

Spinal Orthoses (Thoracic-Lumbar-Sacral, Lumbar, Lumbar-Sacral and Sacroiliac)

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Introduction

Spinal orthoses are addressed by this guideline.

Health Equity Consideration

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

Criteria

Pre-fabricated spinal orthosis

A **pre-fabricated spinal orthosis** is considered medically necessary for **all** of the following:

- There is documentation of **one** of the following:
 - The individual had an injury or surgery to the spine.
 - The orthosis will help support the back due to a problem with the bones of the spine, such as; arthritis, degenerative lumbar spinal stenosis, or facet disease.
- Stabilizing the individual's trunk is necessary for medical reasons (e.g., to reduce pain); however, limited or intermittent use is recommended to promote active muscle use and limit disuse muscle atrophy.
- The individual's function will be improved by using the orthosis.

Spinal orthosis for Adolescent Idiopathic Scoliosis

A **spinal orthosis for Adolescent Idiopathic Scoliosis (AIS)** (HCPCS L1200, L1300, L1310) is considered medically necessary when the **all** of following conditions are met:

- The skeletal bones are not fully developed. This can be described on a Risser scale from zero to two.
- An x-ray shows that the spine is curved and there is documentation of **any** of the following:
 - The Cobb angle is between 25 and 39 degrees.
 - The Cobb angle is between 20 and 24 degrees, but has changed by at least five degrees in the last nine months.
 - The Cobb angle is between 20 and 24 degrees, or 40 and 49 degrees, and bracing is preferred over surgery or observation.

Pre-fabricated Spinal orthosis with Custom fitting

A **pre-fabricated spinal orthosis with custom fitting** is considered medically necessary when the basic coverage criteria listed for a pre-made orthosis is met including **any** of the following:

- The individual is unable to be fitted with a pre-made orthosis.
- The condition requiring the orthosis is anticipated to be permanent or of long-standing duration beyond six months.
- The back orthosis needs a custom fit to be able to adequately stabilize the spine.

Custom Fabricated Spinal orthosis

A **custom fabricated spinal orthosis** is considered medically necessary when the basic coverage criteria listed for a prefabricated spinal orthosis is met including **any** of the following:

- The individual is unable to be fitted with a pre-made orthosis.
- The condition requiring the orthosis is anticipated to be permanent or of long-standing duration beyond six months.
- The individual has a medical condition that necessitates the creation of a custom-made orthosis to adequately stabilize the spine.

Replacement Criteria

- Same or Similar Durable Medical Equipment
 - Duplication of the same or similar orthoses within the same case is considered not medically necessary.
- A replacement orthosis is considered medically necessary when **all** of the following apply:

- The individual has been seen recently by their provider and has a documented care plan that includes the use of the orthosis.
- There is clinical documentation of **any** of the following:
 - The individual is no longer able to wear the orthosis because of growth or a change in physical condition.
 - The orthosis has been lost or stolen.
 - The orthosis is broken, unable to be repaired, and no longer under warranty.

Not Medically Necessary

- **Bracing** solely used for the management of low back pain is not supported in the literature and is considered not medically necessary.
- **Prophylactic spinal orthoses** are not considered durable medical equipment (DME).
- **Elastic or other fabric support garments** (e.g., maternity support garments) with or without stays or panels do not meet the statutory definition of an orthosis because they are not rigid or semi-rigid devices.
- A **protective body sock** does not meet the definition of an orthosis because it is not a rigid or a semi-rigid device.
- **SpineCor® Dynamic Corrective brace** is considered experimental, investigational, or unproven because the effectiveness of this treatment has not been established.

