[4] ITW is a diagnosis of exclusion for persistent pathological gait pattern characterized by bilateral forefoot weight bearing without heel contact which may lead to ankle injuries, tripping, falling, pain and contractures of the gastroc-soleus complex.[1] It is estimated that ITW occurs in 7 to 24 % of the population and is more common in boys than girls.[9]

The cause of ITW continues to be investigated. Research demonstrates a family predisposition since nearly half of children have one or more relatives with a history of ITW.[5,9] Children with complications during or after birth have a greater incidence of ITW.[10] Electromyography studies indicate that the gastrocnemius and anterior tibialis muscles synergies are out of sync during the gait cycle.[11] In children who toe walk, the gastrocnemius has a greater ratio of type I muscle fibers than type II.[3] Current research indicates that children with ITW process sensory input differently (such as vibration) than children without ITW, however, the evidence is not strong enough to demonstrate a causal relationship with sensory processing disorder.[12]

Children with ITW often demonstrate immature characteristics such as constant running instead of modulating a walking pace, jumping or hopping rather than coordinated stepping and avoidance of controlled eccentric transition movements.[13] The imbalanced biomechanics of dorsiflexion and plantarflexion lead to a failure in achieving proper upright posture causing the trunk to lean forward and place weight bearing on the forefoot.[13]

Some children with ITW may demonstrate a normal gait temporarily when requested or while concentrating on walking.[11] Evidence indicates that half of all children with ITW will self-correct by age 5.5 years, but it is impossible to predict those who will or will not self-correct.[5] Therefore, conservative treatment is recommended as early as possible to prevent musculoskeletal disorders such as: development of plantarflexion contracture, excessive pelvic tilt, genu valgum, genu recurvatum or external tibial torsion.[13]

### Normal Gait Development

Children learn to walk independently at various ages. According to the World Health Organization, the mean age is 12.1 months but may be as early as 8.2 months or as late as 17.6 months before walking is considered delayed.[14] Toddlers initially walk with stiff legs and flat feet using a low walking speed, high cadence, short step length, wide base of support and prolonged double support.[3,13,15] This immature gait pattern relies on simultaneous hip and knee flexion during swing, no gastroc-soleus power at the ankle during push off and incomplete hip and knee extension during stance.[13]



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Within 6 months of independent walking, a toddler's gait matures through postural control integration with dynamic mobility.[16] During this time, a toddler may walk on their tiptoes but should develop consistent heel strike around 18 months of age.[3] Children continue to fine tune their gait as they grow. By age 3 to 4 years, children walk with a more adult gait pattern.[16] Mature gait is characterized by the weight bearing which begins at heel strike (initial contact) and is transferred forward through the ankle during mid-stance and ends with forefoot push-off (toe off). There is controversy in the literature regarding the age at which a mature gait is achieved. Some researchers report mature gait at 5 to 7 years, while others cite 7 to 8 years, while others indicate gait is not mature until adolescence.[13,15-17]

## PTOT-13.7.4: Physical/Occupational Therapy Management and Intervention

**Assessment includes: [18]**

| Recommended Tests | Significance |
|---|---|
| Range of Motion | ➢ Passive dorsiflexion in subtalar neutral with knee extended and flexed<br>➢ Active dorsiflexion with knee extended |
| Gait Analysis | ➢ Percentage of time ankle is in plantarflexion during stance and/or swing<br>➢ Lack of 1st, 2nd, 3rd ankle rockers<br>➢ Premature heel rise<br>➢ Knee hyperextension during stance<br>➢ Increased anterior pelvic tilt, lumbar lordosis and/or increased hip flexion |
| Neurological exam | ➢ Assess muscle tone |
| Strength | ➢ Anterior tibialis<br>➢ Gastrocnemius |
| Integument | ➢ Presence of calluses, bunions or redness |
| Pain | ➢ Age appropriate pain scale |
| Gross Motor Skills | ➢ Squatting<br>➢ Transition to/from floor and standing<br>➢ Stairs<br>➢ Balance<br>➢ Jumping<br>➢ Coordination |
| **Additional Screenings** | **Tools** |
| Sensory Processing | ➢ Short Sensory Profile |
| Speech and Language | ➢ *Ages and Stages* Communication section |

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**Management and Intervention**

ITW treatment methods and timing are controversial.[3] Conservative management of ITW may include: muscle stretching/strengthening, ankle joint manipulations, motor control interventions, auditory feedback, orthotics, night splints, serial casting, changes in sensory input (such as vibration, different flooring surfaces), and botulinum toxin A injections.[3] The effectiveness of conservative treatment depends on the age of child, degree of gastroc-soleus contracture and the percentage of time spent toe walking.[18] However, current evidence indicates that motor control interventions applied alone are ineffective in correcting ITW.[13] Surgery is reserved for older children who have failed conservative treatment and present with ankle/foot pain and fixed contractures.[3]

The levels of evidence for ITW management strategies to achieve normal heel-toe gait are: surgery [4] (high), serial casting [19] (moderate), orthotics [20] (moderate), Botox [21] (very low), and motor control interventions only[13] (low).

The priorities of ITW management are to obtain 10° of dorsiflexion, strengthening core and lower extremities, balance training, gait training with articulating AFOs and implementation and monitoring of a home exercise program (HEP).[18]

**Intervention/Treatment and Frequency**

It is recommended that conservative treatment be initiated when there are limitations in dorsiflexion PROM or AROM, decreased dorsiflexion strength, gait abnormalities or decreased balance.[18]

| Initial Presentation ROM is measured in subtalar neutral & with knee extended | Treatment | Frequency and Duration | Goals |
|---|---|---|---|
| ≤ 0° or neutral DF PROM | Serial Casting | Weekly for 6 weeks | 10° of DF PROM |
| 0° to 5° of DF PROM | Emphasis: Prolonged stretching using night splints and HEP<br><br>Additional treatment (tx) options: manual therapy, joint mobilizations, standing balance | Bi-weekly PT to monitor HEP for 4 to 6 months<br><br>(consider serial casting if after 4-6 months tx only obtains 0° to 5°) | 10° of DF PROM |
| 5° to 10° of DF PROM | Night splinting progressing to daytime articulating AFOs<br><br>Additional tx options: stretching, strengthening, manual therapy, joint mobilizations, balance training, augmented auditory feedback, gait/treadmill training, HEP | Bi-weekly PT to monitor HEP for 4 to 6 months | 10° of DF PROM<br><br>Heel-toe gait<br><br>Improve balance skills |

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| Initial Presentation ROM is measured in subtalar neutral & with knee extended | Treatment | Frequency and Duration | Goals |
|---|---|---|---|
| ≥10° of DF PROM | Articulated AFOs for daytime use<br><br>Additional tx options:<br>possible night splints, stretching, strengthening, manual therapy, joint mobilizations, gait/treadmill training, auditory feedback, HEP | Monthly PT to monitor HEP for 4 to 6 months | Maintain or increase DF ROM<br>Increase heel-toe walking to 75% of the time |

- Frequency may be adjusted due to progress or lack of progress with tx and HEP.
- Plateaus or regression in ROM and/or ITW may occur during growth spurts, anxiety, illness, fatigue or lack of follow through at home. During these times, HEP is essential. Therapy reassessment may be needed after resuming HEP for 4 weeks.
- PT follow up for orthotic management may be needed periodically.

(Table extrapolated from LeCras S, et al. 2011)

**Risks and Benefits**

The risks associated with serial casting, AFOs, night splints are compromised skin integrity.[18] Botox and surgery carry inherent risks; however, surgery may lead to over lengthening of the gastrocnemius and/or sural nerve damage.[4]

Benefits of early identification and management of ITW may decrease loss of ankle range of motion, contractures, postural imbalances, pain and improve development of a normal gait pattern, thus decreasing the need for invasive treatments.[18]

**Expected Outcomes**

The expected outcome of ITW intervention is an increase in dorsiflexion to obtain heel strike 75% of the time or greater during gait without AFOs.[18]



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## PTOT-13.7.5: Discharge Criteria

Termination of therapy services should occur when:[18]

- Non-compliance of child and/or caregiver,
- Ankle dorsiflexion is maintained at greater than or equal to 10° for 6 months with home exercise program,
- Heel-toe ambulation occurs in greater than 75% of unprompted gait without AFOs,
- Gross motor skills are maximized and/or age-appropriate normal, and
- Independence is demonstrated in home exercise program.

