Pediatric Neck Imaging Policy

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eviCore healthcare Clinical Decision Support Tool Diagnostic Strategies: This tool addresses common symptoms and symptom complexes. Imaging requests for individuals with atypical symptoms or clinical presentations that are not specifically addressed will require physician review. Consultation with the referring physician, specialist and/or individual’s Primary Care Physician (PCP) may provide additional insight.

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## PEDIATRIC NECK IMAGING GUIDELINES

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PEDNECK-1.1 Pediatric Neck Imaging Age Considerations

Many conditions affecting the neck in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, minor differences may exist in management due to patient age, comorbidities, and differences in disease natural history between children and adults.

- Patients age <18 years old should be imaged according to the Pediatric Neck Imaging Guidelines, and patients age ≥18 years should be imaged according to the Neck Imaging Guidelines, except where directed otherwise by a specific guideline section.

PEDNECK-1.2 Pediatric Neck Imaging Appropriate Clinical Evaluation

- A recent (within 60 days) face-to-face evaluation including a detailed history, physical examination, and appropriate laboratory studies should be performed prior to considering advanced imaging, unless the patient is undergoing guideline-supported scheduled follow-up imaging evaluation.

- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic patients for disorders involving the neck is not supported. Advanced imaging of the neck should only be approved in patients who have documented active clinical signs or symptoms of disease involving the neck.

- Unless otherwise stated in a specific guideline section, repeat imaging studies of the neck are not necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect patient management or treatment decisions.

PEDNECK-1.3 Pediatric Neck Imaging Modality General Considerations

- MRI
  - MRI Neck is generally performed without and with contrast (CPT® 70543) unless the patient has a documented contraindication to gadolinium or otherwise stated in a specific guideline section.
  - Due to the length of time for image acquisition and the need for stillness, anesthesia is required for almost all infants and young children (age <7 years), as well as older children with delays in development or maturity. In this patient population, MRI imaging sessions should be planned with a goal of avoiding a short-interval repeat anesthesia exposure due to insufficient information using the following considerations:
• MRI should always be performed without and with contrast unless there is a specific contraindication to gadolinium use since the patient already has intravenous access for anesthesia.
• If multiple body areas are supported by eviCore guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session.
  o The presence of surgical hardware or implanted devices may preclude MRI.
  o The selection of best examination may require coordination between the provider and the imaging service.

✓ CT
  o CT Neck typically extends from the base of the skull to the upper thorax.
    • A separate CPT® code for head imaging in order to visualize the skull base is not necessary.
    • In some cases, especially in follow-up of a known finding, it may be appropriate to limit the exam to the region of concern to reduce radiation exposure.
  o CT Neck is generally performed with contrast (CPT® 70491) unless the patient has a documented contraindication to CT contrast or otherwise stated in a specific guideline section.
  o CT Neck may be indicated for further evaluation of abnormalities suggested on prior US or MRI Procedures.
  o In general, CT Neck is appropriate when evaluating trauma, malignancy, and for preoperative planning.
  o CTA Neck (CPT® 70498) is indicated for evaluation of the vessels of the neck, especially with concern for dissection.
  o CT should not be used to replace MRI in an attempt to avoid sedation unless listed as a recommended study in a specific guideline section.
  o The selection of best examination may require coordination between the provider and the imaging service.

✓ Ultrasound
  o Ultrasound of the soft tissues of the neck (CPT® 76536) is indicated as an initial study for evaluating adenopathy, ill-defined mass or swelling, thyroid, parathyroid, parotid and other salivary glands, and cysts.
  o For those patients who do require advanced imaging, ultrasound can be very beneficial in selecting the proper modality, body area, image sequences, and contrast level that will provide the most definitive information for the patient.

✓ Nuclear Medicine
  o Nuclear medicine studies of the neck in pediatric patients are most commonly used to evaluate neck masses, or thyroid and parathyroid disease following initial
studies with anatomic imaging, such as ultrasound, CT, or MRI. See PEDNECK-2~NECK MASSES (PEDIATRIC) and PEDNECK-6~THYROID AND PARATHYROID for imaging guidelines.

- Salivary Gland Nuclear Imaging (one of CPT® 78230, CPT® 78231, or CPT® 78232) is indicated for the following:
  - Evaluation of salivary gland function in patients with dry mouth (xerostomia) and one of the following:
    - Sjögren’s syndrome
    - Sialadenitis
    - History of head or neck radiation therapy
  - Evaluation of children with cerebral palsy.