Background and Supporting Information

- The **Risser staging system** uses the ossification of the iliac apophysis and its fusion to the ilium to help determine the ossification stage of the vertebrae, and is often used in planning surgical intervention for scoliosis. To determine an individual's Risser stage, the iliac wing is divided into quarters, and the percentage of ossified quarters corresponds to the Risser stage (0-5). Lower Risser stages signify greater growth remaining and greater risk for curve progression. Skeletal maturity is defined by Risser stage 4 in female individuals and Risser stage 5 in male individuals. In the United States, the Risser stages are defined as:
 - Stage 0 = No ossification of the iliac apophysis
 - Stage 1 = Up to 25% ossification of the iliac apophysis
 - Stage 2 = 26-50% ossification of the iliac apophysis
 - Stage 3 = 51-75% ossification of the iliac apophysis
 - Stage 4 = Greater than 75% ossification of the iliac apophysis
 - Stage 5 = Full bony fusion of the iliac apophysis (Hacquebord & Leopold, 2012)
- The **Cobb angle** is the reference standard for quantitative monitoring of scoliosis. The Cobb angle is formed by the intersection of a line parallel to the superior end plate of the most cephalad end vertebra in a particular curve, with the line parallel

to the inferior end plate of the most caudad end vertebra of the curve (Kuznia et al., 2020).

Evidence Discussion

Management of low back pain

A 2023 randomized controlled study by Hettchen et al. showed that wearing a Spinomed active orthosis for 16 weeks produced significant improvements in chronic back pain intensity and back pain induced physical disability in hyperkyphotic older women, with the orthosis group experiencing large beneficial effects compared to untreated controls ($p=.008$ for pain and $p<.001$ for disability). Individuals also demonstrated significant reductions in kyphosis angle and small but favorable changes in trunk strength ($p=.049$) and functional ability, which suggested that regular home use of the orthosis for 2 to 3 hours twice daily could support safer and more independent daily functioning. The authors concluded that this active strengthening spinal orthosis was effective for vertebral fractures older than three months and could be incorporated into conservative home-based management to reduce pain and improve posture and movement abilities. Limitations included the lack of significant improvement across all secondary outcomes and reliance on self-reported adherence, though compliance averaged 82% and no relevant adverse effects were reported after minor orthosis adjustments, indicating good tolerability for home use.

Annaswamy et al. (2021) reported on a prospective, randomized trial including 59 individuals with chronic low back pain (greater than 12 weeks) that compared standard conservative care with and without a concomitant lumbar orthosis. All participants received education and exercise instructions. In addition, the treatment group received a lumbar orthosis to be worn as needed for symptomatic relief. The outcome measures were assessed at baseline, six weeks, 12 weeks, and at six months. Patient-reported function and quality of life were assessed by the: Numerical Rating Scale (pain intensity), Pain Disability Questionnaire, Patient-Reported Outcome Measurement Information System, and EuroQol 5-Dimension (EQ-5D). The authors concluded that treatment with a semi-rigid back brace did not provide any significant benefit when combined with patient education and exercise instruction. Moreover, at six months, treatment with a lumbar orthosis was associated with worse disability, function, and quality-of-life scores compared with no bracing; however, the authors noted that dropout rate, recall bias, and potential lack of generalizability may have impacted the results.

Injury to the spine or related soft tissues

Individuals with thoracolumbar spinal column injuries have often been involved in high-energy trauma (e.g., motor vehicle collision, fall from a height) and sustain multiple injuries. Non-operative management of stable thoracic and lumbar spinal fractures may

involve the use of a spinal orthotic vest or brace that permits early ambulation (Wood et al., 2014).

Choo and Chang (2020) performed a narrative review and showed that spinal orthoses reduced pain and disability for individuals with spinal pain by protecting affected soft tissues, limiting trunk flexion, extension, lateral flexion, and rotation, and supporting healing during conservative management. Short term use of spinal orthoses improved symptoms without significant adverse effects, which indicated that home use could help individuals safely maintain comfort, stability, and functional activity during recovery. The authors concluded that spinal orthoses offered meaningful clinical benefit when used judiciously as part of a conservative treatment plan. Study limitations included the potential for complications during long term use, such as muscle weakness and joint contracture, and the heterogeneity of available studies, which restricted the ability to determine optimal duration and specific device selection for various home based contexts.