### When to Refer[18]

| Condition: | Refer to: |
|---|---|
| Sudden onset of toe walking or unilateral toe walking | Neurologist or Orthopedist |
| Signs or symptoms of Autism Spectrum Disorder | Developmental Pediatrician |
| Signs or symptoms of neuromuscular involvement | Neurologist or Physiatrist |
| Congenital Orthopedic condition | Orthopedist |

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# PTOT-13.8: Pediatric Intoeing

## PTOT-13.8.1: Definition

- Pediatric in-toeing is defined as when the feet turn inward instead of pointing straight ahead during walking or running in typically developing children of less than 8 years old.[1] In-toeing is the medical term used for what is commonly referred to as pigeon-toed.[1]

## PTOT-13.8.2: Target Populations

### Inclusions:[2]

- Typically developing children of less than 8 years old
- Walking or running with toes pointed inward

### Exclusions:[2]

- Cerebral Palsy
- Spina bifida
- Slipped capital epiphysis
- Legg Calve Perthes disease
- Clubfoot
- Children with neurological disorders

### Target Users:

- Physical Therapists
- Occupational Therapists
- Physicians
- Parents or Caregivers

### Differential Diagnosis

- Hip dysplasia[3]
- Idiopathic clubfoot[1]
- Congenital talipes equinovarus[1]



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## PTOT-13.8.3: Clinical Presentation

### Overview of Intoeing

- Intoeing is a common childhood gait pattern where the feet, and sometimes both legs, face each other.[2] In addition to the aesthetics of an intoeing gait pattern, other signs and symptoms may include: frequent tripping, clumsiness, and fatigue like pains in legs or low back at the end of the day.[2] Intoeing occurs in approximately 5.9% of the population and is more prevalent in girls than boys by a 2.4 to 1 ratio.[4] Children who W-sit are also more prone to intoeing.[4]
- The majority of intoeing concerns are due to normal growth variants that resolve on their own by age 8 years.[1,2,5-7] It is estimated that 95% of intoeing cases self-correct by age 8 years.[6] However, this condition is worrisome to parents and may result in unnecessary referrals to pediatricians, orthopedic specialists and physical therapists.[5,7,8]
- Although limited, Current evidence indicates that conservative treatment such as stretching, exercises and bracing for in-toeing, is not necessary or effective and may even be harmful. [2,6,7,9] High level evidence recommends that children under the age of 8 years be evaluated for the cause of intoeing and proper caregiver education be provided through consultative visits.[2,3,6,7,10] Children who experience limping, progressive intoeing, unilateral intoeing, swelling or pain with gait should be referred to an orthopedic surgeon.[1,3]
- Surgical osteotomies are reserved for older children (greater than 8 years old) that demonstrate severe intoeing and are usually performed for cosmetic and not prophylactic reasons.[3,7,11]

### Causes of Pediatric Intoeing

- Intoeing is caused by twisting or torsion of the leg at any level: foot (metatarsus adductus), tibia (internal tibial torsion), or the hip (femoral anteversion).[3] Due to skeletal growth, the age of the child may provide clues to the cause of intoeing. Intoeing in infants is usually from metatarsus adductus, in toddlers the cause is typically internal tibial torsion and in children less than 10 years the cause is usually femoral anteversion.[1,3]

### Metatarsus Adductus:

- Also known as metatarsus varus.[9]
- The forefoot is adducted and the lateral border of the foot curved or convexed.[9]
- Differs from clubfoot since the heel is not in equinovarus.[9]
- May be present at birth due to intrauterine crowding or as a result of sleeping in prone with feet tucked under buttocks.[6]
- Severity is measured by flexibility of holding the heel in neutral and abducting the forefoot.[6]
  - Grade I the forefoot passes neutral position

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- Grade II the forefoot achieves neutral
- Grade III the forefoot is unable to passively achieve neutral.[6]

- Grades I and II typically resolve by 12 months, whereas Grade III may need 6 weeks of serial casting.[6]

**Internal Tibial Torsion:**

- Internal twisting of the tibia may occur before birth due to intrauterine crowding.[1]
- Is most noticeable once a child begins to walk.[6]
- As the child grows taller, the tibia untwist.[1]
- Is the most common cause of intoeing in children ages 1 to 5 years.[12]
- Is often asymmetrical and tends to affect the left foot more often than the right foot.[6]
- 95% of all children with internal tibial torsion resolve without treatment by the age of 8 years.[6]
- Residual deformities have not been shown to affect running, jumping or the risk of future arthritis.[6]
- Treatment of tibial torsion (such as stretching, orthotics, bracing) in an infant or child is not supported by current evidence.[1-3,6,9]

**Femoral Anteversion:**

- Internal rotation of the femur may also be described as excessive femoral torsion.[1]
- The upper end of the femur is twisted which allows the hip to turn more inward.[1]
- Both the knees and feet turn inward during walking.[1]
- Often runs in families.[6]
- Usually bilateral.[6]
- Child will prefer to W-sit.[1]
- Spontaneously corrects as children grow older.[1]
- Special shoes, braces and exercises are unnecessary.[1]
- Surgery is not considered until after age 9 to 10 years.[1]

**Cultural Considerations**

- Children who are from cultures that spend time kneeling on the floor with legs internally rotate have an increased incidence of tibial torsion prevalence throughout their life.[13] This may lead to degenerative arthritis later in life.[13]



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## PTOT-13.8.4: Physical/Occupational Therapy Management and Intervention

- Physical and Occupational Therapy for intoeing is limited to reassuring parents or caregivers that in-toeing will self-correct. Parents need to be educated in the natural progression of intoeing and activities to avoid, such as kneeling and W-sitting.[1,2,6] Treatment consisting of bracing, night splints, twister cables, orthotics, special shoes and/or exercise are contraindicated by current evidence. [1-3,6,9]

| Assessment | Significance |
|---|---|
| Age of onset for intoeing gait [3] | Assists with determining root cause of intoeing |
| Forefoot alignment | To determine metatarsus adductus |
| Foot Progression Angle (FPA) is the angle formed by the line of progression (direction of gait) and foot print bisection line through 2nd toe [2] | Normal range -3° to +20° (negative indicates intoeing)<br>Measurement greater than 2 SD is an abnormal FPA |
| Thigh-Foot Angle is the angle between the foot and thigh axis in prone with knee flexed to 90° [6] | Mean is 10° (norm -5° to 30°)<br>Negative angles less than -5° indicate intoeing and positive angles indicate out toeing |
| Hip Internal and External ROM measured in prone [6] | Mean ER is 45°<br>Mean IR is 50° for boys and 40° for girls<br>>45 degrees IR in newborns and >15 IR in children 8 or older can be indicative of intoeing |

### Risks and Benefits

- Physical and Occupational Therapy consultative visit(s) may provide parent or caregiver reassurance and education on the natural progression of intoeing. [1,2,6] Yearly consultative visits with physical or occupational therapist may be beneficial in monitoring intoeing for abnormal progression and for referring children to orthopedic surgeons. Treatments of lower extremity exercises, stretches, bracing, orthotics and special shoes are clearly contraindicated by the evidence. [1-3,6,9]

### Expected Outcomes

- Intoeing spontaneously resolves without treatment by age 8 years. [1,2,5-7]

### Treatment Intensity and Frequency Guidelines

- Consultative therapy model is appropriate when expertise is needed to identify problems or recommend a solution for a specific issue such as frequent tripping, and to monitor the severity of in-toeing. If in-toeing persists after age 8 years, the child must be referred to a pediatric orthopedic physician.

### When to Refer to a pediatric orthopedic physician: [9]

- Abnormal muscle tone warrants further testing
- Limited hip abduction and leg length discrepancy
- Pain with ambulation
- Unilateral intoeing

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- Intoeing after age 8 years

## PTOT-13.8.5: Discharge Criteria

- Termination of therapy services should occur when:
  - Goals of treatment have been attained
  - The degree of improvement is no longer functionally significant.

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# PTOT-13.9: Neuromuscular Disorders

## PTOT-13.9.1: Definitions

- **Neuromuscular disorders** are a heterogeneous group consisting of several different types, varying age of onset, and severities, that result from structural, genetic, endocrine, metabolic, toxic exposure or inflammatory pathologies.[1] These disorders may cause static or progressive impairments that threaten structural integrity and/or functional capabilities. Static or non-progressive neuromuscular disorders may include, but are not limited to: cerebral palsy, spina bifida, acquired or traumatic brain injuries, complications associated with prematurity, brachial plexus injury, drug or poison toxicity, and genetic disorders.
- **Cerebral palsy** (CP) is an overarching term that covers various types of pathology. Cerebral palsy is a permanent disorder of movement and posture, which often include disturbances of sensation perception, cognition, communication, behavior and secondary problems, resulting in activity limitations. CP is one of the most common causes of childhood disability with a prevalence of 2.11 per 1000 births worldwide and estimated 2 to 3 per 1000 births in the United States.[3] Although there are significant improvements in survival of preterm infants, which is a direct risk for CP, the incidence of CP remains stable for the past 50 years.[4] Early diagnosis of CP is possible as early as 12 weeks of age.[44]

### Operational Definitions

- **Medically-based therapy** is recommended to improve function, manage impairments or complex medical needs. Improvements in function lead to improved activity and participation. The age of the child, period of brain, bone, and muscle plasticity, type of interventions, dosage and participation have the greatest effect on outcomes.[5] Intensive, goal-directed or task-oriented interventions provided during critical periods of neuroplasticity are supported by current evidence.[6-11] Episodic based care is recommended when treatment is focused on reducing secondary impairments or occurs outside critical periods for progress or regression.[9, 12]
  - **Critical period** is defined as a period when biologic or physiological conditions make the client especially sensitive to certain environmental stimuli and development of a new or lost skill is most likely. Critical periods for gross and fine motor development or skill acquisition following injury and surgeries are well established in the scientific literature. Current evidence supports the critical periods are:
    - Early infancy to toddler years are a critical period for neuroplasticity and overall development;[5, 6, 8, 10, 13, 44]
    - During early infancy and prepuberty for improving bone structure and function; [5]
    - During childhood for participation interventions for development of cognitive, social, emotional, visual, perceptual and motor skills;[5]
    - Up to age 7 years for skill mastery when a child is provided context-based skill exposure to task;[12]