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

References

Evaluation of neck masses in pediatric patients involves careful consideration of clinical history and accurate physical examination. The patient's age and knowledge of the anatomy and embryology of the neck are very important in narrowing the differential diagnosis.

- Ultrasound (CPT® 76536) is indicated as the initial imaging study of choice. Ultrasound helps define the size and extent of localized superficial masses and helps confirm whether they are cystic or solid. Color Doppler ultrasound (CPT® 93880 bilateral study or carotid arteries or CPT® 93882 unilateral study) can evaluate the vasculature.

- Neck MRI without and with contrast (CPT® 70543) or Neck CT with contrast (CPT® 70491) can be approved if ultrasound is inconclusive or to further characterize abnormalities seen on ultrasound.

- Cervical lymphadenitis is common in children and follows most viral or bacterial infections of the ears, nose, and throat. No advanced imaging is necessary in the absence of persistent lymph node enlargement. When lymphadenopathy persists for more than 4 weeks of treatment, see PEDNECK-3~CERVICAL LYMPHADENOPATHY.

- Congenital cervical cysts frequently present in children and include thyroglossal duct cyst (55% of cases), cystic hygroma (25%), branchial cleft cysts (16%), bronchogenic cyst (0.91%), and thymic cyst (0.3%).
  - Barium swallow and neck MRI without and with contrast (CPT® 70543) or Neck CT with contrast (CPT® 70491) are indicated for diagnosis of fourth branchial pouch cysts.
  - Imaging is not indicated for diagnosis of the other cysts, however MRI without and with contrast (CPT® 70543) or Neck CT with contrast (CPT® 70491) may be indicated for preoperative planning.

- Salivary Gland Nuclear Imaging (one of CPT® 78230, CPT® 78231, or CPT® 78232) is indicated for evaluation of parotid masses to allow preoperative diagnosis of Warthin’s tumor.

**Practice Notes**

- The most common malignant ENT tumors in children are lymphoma and rhabdomyosarcoma.
Differential diagnosis of neck lesions by anatomic region:

✓ Subcutaneous tissues:
  o Teratoma (includes dermoid cysts)
  o Vascular malformations
  o Lipoma
  o Cellulitis
  o Plexiform neurofibromas
  o Keloid
  o Scar
  o Subcutaneous fat fibrosis (in neonates)

✓ Retropharyngeal space:
  o Abscess, cellulitis, adenitis
    • Usually involves children under age 6
    • Patients have history of upper respiratory tract infection followed by high fever, dysphagia, and neck pain.
  o Lymphadenopathy
  o Extension of goiter
  o Extension of pharyngeal tumor

✓ Retrovisceral space (posterior to the cervical esophagus):
  o Gastrointestinal duplication cysts (usually are diagnosed in first year of life)

✓ Pretracheal space (contains trachea, larynx, cervical esophagus, recurrent laryngeal nerves, and thyroid and parathyroid glands):
  o Thyroglossal duct cyst
    • Thyroglossal duct cyst is most common before the age of 20, 75% present as a midline mass and 43% of patients present with an infected mass.
    • Usually presents as an enlarging, painless midline mass.
    • Thyroid carcinoma occurs in 1% of thyroglossal duct cysts.
  o Goiter
  o Laryngocele
  o Lymphadenopathy
  o Abscess

✓ Danger space (closed space lying between the skull base and the posterior mediastinum and between the alar and prevertebral fasciae in a sagittal plane):
  o Cellulitis
  o Abscess

✓ Prevertebral space:
  o Neuroenteric cyst
- Cellulitis
- Abscess
- Spondylodiskitis
- Lymphadenopathy
- Cellulitis
- Abscess
- Paraganglioma

**Carotid sheath space:**
- Jugular vein thrombosis or phlebitis
- Lymphadenopathy
- Cellulitis
- Abscess
- Paraganglioma

**Parotid gland space:**
- Parotid lymphadenopathy
- Retromandibular vein thrombosis
- Parotiditis
- Sialodochitis (inflammation of the salivary gland duct)
- Salivary duct stone

**Submandibular and sublingual spaces:**
- Thyroglossal duct cyst
- Branchial cleft cyst
  - 90% of branchial abnormalities arise from the second branchial apparatus.
  - Second branchial cleft cysts are the most common branchial cleft cyst and usually present in young adults as painless fluctuant masses.
    - A history of repeated infections in the region of the mandible suggests the diagnosis.
    - Most second branchial cleft cysts are located in the submandibular space, at the anteromedial border of the sternocleidomastoid muscle, lateral to the carotid space, or posterior to the submandibular gland.