A 2024 review by Borg et al. showed that spinal orthoses improved pain, functionality, and quality of life in individuals with osteoporotic vertebral fractures, with ten included studies involving 970 individuals reporting significant reductions in pain and functional limitation when orthoses were worn consistently. Dynamic hyperextension orthoses improved trunk muscle strength and supported posture, which suggested meaningful advantages for home use as these devices could be worn for extended daily periods to provide ongoing stabilization, reduce pain during routine activities, and enhance independence. The authors concluded that spinal orthoses represented a beneficial conservative option for managing vertebral fracture related symptoms in the home environment, although they emphasized the need for additional high quality studies to clarify comparative efficacy across device types. Study limitations included heterogeneity in orthosis designs, variability in study quality, and inconsistent outcome measures, which restricted the ability to determine optimal device selection and standardize home based recommendations.

Mulcahy et al. (2021) conducted a systematic review including two randomized controlled trials to evaluate the use of an orthosis compared with no orthosis in the management of thoracolumbar burst fractures in individuals without neurological deficit. The functional outcomes, radiologic measures of kyphosis, pain scores, and quality-of-life scores were equivalent between the orthosis and the no orthosis groups. The level of evidence ranged from very low to moderate for the outcomes evaluated. The rate of complications and the rate of failure of treatment requiring surgery was low. The authors concluded that outcomes are similar between individuals treated with and without bracing in non-operative treatment of thoracolumbar burst fracture. However, the authors noted that larger trials are needed to evaluate these findings.

Surgical procedure on the spine or related soft tissue

In a review article, Fiani et al. (2021) discussed the osteoporotic individual and considerations in spine surgery. The authors concluded that the literature suggests in instances of poor bone quality, as in the case of osteoporosis, internal fixation may fail, leading to higher risks of nonunion or pseudarthrosis. Thus, there may be a role for postoperative bracing. Moreover, the authors noted that there is inadequate data on the role of bracing in osteoporotic individuals who have undergone spinal fusion and further investigation is warranted.

Jones et al. (2021) performed a systematic review and meta-analysis including randomized controlled trials following 278 individuals to evaluate the effectiveness of postoperative bracing after lumbar spinal fusion for degenerative spine conditions. The authors found that postoperative lumbar bracing was associated with worse disability scores compared with no bracing. No differences in pain control, fusion rates, or complications were seen between groups. The authors suggested that bracing may have led to worse disability outcomes due to muscle weakness and disuse atrophy. In conclusion, the authors recommended additional well-designed studies with larger sample sizes.

In 2023, Pizones and colleagues reported a retrospective cohort study that evaluated whether postoperative bracing prevented mechanical complications and re-interventions in the first two postoperative years after spinal deformity surgery. Three hundred eighty individuals were separated into two groups (three month use of a TLSO or no brace). Demographic, intraoperative, and postoperative spinopelvic parameters, as well as complications in the first two postoperative years were reported. The authors concluded that, after controlling for potential confounders, the results did not identify a protective effect of postoperative braces.

Scoliosis

Dunn et al. (2018) conducted a systematic review including four controlled studies with 587 pediatric individuals with adolescent idiopathic scoliosis (AIS) to evaluate the evidence on the benefits and harms of AIS screening for the US Preventive Services Task Force (USPSTF). The authors reported that use of a TLSO was significantly associated with benefits in terms of reduced curve progression as compared with controls.

A 2025 comparative interventional study (Zhou et al.) showed that individuals with AIS who used a scoliosis orthosis for 12 months experienced significantly greater improvements in spinal alignment compared with those who received rehabilitation alone. The orthosis group demonstrated consistently smaller Cobb angles at 3, 6, and 12 months, all with statistically significant differences ($p < 0.05$), and a higher proportion of grade 0 spinal rotation after 12 months, which suggested more effective trunk stabilization in daily home settings. Improvements in thoracic asymmetry and shoulder

height were also significantly greater in the orthosis group, indicating that home-based brace wear supported both structural correction and functional well-being. The authors concluded that spinal orthoses provided meaningful therapeutic benefit when integrated into sustained home use. Study limitations included the single center design, reliance on one type of orthotic intervention, and absence of long term follow up beyond the 12 month period, which limited generalizability.