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- **Episodic based care** is a specific period of intervention targeting a patient's specific need with a definite beginning and an end date.[9, 14] Patients with chronic conditions, such as CP or muscular dystrophy, may require multiple episodes of care throughout their lifespan.[9, 14] Each episode should have a meaningful outcome and not simply be continuations of goal setting.[15] "Researchers have found that short-duration, intensive, and episodic physical therapy models followed by rest periods resulted in higher adherence and improvement in motor performance, as well as both parents and therapists perceiving that the child attained their goals more rapidly. An episodic care approach also may be more amenable to parents of children with chronic conditions, who may prefer breaks between episodes of therapy to allow for a rest period and to participate in other community activities as opposed to receiving therapy for an indefinite length of time."[14] An episode of care ends when the child is in a steady state and needs time to practice for repetition.[9]
- **Complex needs** occur with an illness or disability that requires considerable external support to manage usual daily tasks; these complex needs may result from birth, illness or injury. Complex needs may include management of complex behaviors, monitoring equipment, splints/orthotics/serial casting, external fixation devices, and monitoring of the client's health status related to oxygen monitoring, cardiac devices, enteral feeding devices, colostomy bags, intravenous catheters, dialysis, tracheostomy tubes, urinary catheters, skin integrity and augmentative communication devices.
- **Progress** is change that extends beyond measured quantity and its true value (i.e. measurement error), but rather on the identification of functional changes that make a real difference in the lives of patients and families.[16]
- **Regression** is the loss of an acquired function or failure to progress after a period of relatively typical development as the result of a recognized event, illness or environmental change.[16]
- **Impairments** may be primary or secondary. According the International Classification of Functioning, Disability, and Health (ICF) model, primary impairments are organ or system level deficits that are apparent at the time of diagnosis; and secondary impairments are organ or system level deficits that occur over time because of primary impairments.[17, 18]
  - Examples of primary impairments:
    - Spasticity or Hypotonia
    - Impaired motor control
    - Impaired sensory processing
    - Ligamentous laxity
  - Examples of secondary impairments:
    - Joint contractures
    - Decreased strength
    - Impaired balance
    - Decreased proprioception

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- **Activity** is defined as performing a task or action.[17] Children with neuromuscular disorders may demonstrate activity limitations in areas of gross motor activities, fine motor activities, play, and self-care activities. Examples of activity limitations may include: gait deficits, impaired mobility, unable to feed self, or inability to dress self. There are three stages to skill attainment:[15]
  - Acquisition phase – the ability to perform a newly learned skill and requires skilled therapeutic services to address underlying deficits, establish adaptive strategies and equipment to promote success, consistent updating the plan of care through the use of therapist's assessment skills and ongoing caregiver education.
  - Fluency phase – is the rate at which a newly acquired skill is performed. This phase requires practice and repetition for fluency and less direct therapeutic services.
  - Maintenance – refers to the child's ability to perform an activity and participate successfully without the need for ongoing therapy. This phase is supported by consultative services to monitor and identify potential problems before the child's activity and participation are adversely affected.
- **Participation** is the involvement in life situations.[17] Children with neuromuscular disorders may experience participation restrictions at home and in the community as well as in social, sport and leisure activities. Examples of participation are: recess, physical education classes, sports, and family recreational activities.

## PTOT-13.9.2: Purpose of Guideline

- Dosing of interventions in pediatric physical and occupational therapy has been identified as a national priority.[19] Dosing includes frequency of sessions (number of sessions a week), intensity (number of exercise repetitions or how hard the patient works), time (minutes per session), and type of intervention (therapeutic exercise, gait training, education, etc.).[20] Physical and Occupational therapy may be delivered at different frequencies and durations, which creates challenges for providers and clinical reviewers. These challenges are further fueled by the lifelong chronic nature of neuromuscular disorders, natural emotions experienced by caregivers and the fact that evidence significantly precedes point of care.[21] The purpose of this guideline is to provide an overview of pediatric non-progressive neuromuscular conditions and convey current evidence in order to guide consistent utilization management decisions.



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## PTOT-13.9.3: Components of Evaluation and Management

- The examination process and procedures must be tailored to the child's age, medical status, diagnosis, child and caregiver goals and priorities. The ICF model may be helpful to frame the assessment of body functions and structures, function and disability, personal and environmental factors.[18]
- Subjective
  - Medical
    - Patient must be deemed medically stable to participate in therapy
    - Identify co-morbidities requiring medical management and those that affect therapy management
    - If post-surgical, determine any precautions or limitations
    - Identify recent illnesses, procedures or hospitalizations
    - Identify any special precautions such as allergies, seizures, etc.
    - Identify past therapy treatment history and response
    - Obtain pregnancy and delivery history (if applicable)
  - Caregiver
    - Clarify caregiver knowledge base, skills, and learning style to empower them with information and partnership[23]
    - Identify the caregiver's goals and priorities[22]
    - Identify current services and specialist involved in the child's care[22]
    - Identify current equipment such as braces and assistive devices[22]
    - Identify social situation in home and what supports are available[22]
    - Identify age which key developmental milestones were reache[22]
  - Child:
    - Identify his/her interests, strengths and goals
    - Identify his/her likes and dislikes
- Objective Findings
  - The evaluation is aimed to identify impairments of body function and structure that may impact functional activities and participation. The following chart is divided into three columns. The first column lists impairments identified during the examination. The activity and participation columns consist of tests-measures to objectively quantify limitations associated with impairments. In addition to impairment/activity/participation assessments, classification scales, developmental testing and criterion-referenced tests provide a complete clinical picture and are important in clinical planning and assessing outcomes.

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## PTOT-13.9.3.1: Impairment, Activity and Participation Assessment

| Impairment | Activity | Participation |
|---|---|---|
| ➢ Musculoskeletal Strength<br>◆ isometric<br>◆ functional<br>➢ Range of Motion<br>◆ passive<br>◆ active<br>**Flexibility**<br>➢ Joint integrity<br>➢ Postural alignment<br>◆ static<br>◆ dynamic<br>**Neurological**<br>➢ Muscle tone/spasticity<br>◆ Modified Ashworth Scale (MAS)<br>◆ Tardieu Scale<br>➢ Balance<br>◆ Pediatric Balance Scale<br>◆ Functional Reach Test<br>➢ Coordination<br><br>**Motor Planning**<br>➢ Proprioception<br>➢ Reflexes<br>◆ Primitive<br>◆ Righting<br>◆ Equilibrium<br>◆ Deep Tendon<br>➢ Sensory Processing<br>◆ Sensory Profiles<br>◆ Sensory Integration and Praxis Test (SIPT)<br>➢ Visual<br>◆ Beery-Buktenica Developmental Test of Visual-Motor Integration (Beery VMI)<br>◆ Test of Visual Motor Skills (TVMS-3)<br>◆ Motor Free Visual Perception Test (MVPT)<br>◆ Wide Range Assessment of Visual Motor Ability (WRAVMA) | ➢ Gross motor skills performance[24]<br>◆ Gross Motor Function Measure (GMFM)[25]<br>◆ Peabody Developmental Motor Scales (PDMS-2)[26]<br>◆ Bayley Scales of Infant Development III<br>◆ Alberta Infant Motor Scales (AIMS)[27]<br>◆ Test of Gross Motor Development (TGMD-2)<br>◆ Bruninks-Oseretsky Test of Motor Proficiency (BOT-2)[28]<br>◆ Movement Assessment Battery for Children (Movement ABC-2)<br><br>➢ Fine motor skills performance[24]<br>◆ Peabody Developmental Motor Scales (PDMS-2)[26]<br>◆ Bruininks-Osertesky Test of Motor Proficiency (BOT-2)[28]<br>◆ Miller Function and Participation (M-FUN)<br>➢ Gait[24]<br>◆ Analysis of spatial and temporal gait parameters such as: velocity, cadence, step and stride length, base of support over level and uneven surfaces<br>◆ 6 Minute Walk Test[29]<br>◆ 10 Meter Walk Test<br>◆ Observational Gait Scale (OGS)<br>◆ Timed Up and Go (TUG)[30] | ➢ Canadian Occupational Performance Measure (COPM)<br><br>➢ Children's Assessment of Participation and Enjoyment (CAPE)<br>➢ Pediatric Inventory of Disability Inventory (PEDI and PEDI-CAT)<br>➢ School Function Assessment (SFA)<br>➢ Goal Attainment Scale (GAS)<br>➢ Activities Scale for Kids (ASK) |

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| Impairment | Activity | Participation |
|---|---|---|
| **Cardiopulmonary**<br>➢ Vital Signs<br>◆ Heart rate<br>◆ Respiratory rate<br>➢ Endurance<br>◆ 6 Minute Walk Test<br><br>**Pain**<br>➢ Visual or Verbal Analog Scale<br>➢ FACES Pain Rating Scale<br>➢ Face, Legs, Activity, Crying, Consolability Scale (FLACC) | ➢ Functional Mobility<br>◆ Pediatric Evaluation of Disability Inventory (PEDI and PEDI-CAT)[31]<br>◆ Test of Gross Motor Development (TGMD-2)<br>◆ Gillett Functional Assessment Questionnaire (FAQ)[32]<br>➢ Self-Care Skills<br>◆ Roll Evaluation of Daily Living (REAL)<br>◆ Pediatric Evaluation of Disability Inventory (PEDI and PEDI-CAT)<br>◆ Wee FIM<br>➢ Play Skills<br>◆ Preschool Play Scale | |

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## PTOT-13.9.3.2: Classification Scales