**Masticator space (includes masseter and pterygoid muscles):**
- Venous or lymphatic malformation
- Cellulitis
- Abscess
- Rhabdomyosarcoma

**Parapharyngeal space:**
- Cellulitis
- Abscess
- Rhabdomyosarcoma
- Extension of lymphoma

**Paravertebral space:**
- Cervical dermal sinus (epithelium-lines dural tubes that connect the skin with the central nervous system or its covering)
- Meningocele
- Rhabdomyosarcoma
- Extension of lymphoma
- Cervical neuroblastoma

**Posterior cervical space:**
- Lymphadenopathy
- Lymphatic malformation

**References**
Causes of cervical lymphadenopathy can be divided into two categories:

1) Inflammatory
2) Neoplastic

**PEDNECK-3.1 Imaging**

- Painful acute lymphadenopathy and other painful neck masses (including neck “swelling”) should be treated with a trial of conservative therapy for at least 4 weeks, including antibiotics if appropriate.
  - If there is improvement with conservative treatment, advanced imaging is not indicated.

- Ultrasound (CPT® 76536) is indicated as an initial evaluation if lymphadenopathy persists for more than 4 weeks.

- MRI Neck without and with contrast (CPT® 70543) or CT Neck with contrast (CPT® 70491) can be approved if ultrasound is inconclusive or to further characterize abnormalities seen on ultrasound.

- If systemic symptoms or other clinical findings suggest malignancy see **PEDONC-5~PEDIATRIC LYMPHOMA**.

**Practice Notes**

Inflammatory lymph nodes from acute lymphadenitis are usually painful, tender and mobile, frequently associated with upper respiratory infection, pharyngitis or dental infection.

Occasionally, sarcoidosis or toxoplasmosis and Human immunodeficiency virus (HIV) can cause inflammatory lymphadenopathy as well.

**References**


Infants under 12 Months of Age (Congenital Muscular Torticollis)

✔ Ultrasound Neck (CPT® 76536) is indicated as the initial study to evaluate suspected congenital muscular torticollis, also called fibromatosis coli.
  o Positive ➔ No further imaging is needed since diagnosis is defined.
  o Negative ➔ CT Neck with contrast (CPT® 70491) or MRI Neck without and with contrast (CPT® 70543) can be approved to evaluate for other structural causes.

Children and Adults (Acquired Torticollis)

✔ If there has been recent trauma, plain radiographs of the cervical spine should be obtained as an initial evaluation CT Neck with contrast (CPT® 70491) and/or CT Cervical spine without contrast (CPT® 72125) is indicated as the initial study to identify fracture or malalignment.

✔ In the absence of trauma, CT Neck with contrast (CPT® 70491), CT Cervical spine without contrast (CPT® 72125), MRI Cervical spine without contrast (CPT® 72141), MRI Neck without and with contrast (CPT® 70543), or MRA Neck without and with contrast (CPT® 70549) can be approved to identify underlying bony, muscular, vascular, or neurologic causes.
  o Positive ➔ Further advanced imaging is not required if a local cause has been identified.
  o Negative ➔ MRI of the brain without and with contrast (CPT® 70553) to exclude CNS cause.

Practice Note

Torticollis or cervical dystonia is an abnormal twisting of the neck with head rotated or twisted. The causes are variable and may be congenital, acquired (caused by trauma, infection, inflammation, or neoplasm), or idiopathic. It occurs more frequently in children and on the right side (75%).

References

Dysphagia imaging indications in pediatric patients are very similar to those for adult patients. See NECK-3~DYSPHAGIA for imaging guidelines.

Pediatric-specific imaging considerations include the following:

- X-rays of the neck and chest may be appropriate as the initial imaging study when concerned for foreign body ingestion as cause of dysphagia.
- Esophageal motility study (CPT® 78258) is indicated for any of the following:
  - Dysphagia associated with chest pain and difficulty swallowing both solids and liquids.
  - Gastroesophageal reflux

**Reference**

PEDNECK-6.1 Thyroid Masses or Nodules

- Ultrasound (CPT® 76536) is the recommended initial study for evaluation of thyroid masses or nodules in pediatric patients.
  - If TSH normal or elevated, fine needle aspiration (FNA) under ultrasound guidance (CPT® 76942) is indicated.
  - If TSH is low, nuclear thyroid scintigraphy (either CPT® 78013 or CPT® 78014), is indicated.
    - Hyperfunctioning nodules should be resected surgically.
    - Hypofunctioning nodules should undergo FNA under ultrasound guidance (CPT® 76942).