Dolan et al. (2019) reported a multicenter trial (Bracing in Adolescent Idiopathic Scoliosis Trial (BrAIST)) that compared TLSO bracing to observation in skeletally immature adolescents (10 to 15 years) with a Cobb angle of 20° to 40°. The authors noted more adolescents treated with bracing had a Cobb angle of less than 50° at skeletal maturity. Moreover, the proportion of adolescents who had Cobb angle less than 50° at skeletal maturity decreased with increasing duration of brace wear. A nonrigid brace (SpineCor®), which consists of a series of straps, has been proposed as an alternative to rigid bracing for scoliosis. A prospective randomized controlled study (Guo et al., 2014) compared the treatment outcomes of the SpineCor® brace with that of a rigid brace. Thirty-eight participants with AIS were randomly allocated into two groups undergoing treatment with SpineCor® (n = 20) or a rigid brace (n = 18). Participants who had curve progression of greater than 5° with the SpineCor® brace were required to switch to rigid brace treatment. The effectiveness of the two brace treatments was assessed using the Scoliosis Research Society (SRS) standardized criteria. The investigators concluded that curve progression rate was found to be significantly higher in the SpineCor® group when compared with the rigid brace group. Moreover, the investigators reported that changing to rigid bracing could control further curve progression for majority of participants who previously failed with SpineCor® bracing.

A retrospective analysis (Gutman et al., 2016) aimed to compare the treatment effectiveness of the SpineCor® brace with the Boston Brace in 243 individuals with AIS. The primary outcome was the progression in main Cobb angle when reaching one of the following end point criteria: progression in Cobb angle of greater than or equal to 6°; main Cobb angle of greater than 45°; surgery undertaken; or reaching skeletal maturity (Risser sign of five or growth of less than one centimeter in the previous six months). The authors found that the SpineCor® brace was associated with increased curve progression and risk of requiring surgery compared to the standard Boston brace. A comparative study evaluated the treatment outcomes of individuals with AIS treated via either a conventional rigid TLSO or a SpineCor® nonrigid orthosis (Gammon et al., 2010). Outcomes were Scoliosis Research Society (SRS) standardized with failure being defined as curve progression greater than or equal to six degrees, or ever exceeding 45°, or having surgery recommended before skeletal maturity. Participants were followed through the completion of brace treatment or attainment of other treatment end points. The authors reported no significant differences in brace treatment outcomes when comparing TLSO and SpineCor®-treated individuals.

Spinal Deformity

Karimian et al. (2021) reported on a pilot cross-over study including 20 individuals with osteoporotic hyperkyphosis and compared the impact of rigid, semi-rigid, and soft orthoses on the degree of kyphosis and functional balance measurements. The study evaluated functional measures including the forward reach test, Timed Up and Go test, and postural stability. The authors found that all three orthoses served to reduce the kyphosis angle in osteoporotic hyperkyphosis. None of the orthoses had a significant change in the Timed Up and Go test. The rigid orthosis adversely affected functional reach. Thus, the authors opined that the findings suggest that using a rigid orthosis in an individual with osteoporotic hyperkyphosis reduces balance performance.

Kaijser et al. (2019) conducted a randomized controlled trial including 96 women with osteoporosis and back pain to examine the effect of a spinal orthosis on either hyperkyphosis or back extensor muscle strength. Participants were randomized to three groups: a spinal orthosis group, an equipment training group, and a control group. All three groups were examined at baseline and followed up after three and six months. Comparison between groups showed no significant difference in back pain, back extensor strength, or degree of kyphosis at the follow-up after six months. In the spinal orthosis group, back pain decreased slightly and back extensor strength increased by approximately 27%. Thus, the investigators opined that the spinal orthosis may become an alternative method of equipment training to prevent progression of kyphosis and strengthen the spinal musculature in individuals with osteoporosis.

A 2023 randomized controlled trial conducted by Keshavarzi et al. involving 48 individuals with hyperkyphosis (greater than 50°) investigated the effect of a semi-rigid thoracolumbar orthosis (TLO) on thoracic kyphosis angle (TKA) and potentially contributing factors of hyperkyphosis, including position sense, back muscle strength, and endurance. Participants were randomly allocated to an experimental (rigid TLO for three consecutive months) or control group (no external support or exercise). Joint position sense, back muscle strength, TKA, and endurance were evaluated at baseline and at week six and week 12. The experimental group demonstrated an improvement in kyphosis of 14.8° with associated improvements in back muscle performance. Thus, the authors concluded that wearing a semi-rigid TLO for three months likely modifies kyphotic posture and enhances back muscle performance in older adults with hyperkyphosis.