- Classification scales are useful for making clinical decisions, setting realistic goals, maintaining realistic expectations and improving communication between clinicians.[44]

| Classification Scales | | |
|---|---|---|
| **Scale** | **Purpose** | **Levels** |
| **Gross Motor Function Classification System-Expanded and Revised (GMFCS)[12, 33]** | The GMFCS is the international gold-standard for gross motor classification of CP utilized for prognosis, goal setting, and research.[24, 34, 35] It is most accurate after age 2 years.[44]<br>GMFCS is determined by age category and performance of sitting, transfers and mobility in the home, school and community settings.<br><br>Children reach 90% of their gross motor potential by:[12]<br>Level I – 4.8 years<br>Level II – 4.4 years<br>Level III – 3.7 years<br>Level IV – 3.5 years<br>Level V – 2.7 years | Level I - Walks without limitations<br><br>Level II – Walks with limitations<br><br>Level III – Walks using a hand-held mobility device<br><br>Level IV – Self-mobility with limitations, may use powered mobility<br><br>Level V – Transported in a manual wheelchair |
| **Manual Ability Classification System (MACS)[36]** | MACS is used with children with CP to classify their ability to use one or both hands to handle objects in daily activities.[37] | Level I – Handles objects easily and successfully<br><br>Level II – Handles most objects but with reduced quality and/or speed<br><br>Level III – Handles objects with difficulty and needs help to prepare and/or modify activities<br>Level IV – Handles a limited selection of easily managed objects in adapted situations<br><br>Level V – Does not handle objects and has severely limited ability to perform even simple actions |



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## PTOT-13.9.3.3: Standardized Developmental Tests

- Developmental milestones are a set of functional skills or age-specific tasks that most children can do at a certain age range. Although each milestone has an age level, the actual age when a normally developing child reaches that milestone can vary. Resources for reviewing developmental milestones are readily available online:
  - https://www.cdc.gov/ncbddd/actearly/milestones/index.html
  - https://pathways.org/topics-of-development/milestones/
- Objective testing must be used to establish baseline measurements of deficits. Periodic reassessment of deficits is required to demonstrate progress.

| Assessment | Description |
|---|---|
| Alberta Infant Motor Scale (AIMS) (0-18 months) | Assesses motor development in infants who are at risk of abnormal motor development |
| Battelle Developmental Inventory (BDI) (Birth-8 years) | Tests personal-social, adaptive (personal responsibility, self-care), motor (fine, gross, and perceptual), communication, and cognition; |
| Bayley Scales of Infant and Toddler Development (Age 1-42 months) | Tests adaptive behavior (communication, self-care, self-direction), cognitive, language, motor (fine and gross), social-emotional |
| Beery-Buktenica Developmental Test of Visual-Motor Integration (Beery VMI) (2-18 years) | Tests visual motor integration, visual perception and motor coordination, perception and motor coordination. |
| Brigance Inventory of Early Development III-Standardized (Brigance IED III-Standardized) (Birth to 7 years) | 5 Domains: Physical development (gross & fine motor), language, academic skills/ cognitive (literacy & math/science), adaptive behavior, social-emotional |
| Bruininks Oseretsky Test of Motor Proficiency (BOT-2) (4-21 years) | Tests gross and fine motor proficiency |
| Developmental Assessment of Young Children-2 (DAYC-2) | Tests cognitive, communication, social-emotional, physical development, and adaptive behavior |
| Developmental Profile 3 (DP-3) (Birth to 12.11 years) | Tests physical, adaptive behavior, social/emotional, cognitive, communication |
| Developmental Test of Visual Perception-2 (DTVP-2) (4-10 years) | Tests motor-free and motor-enhanced visual perception |
| Miller Function and Participation (M-FUN) (2-7.11 years) | Tests visual motor, fine motor and gross motor |
| Motor-Free Visual Perception Test (MVPT) (4-85 years) | Tests visual perceptual skills without reliance on motor skills |
| Movement ABC (3-16.11 years) | Assesses mild to moderate motor skills deficits |
| Peabody Developmental Motor Scales-2 (PDMS-2) (Birth to 6 years) | Tests gross, fine, and visual motor skills |
| Pediatric Evaluation of Disability Inventory (PEDI) (6 months-7 years)<br><br>Pediatric Evaluation of Disability Inventory - Computerized Adaptive Testing (PEDI-CAT) (birth to 20 years) | PEDI tests<br>Tests self-care, mobility, and social function;<br><br>PEDI-CAT tests 4 Domains: Daily activities, Mobility, Social/ Cognitive, Responsibility |
| Roll Evaluation of Daily Lift (REAL) (ages 2-18.11) | Tests ADL and IADL |

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| Assessment | Description |
|---|---|
| Test of Visual Motor Skills (TVMS-3) (ages 3-90 years) | Tests visual motor skills |
| Test of Visual Perceptual Skills (TVPS) | Tests visual discrimination, visual memory, visual-spatial relations, form constancy, visual sequential memory, visual figure-ground, visual closure |
| Wide Range Assessment of Visual Motor Ability (WRAVMA) (3-17 years) | Tests visual motor skills of drawing, matching and pegboard |

**Criterion-Referenced Tests**

- In pediatric physical and occupational therapy, motor abilities of children with disabilities are often compared to those of children with normal motor development. Evidence recognizes that children with severe and multiple disabilities should have criterion-referenced instruments of motor abilities since norm-based tests are unsuitable.[38] Commonly used criterion referenced tests are:
  - Gross Motor Function Measure (GMFM) 88 and 66 is an outcome measure that may be used for children 5 months of age and older who have cerebral palsy, acquired brain injury or Down Syndrome.[24] The GMFM is the international standard of assessment for gross motor skills that effect everyday mobility and participation.[24] Clinically important change is 1.5 to 3 points.[24]
  - Pediatric performance measures for physical therapy are: Functional Independence Measure for Children (WeeFIM), PEDI, Gillette and Functional Mobility Scale (FMS).[24, 38]
  - Melbourne Assessment of Unilateral Limb Function is an outcome measure for upper extremity function in children older than 2.5 years of age.[24]
  - Pediatric performance measures for occupational therapy include: ABILHAND Kids, PEDI, WeeFIM.[24, 38]
  - Goal Attainment Scaling – 2nd edition (GAS) and the Canadian Occupational Performance Measure (COPM) are a criterion-referenced tools used to identify and set realistic child/parent/caregiver goals.[39] Goals can be written for all levels of function as identified by the ICF. These tools are beneficial in establishing episodes of care and monitoring progress.



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## PTOT-13.9.4: Treatment Criteria

- For those aspects of sensorimotor function for which there are standardized tests, significant dysfunction is commonly indicated by performance that is moderately to severely delayed which is measured at 1.5 standard deviations or more below the mean.
- Findings indicate a periodic functional skills issue, in which a specific goal is likely to be obtained in a predictable time frame.
- Anatomical and physiological changes related to growth and development associated with neuromuscular disorders.
- Identified deficit can be measured and progress demonstrated throughout the treatment plan.
- Need for home program development, education and training.
- Need for patient or caregiver training in medical, functional or adaptive equipment.

### PTOT-13.9.4.1: Treatment Intensity and Frequency Guidelines

- Research defines severity and complexity criteria for determining frequency and duration for outpatient pediatric physical and occupational therapy.[9] Patients fall into categories based upon factors of: potential to participate (age, diagnosis, progress and motivation), critical period for skill acquisition or regression, level of skilled clinical decision making, and readiness of patient and caregiver (compliance and motivation).[9, 40, 41] Intensive and/or weekly therapy is most appropriate in young children, whereas motor development trajectory curves plateau at age 7 years after which episodic care is appropriate to address activity, participation or new secondary impairments.[12]
- In pediatric physical and occupational therapy, there are four models of frequency:[9]
  - Intensive therapy:
    - Patient has potential for rapid progress towards goals. Rapid changes in condition necessitate frequent changes in treatment. Appropriate for patients in an extremely critical period for skill acquisition or plasticity related to development or medical condition with the use of evidence supported and effective treatment interventions such as CIMT/BIT/.[5, 9, 10, 41-43] Children who have greater than two contractures and/or epilepsy do not respond well to intensive therapy.[58] Evidence indicates when home programs are carefully designed and continually updated by therapists, the home program is a realistic solution to achieving intensive therapy dosage.[11]
  - Weekly/frequent therapy:
    - Patient demonstrates continuous progress towards established goals. Requires frequent intervention for a limited duration to achieve improve function, activity or participation and requires frequent revisions or updates of home program. Treatment may be 1-2 times per week or 2-3 times per month.[5, 8-10, 13, 41]