- CT Neck without (CPT® 70490) or with (CPT® 70491) contrast, or MRI Neck without and with contrast (CPT® 70543) is indicated for preoperative planning in patients with large or fixed masses, vocal cord paralysis, or bulky cervical or supraclavicular adenopathy.
  - CT Chest without (CPT® 71250) or with (CPT® 71260) contrast is also indicated for patients with substernal extension of the thyroid, pulmonary symptoms, or abnormalities on recent chest x-ray.

- If any biopsy reveals thyroid carcinoma, see ONC-6~Thyroid Cancers for further imaging guidelines.

- If the biopsy shows indeterminate findings, repeat ultrasound (CPT® 76536) and/or FNA (CPT® 76942) is indicated 3 months following initial biopsy.
  - If the nodule is stable and/or FNA is benign, repeat ultrasound (CPT® 76536) is indicated in 6 months.
  - If the nodule is growing or the FNA is not benign, the nodule should be resected surgically.

- If the initial biopsy shows benign findings, repeat ultrasound (CPT® 76536) is indicated 6 months following initial biopsy.
  - If the nodule is stable, repeat ultrasound (CPT® 76536) is indicated annually.
  - If the nodule is growing or concerning new findings are present, the nodule should undergo repeat FNA (CPT® 76942) or be resected surgically.
Benign nodules that have been surgically resected do not require routine imaging follow up in the absence of clinical or laboratory changes suggesting recurrence.

**PEDNECK-6.2 Hyperthyroidism**

- Ultrasound (CPT® 76536) is the recommended initial study for evaluation of hyperthyroidism.
  - If a nodule or mass is discovered on ultrasound, the patient should be imaged according to **PEDNECK-6.1 Thyroid Masses or Nodules**.

- For all other patients with documented hyperthyroidism, thyroid uptake nuclear imaging (either CPT® 78012 or CPT® 78014) is indicated.

**PEDNECK-6.3 Hypothyroidism**

- Ultrasound (CPT® 76536) is the recommended initial study for evaluation of hypothyroidism.
  - If a nodule or mass is discovered on ultrasound, the patient should be imaged according to **PEDNECK-6.1 Thyroid Masses or Nodules**.

- For patients with documented congenital hypothyroidism, thyroid uptake nuclear imaging (either CPT® 78014) is indicated.

**PEDNECK-6.4 Parathyroid Imaging**

- Either ultrasound (CPT® 76536) or sestamibi parathyroid nuclear imaging (one of CPT® 78070, CPT® 78071, or CPT® 78072) is indicated for initial evaluation of hyperparathyroidism, generally indicated by one of the following:
  - Serum calcium (>1 mg/dL over upper limit of normal)
  - Elevated serum calcium and elevated serum parathyroid hormone (PTH)

- CT Neck without and with contrast (CPT® 70492) or MRI Neck without and with contrast (CPT® 70543) is indicated for any of the following:
  - Preoperative planning for localization
  - Serum calcium (>1 mg/dL over upper limit of normal)
  - Recurrent or persistent hyperparathyroidism following neck exploration (MRI preferred unless contraindicated)

**References**

8. Surks MI, Ortiz E, Daniels GFH, et al. Subclinical thyroid disease: scientific review and guidelines for diagnosis and management, *JAMA* 2004; 291:228-238.
18. Greenspan BS, Dillehay GL, Intenzo C. SNM practice guideline for parathyroid scintigraphy 4.0*. [http://interactive.snm.org/docs/Parathyroid_Scintigraphy_V4_0_FINAL.pdf](http://interactive.snm.org/docs/Parathyroid_Scintigraphy_V4_0_FINAL.pdf).
Esophagus imaging indications in pediatric patients are very similar to those for adult patients. See NECK-4~ESOPHAGUS for imaging guidelines.

Pediatric-specific imaging considerations include the following:

- Esophagram is the study of choice for evaluating congenital atresia or tracheoesophageal fistula.
- Neck CT with contrast (CPT® 70491) and Chest CT with contrast (CPT® 71260) are indicated for evaluation of suspected congenital malformations if x-rays are inconclusive.
  - 3D rendering on a dedicated workstation may be approvable for preoperative planning in complex cases.

References

Trachea imaging indications in pediatric patients are very similar to those for adult patients. See NECK-10~TRACHEA for imaging guidelines.

Pediatric-specific imaging considerations include the following:
- Neck CT with contrast (CPT® 70491) and Chest CT with contrast (CPT® 71260) are indicated for evaluation of suspected congenital malformations if x-rays are inconclusive.
  - 3D rendering on a dedicated workstation may be approvable for preoperative planning in complex cases.

References