Virkki et al. (2021) conducted a retrospective review of 68 pediatric individuals to identify the bony union rate and risk factors for nonunion of the lumbar spondylolysis of pediatric individuals treated with a rigid TLSO (Boston brace) after a minimum of three months of immobilization (mean = 4.2 months). The authors found that a high thoracolumbosacral orthosis (underarm) does not seem to improve the healing rate of pediatric spondylolysis defects.

Professional Organizations/Societies

A specialty clinical practice guideline (Dailey et al., 2014) reported that, in the setting of subacute low back pain (less than six months in duration), the utilization of a short course of lumbar bracing demonstrated efficacy in pain reduction, medication usage, and improvements in functional disability. However, the authors noted that the use of lumbar bracing is not recommended for the prevention of low back pain.

The American College of Physicians® (ACP) (Qaseem et al., 2017) developed a specialty practice guideline to provide clinical recommendations on noninvasive treatment of low back pain. The authors found insufficient evidence for lumbar supports for acute or subacute low back pain.

Codes Addressed in This Guideline

The inclusion of any code in this table does not imply that the code is under management or requires prior authorization. Refer to the applicable health plan for management details. Prior authorization of a code listed in this table is not a guarantee of payment. The Certificate of Coverage or Evidence of Coverage policy outlines the terms and conditions of the member's health insurance policy.

HCPCS	Description
A4467	Belt, strap, sleeve, garment, or covering, any type
L0450	TLSO, flexible, provides trunk support, upper thoracic region, produces intracavitary pressure to reduce load on the intervertebral disks with rigid stays or panel(s), includes shoulder straps and closures, prefabricated, off-the-shelf
L0452	TLSO, flexible, provides trunk support, upper thoracic region, produces intracavitary pressure to reduce load on the intervertebral disks with rigid stays or panel(s), includes shoulder straps and closures, custom fabricated
L0454	TLSO, flexible, provides trunk support, extends from sacrococcygeal junction to above t-9 vertebra, restricts gross trunk motion in the sagittal plane, produces intracavitary pressure to reduce load on the intervertebral disks with rigid stays or panel(s), includes shoulder straps and closures, prefabricated item that has been trimmed, bent, molded, assembled, or otherwise customized to fit a specific patient by an individual with expertise

HCPCS	Description
L0455	TLSO, flexible, provides trunk support, extends from sacrococcygeal junction to above t-9 vertebra, restricts gross trunk motion in the sagittal plane, produces intracavitary pressure to reduce load on the intervertebral disks with rigid stays or panel(s), includes shoulder straps and closures, prefabricated, off-the-shelf
L0456	TLSO, flexible, provides trunk support, thoracic region, rigid posterior panel and soft anterior apron, extends from the sacrococcygeal junction and terminates just inferior to the scapular spine, restricts gross trunk motion in the sagittal plane, produces intracavitary pressure to reduce load on the intervertebral disks, includes straps and closures, prefabricated item that has been trimmed, bent, molded, assembled, or otherwise customized to fit a specific patient by an individual with expertise
L0457	TLSO, flexible, provides trunk support, thoracic region, rigid posterior panel and soft anterior apron, extends from the sacrococcygeal junction and terminates just inferior to the scapular spine, restricts gross trunk motion in the sagittal plane, produces intracavitary pressure to reduce load on the intervertebral disks, includes straps and closures, prefabricated, off-the-shelf
L0458	TLSO, triplanar control, modular segmented spinal system, two rigid plastic shells, posterior extends from the sacrococcygeal junction and terminates just inferior to the scapular spine, anterior extends from the symphysis pubis to the xiphoid, soft liner, restricts gross trunk motion in the sagittal, coronal, and transverse planes, lateral strength is provided by overlapping plastic and stabilizing closures, includes straps and closures, prefabricated, includes fitting and adjustment
L0460	TLSO, triplanar control, modular segmented spinal system, two rigid plastic shells, posterior extends from the sacrococcygeal junction and terminates just inferior to the scapular spine, anterior extends from the symphysis pubis to the sternal notch, soft liner, restricts gross trunk motion in the sagittal, coronal, and transverse planes, lateral strength is provided by overlapping plastic and stabilizing closures, includes straps and closures, prefabricated item that has been trimmed, bent, molded, assembled, or otherwise customized to fit a specific patient by an individual with expertise