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- Periodic/monthly therapy:
  - Appropriate for patients not in a critical period for skill acquisition or at risk of regression and for maintenance of home program.[9, 15, 22, 44]
- Consultative therapy:
  - Appropriate when expertise is needed to identify problems or recommend a solution.[9, 15, 22, 44]

| Clinical Factors | Intensive 3-11x/wk | Weekly or Bimonthly 1-2x/wk or every other week | Periodic monthly or less often at regular intervals | Consultative or as needed |
|---|---|---|---|---|
| ➢ Potential to participate and benefit from the therapy process considering:<br>➢ - Age<br>➢ - Diagnosis<br>➢ - Prognosis<br>➢ - Motivation<br>➢ - Stage of Readiness | ➢ Rapid functional progress or potential for rapid decline<br>➢ Critical medical condition with risk of loss of function<br>➢ Almost daily changes in condition | ➢ Patient shows continuous progress towards established goals | ➢ Patient shows slow rate of goal achievement in identified areas<br>➢ Does not regress<br>➢ Patient may not be able to cooperate or participate in therapy sessions | ➢ Patient or caregiver able to meet new challenges due to change in life stage or medical condition.<br>➢ Clinical decision making used to identify problems; recommend solutions<br>➢ Issues identified by family/patient, not dictated by condition |
| ➢ Critical period for skill acquisition or potential regression based on development or condition | ➢ Extremely critical period based on condition | ➢ Critical period | ➢ Not in a critical period<br>➢ Related to life stage or medical condition changes | ➢ Specific challenges identified by patient/ caregiver<br>➢ Need for specific adaptive equipment or strategy |
| ➢ Need for clinical decision making/problem solving from licensed therapist | ➢ Requires clinical skills of licensed therapist<br>➢ Very limited amount of therapy program can be safely performed by patient/ caregiver | ➢ Requires clinical skills and problem solving of a licensed therapist for most of program | ➢ Clinical skills and problem solving required to assess condition status<br>➢ Home program updates<br>➢ Home program can be safely performed by patient/caregiver | ➢ Home program carried out<br>➢ independently by patient/ caregiver<br>➢ Clinical skills and problem solving by therapist needed for specific challenge identified by patient/ caregiver |

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| Clinical Factors | Intensive 3-11x/wk | Weekly or Bimonthly 1-2x/wk or every other week | Periodic monthly or less often at regular intervals | Consultative or as needed |
|---|---|---|---|---|
| ➢ Level of support necessary to assist patient in attaining goals, attending therapy, compliance, etc. | ➢ High level of support required to attain goals<br>➢ Minimal or no contribution by patient/ caregiver | ➢ High level of support required to attain goals<br>➢ Patient/ caregiver able to participate, but not independently | ➢ Minimal support required to address factors that may impede ability to progress towards goals. | ➢ Support is needed only to address specific challenges identified by patient/ caregiver<br>➢ Associated with life changes |
| ▪ (Adapted from Bailes, Burch and Reder, 2008) | | | | |

## PTOT-13.9.5: Discharge Criteria

- Termination of therapy services should occur when:
  - Episode goals have been reached for that functional level;
  - The family chooses not to continue therapy or demonstrates noncompliance;
  - When therapy services no longer produce a functional and measurable outcome
  - Lack of progress in a reasonable time-frame;
  - When care is repetitive, skilled therapy services are no longer required and the caregiver/patient can continue with the home program; and/or
  - Improvements that can be attributed to only maturation is not an indication for ongoing treatment.

## PTOT-13.9.6: Physical and Occupational Therapy Intervention

*"Rehabilitation services framed by the child and family's goals are considered best practice and reflect the substantial psychological evidence base about goal-based motivational learning."*[44]

- Therapy resources are most responsibly allocated when they are driven by their potential to improve function and not simply by the existence of a diagnosis. Best practice PT and OT utilizes family-entered care and avoids learned helplessness and dependence on therapy.[23] Therapy management fosters the child's competence in his or her environment, prevents secondary complications and disability, and uses home programs and other community resources to promote independence and empower parents/caregivers.[23, 45] Current best practice focuses on promoting functional outcomes through child-active approaches, compensatory or environmental adaptation and prevention of secondary health issue approaches, rather than improving specific motor skills that follow normal developmental sequencing.[42-44]

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- Novak and colleagues completed a systematic review of pediatric interventions for children with cerebral palsy and found 24% of interventions are proven to be effective, 70% are uncertain and 6% are proven ineffective.[42]
  - Current evidence reports that effective interventions include: constraint induced movement therapy, bimanual training, goal-directed training, context-focused therapy, home programs, strengthening, and gait training.[5, 8, 10, 42, 43, 44]
  - Systematic reviews of evidence have determined the following treatments are ineffective: passive home-based activities, stretching to prevent contractures, therapy suites, neuro-developmental treatment (NDT), hyperbaric oxygen and sensory integration.[10, 42, 43, 46]

| Goal/Outcome | Examples of Interventions: [5,8,10,42-44] |
|---|---|
| Aerobic capacity | Aquatic programs, gait and loco-motor training, walking and wheelchair propulsion programs |
| Access to household and community activities | Mobility, gait and locomotion training, balance and coordination, perceptual training, sensory processing, transfer training |
| Independence in self-care | Training in bed mobility, transfers, bathing, dressing, grooming, and toileting. |
| Prescription, application, and training in use of adaptive equipment | ➢ Written or augmentative communication devices<br>➢ Environmental modifications<br>➢ Assistive devices: crutches, canes, walkers, wheelchairs<br>➢ Power devices: motorized wheelchairs and scooters<br>➢ Adaptive devices: seating systems, raised toilet seats, grab bars; supine, prone or dynamic standers<br>➢ Orthotic devices: braces, shoe inserts, splints<br>➢ Prosthetic limbs<br>➢ Protective devices: cushions, helmets<br>➢ Supportive devices: compression garments, collars, |
| Improved respiration | Breathing strategies and techniques to maximize ventilation, positioning, movement, and exercises to improve function |
| Improved oral-motor skills | Teach strategies and techniques for feeding, eating, biting, chewing, swallowing and drinking. |
| Improved joint integrity and mobility | Flexibility exercises, massage, joint/soft tissue mobilization, serial casting<br>Note: High-quality evidence indicates manual stretch for the treatment and prevention of contractures does not have clinically important effects on joint mobility [46] |
| Improved motor function | CIMT/BIT, robotic training, body weight-supported treadmill training, biofeedback, strengthening, functional electrical stimulation |
| Reduce edema, lymphedema, or effusion | Compression bandaging, compression garments, taping, total contact casting, vasopneumatic compression devices, gravity-assisted compression devices |

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| Goal/Outcome | Examples of Interventions: [5,8,10,42-44] |
|---|---|
| Home Programs | Home programs are indispensable elements of PT/OT intervention, augmenting the effects of therapy and promoting functional application of acquired skills. These programs are developed by the PT and OT and are implemented by parents and caregivers. They may also be self-directed based on the child's developmental maturity and skill level. During the times of direct treatment, the home program serves as an adjunct to treatment, and requires regular review and updating. During periods when little or no functional changes occur, the home program serves to sustain the child's structural and functional status. |
| Self-Management Techniques | Assessing the child and caregiver's readiness for change through motivational interview, providing shared-decision making and empowering families to care for children with chronic conditions rather than being dependent on therapy. |

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# PTOT-13.10: Progressive Neuromuscular Disorders

## PTOT-13.10.1: Definition

Neuromuscular disorders are created by an abnormality on the lower motor neuron and tend to be progressive in nature resulting in muscle weakness and fatigue.[1] Presentation may occur at birth, during childhood or even adulthood. In infants, the presentation may include low tone (hypotonia), difficulty with feeding and/or respiratory issues. In childhood the delays may present as hypotonia, delay in achieving motor milestones, feeding issues, respiratory issues, gait abnormalities, frequent falls, difficulty with getting up from the floor or ascending stairs, muscle cramps or stiffness. In adults, the presentation is generally complaints of weakness, decreased endurance, tripping or falls, problems going up stairs, decreased tolerance to exercise, muscle cramps, muscle wasting, difficulty with breathing, problems with speech or difficulties swallowing.

- Examples of neuromuscular disorders are Duchenne Muscular Dystrophy, Becker Muscular Dystrophy, Spinal Muscular Atrophy, and Charcot-Marie-Tooth disease.

**Inclusion ICD-10 Codes:**

- G71.0 Muscular Dystrophy
- G12.9 Spinal Muscular Atrophy
- G60.0 Charcot-Marie-Tooth Disease

**Exclusions:**

- Non neuromuscular disorders

## PTOT-13.10.2: Purpose of Guideline

- The purpose of this guideline is to provide an overview of pediatric neuromuscular conditions and convey current evidence in order to guide consistent utilization management decisions.

## PTOT-13.10.3: Clinical Presentation

**Overview of Muscular Dystrophy**

- **Duchenne Muscular Dystrophy (DMD)** is the most common X-linked inherited form of muscular dystrophy. [2-6] It is progressive and irreversible, affecting one in 3300 – 6000 live male births.[3-12] Between three and five years of age, DMD symptoms are observed. Symptoms include cardiac dysfunction, respiratory issues, difficulty with ambulation, and slowed or loss of motor skills from muscle weakness.[13] Progressive muscle weakness occurs due to mutations or deletions of the dystrophin gene leading to loss of the ability to ambulate by 13 years of age, resulting in wheelchair dependency.[2, 3, 5, 7-16]

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### Stages in DMD[7]

- Stage 1: Presymptomatic- may show delays in attaining developmental milestones but no gait disturbance.
  - Rehabilitation management: Education to patient, family and caregivers on muscle preservation, contracture management, appropriate exercises, adaptive equipment needs, and empowerment, and support for function and participation
- Stage 2: Early Ambulatory- Gower's sign, waddling gait, possible toe walking, able to climb stairs
  - Rehabilitation management: Same as stage 1.
- Stage 3: Late Ambulatory- increased difficulty and energy required to walk, losing ability to transition from floor and ascend stairs
  - Rehabilitation management: Continue previous activities, with the addition of providing appropriate wheelchair, seating system, aids and adaptations to maximize independence in activities of daily living, function and participation.
- Stage 4: Early non-ambulatory- may be able to self-propel a wheelchair, able to maintain posture, may develop scoliosis
  - Rehabilitation management: Continue previous measures, ensuring proper equipment and education to empower the family.
- Stage 5: Late non-ambulatory- upper limb function and postural maintenance is increasingly limited
  - Rehabilitation management: Continue previous measures, ensuring proper equipment and education to empower the family.