HCPCS	Description
L0462	TLSO, triplanar control, modular segmented spinal system, three rigid plastic shells, posterior extends from the sacrococcygeal junction and terminates just inferior to the scapular spine, anterior extends from the symphysis pubis to the sternal notch, soft liner, restricts gross trunk motion in the sagittal, coronal, and transverse planes, lateral strength is provided by overlapping plastic and stabilizing closures, includes straps and closures, prefabricated, includes fitting and adjustment
L0464	TLSO, triplanar control, modular segmented spinal system, four rigid plastic shells, posterior extends from sacrococcygeal junction and terminates just inferior to scapular spine, anterior extends from symphysis pubis to the sternal notch, soft liner, restricts gross trunk motion in sagittal, coronal, and transverse planes, lateral strength is provided by overlapping plastic and stabilizing closures, includes straps and closures, prefabricated, includes fitting and adjustment
L0466	TLSO, sagittal control, rigid posterior frame and flexible soft anterior apron with straps, closures and padding, restricts gross trunk motion in sagittal plane, produces intracavitary pressure to reduce load on intervertebral disks, prefabricated item that has been trimmed, bent, molded, assembled, or otherwise customized to fit a specific patient by an individual with expertise
L0467	TLSO, sagittal control, rigid posterior frame and flexible soft anterior apron with straps, closures and padding, restricts gross trunk motion in sagittal plane, produces intracavitary pressure to reduce load on intervertebral disks, prefabricated, off-the-shelf
L0468	TLSO, sagittal-coronal control, rigid posterior frame and flexible soft anterior apron with straps, closures and padding, extends from sacrococcygeal junction over scapulae, lateral strength provided by pelvic, thoracic, and lateral frame pieces, restricts gross trunk motion in sagittal, and coronal planes, produces intracavitary pressure to reduce load on intervertebral disks, prefabricated item that has been trimmed, bent, molded, assembled, or otherwise customized to fit a specific patient by an individual with expertise

HCPCS	Description
L0469	TLSO, sagittal-coronal control, rigid posterior frame and flexible soft anterior apron with straps, closures and padding, extends from sacrococcygeal junction over scapulae, lateral strength provided by pelvic, thoracic, and lateral frame pieces, restricts gross trunk motion in sagittal and coronal planes, produces intracavitary pressure to reduce load on intervertebral disks, prefabricated, off-the-shelf
L0470	TLSO, triplanar control, rigid posterior frame and flexible soft anterior apron with straps, closures and padding, extends from sacrococcygeal junction to scapula, lateral strength provided by pelvic, thoracic, and lateral frame pieces, rotational strength provided by subclavicular extensions, restricts gross trunk motion in sagittal, coronal, and transverse planes, provides intracavitary pressure to reduce load on the intervertebral disks, includes fitting and shaping the frame, prefabricated, includes fitting and adjustment
L0472	TLSO, triplanar control, hyperextension, rigid anterior and lateral frame extends from symphysis pubis to sternal notch with two anterior components (one pubic and one sternal), posterior and lateral pads with straps and closures, limits spinal flexion, restricts gross trunk motion in sagittal, coronal, and transverse planes, includes fitting and shaping the frame, prefabricated, includes fitting and adjustment
L0480	TLSO, triplanar control, one piece rigid plastic shell without interface liner, with multiple straps and closures, posterior extends from sacrococcygeal junction and terminates just inferior to scapular spine, anterior extends from symphysis pubis to sternal notch, anterior or posterior opening, restricts gross trunk motion in sagittal, coronal, and transverse planes, includes a carved plaster or cad-cam model, custom fabricated
L0482	TLSO, triplanar control, one piece rigid plastic shell with interface liner, multiple straps and closures, posterior extends from sacrococcygeal junction and terminates just inferior to scapular spine, anterior extends from symphysis pubis to sternal notch, anterior or posterior opening, restricts gross trunk motion in sagittal, coronal, and transverse planes, includes a carved plaster or cad-cam model, custom fabricated