**Becker Muscular Dystrophy (BMD)** is also an X-linked disorder, however, it is less severe and has a later onset of muscular weakness and loss of ambulation.[14, 17] Boys with BMD are usually ambulatory over 16 years of age, some until 40 years of age.[7, 9] The incidence of BMD is also less common as it is reported to affect one in 14,000-18,000 males.[9] Cardiac involvement is more variable in males with BMD, however, it appears to directly contribute to death more frequently.[9]

### Overview of Spinal Muscular Atrophy [5, 18-20]

- Spinal Muscular Atrophy (SMA) is one of the most common autosomal recessive neurodegenerative diseases. It occurs in one of 10,000 live births. SMA is characterized by a homozygous deletion and/or mutation in the survival motor neuron 1 (SMN1) gene and the leading genetic cause of death in infants.
- Four clinical types of SMA:
  - Type 1: diagnosed before the age of 6 months; presents with profound weakness, low muscle tone and difficulty feeding. These infants are typically delayed in developmental skills, as they are likely to never achieve independent sitting. If they do not receive invasive ventilation, they are likely to die before 2 years of age.



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- Type 2: intermediate form; presents before 18 months of age. Children sit independently but do not reach the ability to stand independently or walk. Life expectancy is decreased due to respiratory muscle weakness.
- Type 3: also known as juvenile or Kugelberg-Welander syndrome has two subtypes:
  - Type 3a: onset of clinical symptoms before 3 years of age
  - Type 3b: onset of clinical symptoms after 3 years of age
    - Major milestones are generally achieved, including walking independently. However, the level of motor performance varies greatly. Some children have difficulty with running and sports, while others have trouble standing up and taking a few steps unassisted. Only a small amount of people with SMA Type 3 will maintain the ability to walk independently throughout their lifetime, while 50% will not be able to walk independently during their twenties. People with type 3b have better outcomes on functional outcome measures than those with type 3a.
- Type 4: Onset during adulthood

**Overview of Charcot-Marie-Tooth Disease**

- Charcot-Marie-Tooth (CMT) disease has a high incidence rate of one in 2500 and is the most common hereditary neuromuscular disorders.[21-23] It progresses slowly and is typically diagnosed in childhood or adolescence.[23] First it affects the intrinsic muscles of the feet and progresses proximally, resulting in foot drop. The foot drop disturbs the swing phase of the gait cycle, causing frequent tripping and falling. The impaired gait cycle requires increased energy consumption, therefore, decreasing walking endurance. The overall consequence is difficulty running or jumping. Upper extremities and proximal muscles usually have less involvement; however, intrinsic hand muscles can be affected.[22, 23] Stretching may be beneficial in conserving range of motion, however, orthotic devices are the foundation for mobility and ambulation preservation and upper extremity function.[22]

## PTOT-13.10.4: Components of Evaluation and Management

- The examination process and procedures must be tailored to the child's age, medical status, diagnosis, child and caregiver goals and priorities. The *International Classification of Functioning, Disability and Health for Children and Youth* (ICF-CY) model focuses on an individual's health rather than disability. [24] ICF uses four domains:
  - body function – psychological and physiological functions of body systems,
  - body structure – anatomical parts of the body,
  - activity – task or action performed by the child, and
  - participation – involvement in life and social situations.

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- ICF-CY considers how a child's body structures and functions interact dynamically with the environment to result in disability, which is defined as limitations in activity and participation. No core set has been developed for dystrophinopathies, however, it is recommended by Conway et al.[17] The ICF-CY appears to be a very useful tool to determine areas of intervention to encourage participation of children with neuromuscular disorders in activities. This may optimize their ability to engage in age appropriate activities with their peers.[4] Primary impairments lead to secondary impairments which limit activity and participation. Limitations in activity and participation are directly related to quality of life**.**

**Subjective Findings**

- Medical:
  - Patient must be deemed medically stable to participate in therapy
  - Identify co-morbidities requiring medical management and those that affect therapy management
  - If post-surgical, determine any precautions or limitations
  - Identify recent illnesses, procedures or hospitalizations
  - Identify any special precautions such as cardiovascular, corticosteroid use, recent fractures, etc.
  - Identify past therapy treatment history and response
  - Obtain pregnancy and delivery history (if applicable)
- Caregiver:
  - Clarify caregiver knowledge base, skills, and learning style to empower them with information and partnership
  - Identify the caregiver's goals and priorities
  - Identify current services and specialist involved in the child's care
  - Identify current equipment such as braces and assistive devices
  - Identify social situation in home and what supports are available
  - Identify age which key developmental milestones were reached
  - Identify age which decrease in gross motor function/skills occurred
- Child:
  - Identify his/her interests, strengths and goals
  - Identify his/her likes and dislikes

**Objective Findings**

The evaluation is aimed to identify impairments of body function and structure that may impact functional activities and participation. The following chart is divided into three columns. The first column lists possible impairments identified during the examination. The activity and participation columns consist of tests-measures to objectively quantify limitations associated with impairments. In addition to impairment/activity/participation assessments, functional tests, developmental testing, and criterion-referenced tests provide a complete clinical picture and are important in clinical planning and assessing outcomes.



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## Impairment, Activity and Participation Assessment

| Impairment | Activity | Participation |
|---|---|---|
| **Musculoskeletal**<br>➢ Strength<br>◆ isometric<br>◆ functional<br>➢ Range of Motion<br>◆ passive<br>◆ active<br>➢ Flexibility<br>➢ Joint integrity<br>➢ Postural alignment<br>◆ static<br>◆ dynamic<br><br>**Neurological**<br>➢ Muscle tone/spasticity<br>◆ Modified Ashworth Scale (MAS)<br>◆ Tardieu Scale<br>➢ Balance<br>◆ Pediatric Balance Scale<br>◆ Functional Reach Test<br>➢ Coordination<br>➢ Motor Planning<br>➢ Proprioception<br>➢ Reflexes<br>◆ Primitive<br>◆ Righting<br>◆ Equilibrium<br>◆ Deep Tendon<br>➢ Sensory Processing<br>◆ Sensory Profiles<br>◆ Sensory Integration and Praxis Test (SIPT)<br>➢ Visual<br>◆ Beery-Buktenica Developmental Test of Visual-Motor Integration (Beery VMI)<br>◆ Test of Visual Motor Skills (TVMS-3)<br>◆ Motor Free Visual Perception Test (MVPT)<br>◆ Wide Range Assessment of Visual Motor Ability (WRAVMA) | **Gross motor skills performance**<br>➢ Peabody Developmental Motor Scales (PDMS-2)<br>➢ Bayley Scales of Infant Development III<br>➢ Alberta Infant Motor Scales (AIMS)<br>➢ Test of Gross Motor Development (TGMD-2)<br>➢ Bruninks-Oseretsky Test of Motor Proficiency (BOT-2)<br>➢ Movement Assessment Battery for Children (Movement ABC-2)<br><br>**Fine motor skills performance**<br>➢ Peabody Developmental Motor Scales (PDMS-2)<br>➢ Bruininks-Osertesky Test of Motor Proficiency (BOT-2)<br>➢ Miller Function and Participation (M-FUN)<br><br>**Gait**<br>➢ Analysis of spatial and temporal gait parameters such as: velocity, cadence, step and stride length, base of support over level and uneven surfaces<br>➢ 6 Minute Walk Test<br>➢ 10 Meter Walk Test<br>➢ Observational Gait Scale (OGS)<br>➢ Timed Up and Go (TUG)<br><br>**Functional Mobility**<br>➢ Pediatric Evaluation of Disability Inventory (PEDI and PEDI-CAT)<br>➢ Test of Gross Motor Development (TGMD-2)<br>➢ Gillett Functional Assessment Questionnaire (FAQ)<br><br>**Self-Care Skills**<br>➢ Roll Evaluation of Daily Living (REAL)<br>➢ Pediatric Evaluation of Disability Inventory (PEDI and PEDI-CAT)<br>➢ Wee FIM | ➢ Canadian Occupational Performance Measure (COPM)<br>➢ Children's Assessment of Participation and Enjoyment (CAPE)<br>➢ Pediatric Inventory of Disability Inventory (PEDI and PEDI-CAT<br>➢ School Function Assessment (SFA)<br>➢ Goal Attainment Scale (GAS)<br>➢ Activities Scale for Kids (ASK)<br>➢ Health Related Quality of Life (HR QoL)<br>➢ Kidscreen<br>➢ Pediatric Quality of Life Inventory (Peds QL) |

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| Impairment | Activity | Participation |
|---|---|---|
| **Cardiopulmonary**<br>➢ Vital Signs<br>◆ Heart rate<br>◆ Respiratory rate<br>➢ Endurance<br>◆ 6 Minute Walk Test<br><br>**Pain**<br>➢ Visual or Verbal Analog Scale<br>➢ FACES Pain Rating Scale<br>➢ Face, Legs, Activity, Crying, Consolability Scale (FLACC) | **Play Skills**<br>➢ Preschool Play Scale | |

**Commonly performed tests in patients with Neuromuscular disorders[8, 20, 21, 25, 26]**

| Assessment | Description |
|---|---|
| Vignos Scale | Lower Extremity Functional Scale (DMD) |
| Brooke Scale | Upper Extremity Functional Scale (in DMD and BMD) |
| Hammersmith Functional Motor Scale | Used in DMD to assess and monitor motor skills |
| Egel Klassifikation | Quantifies functional limits in advanced DMD and other neuromuscular diseases |
| Motor Function Measure | Provides detailed assessment of proximal and distal muscles. Used for neuromuscular diseases in general |
| North Star Ambulatory Assessment | Derived from the Hammersmith Functional Motor Scale, it is used for ambulatory patients with DMD. Includes running and jumping. |
| Medical Research Council Scale (MRC) | Assesses muscle strength. |
| 6-Minute walk test (6MWT) | Assesses functional capacity |
| 3 Dimensional gait analysis (3DGA) | Assess kinematics |
| Functional Evaluation Scale for DMD (FES-DMD) | Quantify and score compensatory movements in specific activities |
| Performance of Upper Limb (PUL) | Assess and monitor upper limb function progression in patients with muscular dystrophy |
| Jebsen-Taylor Test (JTT) | Assess and monitor upper limb function progression in patients with muscular dystrophy |
| Revised Hammersmith Scale for Spinal Muscular Atrophy (RHS) for SMA | Revised for use in patients with SMA to capture abilities across the spectrum of SMA |
| Disabilities of the Arm Shoulder and Hand questionnaire (DASH) | Assess upper extremity function in patients with CMT |
| Modified Time Up and Go (Modified TUG) | Measures anticipatory standing balance and walking. |
| Bruininks Oseretsky Test of Motor Proficiency (BOT-2) (4-21 years) | Tests gross and fine motor proficiency |
| Pediatric Evaluation of Disability Inventory (PEDI) (6 months-7 years)<br><br>Pediatric Evaluation of Disability Inventory -Computerized Adaptive Testing (PEDI-CAT) (birth to 20 years) | PEDI tests<br>Tests self-care, mobility, and social function;<br><br>PEDI-CAT tests 4 Domains: Daily activities, Mobility, Social/ Cognitive, Responsibility |

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## PTOT-13.10.4.1: Treatment Criteria

- Findings indicate a periodic functional skills issue, in which a specific goal is likely to be obtained in a generally predictable time frame.
- Anatomical and physiological changes related to growth and development
- Identified deficit can be measured and progress demonstrated throughout the treatment plan.
- Home program development, education and training
- Patient or caregiver training in medical, functional or adaptive equipment

## PTOT-13.10.4.2: Treatment Intensity and Frequency Guidelines

- Treatment intensity is associated with the potential for improvement, required skill level of the person delivering the intervention, and the amount of clinical decision making necessary to implement the intervention. Briefly, the four treatment models for a pediatric setting include:
  - Intensive therapy model. Patient has potential for rapid progress towards goals. Rapid changes in condition necessitate frequent changes in treatment. Appropriate for patients in an extremely critical period for skill acquisition related to development or medical condition.
  - Weekly/frequent therapy model. Patient demonstrates continuous progress towards established goals. Requires frequent intervention for a limited duration to achieve functional skills or requires frequent revisions or updates of home program. Treatment may be 1-2 times per week or 2-3 times per month.
  - Periodic/monthly therapy model. Appropriate for patients not in a critical period for skill acquisition or at risk of regression.
  - Consultative therapy model. Appropriate when expertise is needed to identify problems or recommend a solution for a specific issue.



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| Clinical Factors | Intensive 3-11x/wk | Weekly or Bimonthly 1-2x/wk or every other week | Periodic monthly or less often at regular intervals | Consultative or as needed |
|---|---|---|---|---|
| Potential to participate and benefit from the therapy process considering:<br>➢ Age<br>➢ Diagnosis<br>➢ Prognosis<br>➢ Motivation<br>➢ Stage of Readiness | ➢ Rapid functional progress or potential for rapid decline<br>➢ Critical medical condition with risk of loss of function<br>➢ Almost daily changes in condition | ➢ Patient shows continuous progress towards established goals | ➢ Patient shows slow rate of goal achievement in identified areas<br>➢ Does not regress<br>➢ Patient may not be able to cooperate or participate in therapy sessions | ➢ Patient or caregiver able to meet new challenges due to change in life stage or medical condition.<br>➢ Clinical decision making used to identify problems; recommend solutions<br>➢ Issues identified by family/patient, not dictated by condition |
| Critical period for skill acquisition or potential regression based on development or condition | ➢ Extremely critical period based on condition | ➢ Critical period | ➢ Not in a critical period<br>➢ Related to life stage or medical condition changes | ➢ Specific challenges identified by patient/caregiver<br>➢ Need for specific adaptive equipment or strategy |
| Need for clinical decision making/problem solving from licensed therapist | ➢ Requires clinical skills of licensed therapist<br>➢ Very limited amount of therapy program can be safely performed by patient/ caregiver | ➢ Requires clinical skills and problem solving of a licensed therapist for most of program | ➢ Clinical skills and problem solving required to assess condition status<br>➢ Home program updates<br>➢ Home program can be safely performed by patient/ caregiver | ➢ Home program carried out<br>➢ independently by patient/ caregiver<br>➢ Clinical skills and problem solving by therapist needed for specific challenge identified by patient/caregiver |
| Level of support necessary to assist patient in attaining goals, attending therapy, compliance, etc. | ➢ High level of support required to attain goals<br>➢ Minimal or no contribution by patient/ caregiver | ➢ High level of support required to attain goals<br>➢ Patient/ caregiver able to participate, but not independently | ➢ Minimal support required to address factors that may impede ability to progress towards goals. | ➢ Support is needed only to address specific challenges identified by patient/ caregiver<br>➢ Associated with life changes |
| (Adapted from Bailes, Burch and Reder, 2008)[27] | | | | |

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## PTOT-13.10.5: Discharge Criteria

- Termination of therapy services should occur when:
  - Episode goals have been reached for that functional level
  - The family chooses not to continue therapy
  - When therapy services no longer produce a functional and measurable outcome
  - Lack of progress in a reasonable time-frame
  - When care is repetitive, skilled therapy services are no longer required and the caregiver/patient can continue with the home program
  - Improvements that can be attributed to only maturation are not an indication for ongoing treatment.

## PTOT-13.10.6: Referrals and Adjuncts to Physical/Occupational Therapy:

- Cardiologist
- Neurologist
- Orthopedist
- Orthotist
- Educational and community-based programs
- Respite Care
- Behavioral intervention
- Vocational services
- Nutritionists
- Psychologists
- Speech-Language Pathologists

## PTOT-13.10.7: Section intentionally left blank

## PTOT-13.10.8: Physical and Occupational Therapy Intervention

Therapy resources are most responsibly allocated when they are driven by their potential to improve function and not simply by the existence of a diagnosis. Best practice PT and OT utilizes family-centered care and avoids learned helplessness and dependence on therapy. Therapy management fosters the child's competence in his or her environment, prevents secondary complications and disability, and uses home programs and other community resources to promote independence and empower parents/caregivers.

- Unfortunately, through review of the literature, there is no evidence to support any specific dosing of interventions in patients with neuromuscular disorders. Following is a synopsis of interventions from the literature review.



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| Reference and Study Design | Oxford Level of Evidence | Conclusion |
|---|---|---|
| Voet, et al. 2013 Cochrane Systematic Review[28] | 1 | Aerobic exercise for patients with dermatomyositis and polymyositis and aerobic and strengthening exercises for patients with myotonic dystrophy type I don't appear to cause harm, however, there is not enough evidence to show any benefit for aerobic capacity. |
| Jansen et al. 2013 RCT[3] | 2 | Leg and arm training using an assisted bicycle is possible and safe for boy with DMD who are either ambulant or wheelchair dependent. The study also suggests the possibility that continued training could help delay secondary loss of function due to disuse of muscle. |
| Adams, et al. 2017 Case series[13] | 4 | Clinically important results were demonstrated in the Peds-QL survey following an 8 week aquatic program, however, there was no significant changes noted in chest expansion, inspiratory capacity or peak expiratory flow in three boys at different stages of DMD. |
| Sman, et al. 2015 Systematic Review[21] | 1 | Optimization of exercise remains unclear in this systematic review of exercise for CMT. |
| Bushby, et al. 2009 Review/ guideline[29] | 1 | Article is the second part of a clinical guideline for diagnosis and management of DMD. This article details multidisciplinary care. Stretching and positioning are supported. Initiation of stretching should be active and continue through to passive stretching and prolonged stretching through use of orthoses or standers. Suggestions for implementing a standing program once standing and walking become laborious. The authors also discuss wearing of orthotics during standing programs and recommend avoiding overexertion and utilizing submaximal aerobic exercise. High resistance strengthening and eccentric exercise are not appropriate for people with DMD across the lifespan. Appears most of recommendations can be done at home or in the community. Swimming pool exercises are mentioned.<br><br>Speech Pathologists should provide oral motor exercises to assist with impaired speech intelligibility and assess for oral-pharyngeal dysphagia to preserve the swallowing function in DMD. |
| Rose, et al. 2010. Cochrane Systematic Review[30] | 1 | Interventions to improve ankle range of motion in patient with neuromuscular disease were assessed. Studies did not show a benefit for wearing a night splint compared to not wearing one, corticosteroids do not improve ankle range of motion, and surgery, although provided an initial improvement after surgery, was not sustainable. |
| Bell, et al. 2017 Cochrane Systematic Review[31] | 1 | Only two abstracts were available for review of interventions to prevent and treat osteoporosis due to corticosteroids. There was not enough evidence to support the use of vibration or medicines to protect bone mineral density. |



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**Sample goals/outcomes and interventions**

| Goal/Outcome | Examples of Interventions |
|---|---|
| Aerobic capacity/endurance | Aquatic programs, gait and loco-motor training , walking, upper extremity ergometer, assisted bicycle training, and wheelchair propulsion programs |
| Access to household and community activities | Body mechanics, postural stabilization, developmental activities, neuromuscular education, perceptual training, sensory training, neuromotor development training, flexibility exercises, gait and locomotion training |
| Independence in self-care | Training in bed mobility, transfers, bathing, dressing, grooming, toileting and developmental activities. |
| Prescription, application, and training in use of adaptive equipment | Written or augmentative communication devices<br>Environmental controls<br>Assistive devices: crutches, canes, walkers, wheelchairs, scooter boards<br>Power devices: motorized wheelchairs and scooters<br>Adaptive devices: seating systems, raised toilet seats, grab bars; supine, prone, or dynamic standers<br>Orthotic devices: braces, shoe inserts, splints<br>Prosthetic limbs<br>Protective devices: cushions, helmets |
| Improved respiration | Breathing strategies and techniques to maximize ventilation, positioning, movement, and exercises to improve function |
| Improved oral-motor skills | Teach strategies and techniques for feeding, eating, biting, chewing, swallowing and drinking. |
| Improved joint integrity and mobility | Flexibility exercises, stretching, massage, joint/soft tissue mobilization |
| Improved/maintained motor function | Upper extremity ergometer, Assisted bicycle training program, submaximal exercises |
| Home Programs | Home programs are indispensable elements of PT/OT intervention, augmenting the effects of therapy and promoting functional application of acquired skills. These programs are developed by the PT and OT and are implemented by parents and caregivers. They may also be self-directed based on the child's developmental maturity and skill level. During the times of direct treatment, the home program serves as an adjunct to treatment, and requires regular review and updating. During periods when little or no functional changes occur, the home program serves to sustain the child's structural and functional status. |



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## PTOT-13.10.8: Home and Self-Care techniques

### Home Medical Equipment

- Orthotics/Prosthetics/Serial Casts
- Wheelchairs/seating systems
- Adaptive equipment
- Augmentative devices
- Gait assistive devices

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# PTOT-14: Maximal Complex Motion Necessary for Functional Activities


| | |
|---|---|
| PTOT-14.1: Shoulder Motion (in degrees) | 755 |
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## PTOT-14.1: Shoulder Motion (in degrees)

| Activity | Motion | Mean | Source |
|---|---|---|---|
| Eating | Flexion | 52 | Matsen1 |
| | Abduction | 22 | Safaee-rad et al2 |
| | Medial rotation | 18 | Safaee-rad et al |
| | Horizontal adduction | 87 | Matsen |
| Drinking with a cup | Flexion | 43 | Safaee-rad et al |
| | Abduction | 31 | Safaee-rad et al |
| | Medial rotation | 23 | Safaee-rad et al |
| Washing axilla | Flexion | 52 | Matsen |
| Combing hair | Horizontal adduction | 104 | Matsen |
| | Abduction | 112 | Matsen |
| | Horizontal adduction | 54 | Matsen |
| Maximal elevation | Flexion/abduction | 148 | Matsen |
| Maximal reaching up back | Horizontal adduction | 55 | Matsen |
| | Extension | 56 | Matsen |
| | Horizontal abduction | 69 | Matsen |
| Reaching perineum | Extension | 38 | Matsen |
| | Horizontal abduction | 86 | Matsen |

## PTOT-14.2: Elbow Motion (in degrees)

| Activity | Flexion Range Min-Max | Pronation | Supination | Source |
|---|---|---|---|---|
| Use telephone | 43-136 | 41 | 23 | Morrey3 |
| Rise from chair | 21-95 | 34 | -10 | Morrey |
| Open door | 24-57 | 35 | 24 | Morrey |
| Read newspaper | 78-104 | 49 | -7 | Morrey |
| Pour pitcher | 36-59 | 43 | 22 | Morrey |
| Put glass to mouth | 49-130 | 10 | 13 | Morrey |
| Drink from cup | 78-129 | -4 | 31 | Safaee-rad et al |
| Cut with knife | 89-107 | 42 | -27 | Morrey |
| Eat with form | 85-128 | 11 | 52 | Morrey |
| Eat with spoon | 101-123 | 23 | 59 | Safaee-rad et al |

Maximal Complex Motion Necessary for Functional Activities

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## PTOT-14.3: Wrist Motion (in degrees)

| Activity | Extension Min-Max | Ulnar Deviation Min-Max | Source |
|---|---|---|---|
| Put glass to mouth | 11-24 | | Brumfield4 |
| Drink from a glass | 2-22 | 5-20 | Ryu5 |
| Drink from handled cup | -8-6 | 8-16 | Safaee-rad et al |
| Eat with a fork | 3-18 | 3 to -5 | Safaee-rad et al |
| Feeding tasks: fork, spoon, cup | -7-21 | 19 to -2 | Cooper6 |
| Cut with a knife | -30 to -5 | 12-27 | Ryu |
| Pour from pitcher | -20-22 | 12-32 | Ryu |
| Turn doorknob | -40-45 | -2-32 | Ryu |
| Use a telephone | -15-40 | -10-12 | Ryu |
| Turn steering wheel | -15-45 | -17-27 | Ryu |
| Rise from chair | -10-60 | 5-30 | Ryu |

## PTOT-14.4: Wrist Motion during Personal Care (in degrees)

| Activity | Extension | Flexion | Ulnar Deviation | Radial Deviation | Source |
|---|---|---|---|---|---|
| Hand to top of head | - | 21 | 16 | - | Ryu |
| Hand to Occiput | - | 10 | 10 | - | Ryu |
| Hand to front of chest | - | 25 | - | 5 | Ryu |
| Hand to sacrum | - | 20 | 48 | - | Ryu |
| Hand to foot | 0.9 | - | 9 | - | Ryu |

Maximal Complex Motion Necessary for Functional Activities

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## PTOT-14.5: Finger and Thumb Motion during 11 Functional Activities (in degrees)

(Holding a telephone, can, fork, scissors, toothbrush, and hammer, using a zipper and comb, turning a key, printing with a pen, and unscrewing a jar)

Source:


1. Totten, PA, and Flinn-Wagner, S: Functional evaluation of the hand. In Stanley, BG, and Trbuzi, SM (eds): Concepts in Hand Rehabil. FA Davis, Philadelphia, 1992.
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| Motion | Range | Mean | SD |
|---|---|---|---|
| Finger MCP flexion | 33-73 | 61 | (12) |
| PIP flexion | 36-86 | 60 | (12) |
| IP flexion | 20-61 | 39 | (14) |
| Thumb MCP flexion | 10-32 | 21 | (5) |
| IP flexion | 20-43 | 18 | (5) |

## PTOT-14.6: Hip Flexion (in degrees)

| | Livingston, et al[7] | McFayden and Winter[8] | Protopapadaki et al[9] |
|---|---|---|---|
| Activity | Range | Mean | Mean |
| Walking on level surfaces | 0-30 | 44 | - |
| Ascending stairs | 0-66 | 60 | 65 |
| Descending stairs | 0-45 | 66 | 49 |
| Sitting | - | 90-112 | - |
| Squatting | - | 115 | - |
| Stooping | - | 125 | - |
| Putting on socks | - | 120 flex, 20 abd, 20 lateral rot. | - |



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## PTOT-14.7: Knee Flexion (in degrees)

| | Jevsevar et al Mean age=53[10] | Livingston et al Women 19-26 yrs | Laubenthal et al Men mean age=25[11] | Rowe et al Mean age=67[12] |
|---|---|---|---|---|
| **Motion** | **Mean** | **Mean Range** | **Mean Range** | **Mean** |
| Walk on level surfaces | 63 | | | 65 |
| Ascend stairs | 93 | 2-105 | 0-83 | 80 |
| Descend stairs | 87 | 1-107 | 0-83 | 78 |
| Rise from chair | 90 | | | 90 |
| Sit in chair | | | 0-93 | 91 |
| Tie shoes | | | 0-106 | |
| Lift object from the floor | | | 0-117 | |
| Put on socks | | | 0-117 | |

## PTOT-14.8: Ankle Motion (in degrees)

| Motion | Gait Level Surfaces | Stair Ascent | Stair Descent |
|---|---|---|---|
| Dorsflexion | 0-10 (Murray) | 14-27 (Livingston et al) | 15-20 (Livingston et al) |
| Plantarflexion | 15-30 (Murray)<br>0-31 (Ostrosky et al) | 23-30 (Livingston et al)<br>15-25 (McFayden and Winter) | 24-31 (Livingston et al)<br>40 (Protopadaki et al) |

## PTOT-14.9: Cervical Motion (in degrees)

| Motion | Range | Source |
|---|---|---|
| Looking up (flexion) | 40-50 | Bennett and Associates13 |
| Looking over the shoulder (rotation) | 60-70 | Bennett and Associates |

## PTOT-14.10: Lumbar Motion (flexion in degrees)

| Motion | Gait Level Surfaces | Stair Ascent |
|---|---|---|
| Sit to stand | 35 | Hsieh and Pringle14 |
| Stand to sit | 42 | Hsieh and Pringle |
| Putting on socks | 57 | Hsieh and Pringle |
| Picking up objects from floor | 60 | Hsieh and Pringle |

Maximal Complex Motion Necessary for Functional Activities

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