HCPCS	Description
L0484	TLSO, triplanar control, two piece rigid plastic shell without interface liner, with multiple straps and closures, posterior extends from sacrococcygeal junction and terminates just inferior to scapular spine, anterior extends from symphysis pubis to sternal notch, lateral strength is enhanced by overlapping plastic, restricts gross trunk motion in the sagittal, coronal, and transverse planes, includes a carved plaster or cad-cam model, custom fabricated
L0486	TLSO, triplanar control, two piece rigid plastic shell with interface liner, multiple straps and closures, posterior extends from sacrococcygeal junction and terminates just inferior to scapular spine, anterior extends from symphysis pubis to sternal notch, lateral strength is enhanced by overlapping plastic, restricts gross trunk motion in the sagittal, coronal, and transverse planes, includes a carved plaster or cad-cam model, custom fabricated
L0488	TLSO, triplanar control, one piece rigid plastic shell with interface liner, multiple straps and closures, posterior extends from sacrococcygeal junction and terminates just inferior to scapular spine, anterior extends from symphysis pubis to sternal notch, anterior or posterior opening, restricts gross trunk motion in sagittal, coronal, and transverse planes, prefabricated, includes fitting and adjustment
L0490	TLSO, sagittal-coronal control, one piece rigid plastic shell, with overlapping reinforced anterior, with multiple straps and closures, posterior extends from sacrococcygeal junction and terminates at or before the t-9 vertebra, anterior extends from symphysis pubis to xiphoid, anterior opening, restricts gross trunk motion in sagittal and coronal planes, prefabricated, includes fitting and adjustment
L0491	TLSO, sagittal-coronal control, modular segmented spinal system, two rigid plastic shells, posterior extends from the sacrococcygeal junction and terminates just inferior to the scapular spine, anterior extends from the symphysis pubis to the xiphoid, soft liner, restricts gross trunk motion in the sagittal and coronal planes, lateral strength is provided by overlapping plastic and stabilizing closures, includes straps and closures, prefabricated, includes fitting and adjustment

HCPCS	Description
L0492	TLSO, sagittal-coronal control, modular segmented spinal system, three rigid plastic shells, posterior extends from the sacrococcygeal junction and terminates just inferior to the scapular spine, anterior extends from the symphysis pubis to the xiphoid, soft liner, restricts gross trunk motion in the sagittal and coronal planes, lateral strength is provided by overlapping plastic and stabilizing closures, includes straps and closures, prefabricated, includes fitting and adjustment
L0621	Sacroiliac orthosis, flexible, provides pelvic-sacral support, reduces motion about the sacroiliac joint, includes straps, closures, may include pendulous abdomen design, prefabricated, off-the-shelf
L0622	Sacroiliac orthosis, flexible, provides pelvic-sacral support, reduces motion about the sacroiliac joint, includes straps, closures, may include pendulous abdomen design, custom fabricated
L0623	Sacroiliac orthosis, provides pelvic-sacral support, with rigid or semi-rigid panels over the sacrum and abdomen, reduces motion about the sacroiliac joint, includes straps, closures, may include pendulous abdomen design, prefabricated, off-the-shelf
L0624	Sacroiliac orthosis, provides pelvic-sacral support, with rigid or semi-rigid panels placed over the sacrum and abdomen, reduces motion about the sacroiliac joint, includes straps, closures, may include pendulous abdomen design, custom fabricated
L0625	Lumbar orthosis, flexible, provides lumbar support, posterior extends from L-1 to below L-5 vertebra, produces intracavitary pressure to reduce load on the intervertebral discs, includes straps, closures, may include pendulous abdomen design, shoulder straps, stays, prefabricated, off-the-shelf
L0626	Lumbar orthosis, sagittal control, with rigid posterior panel(s), posterior extends from L-1 to below L-5 vertebra, produces intracavitary pressure to reduce load on the intervertebral discs, includes straps, closures, may include padding, stays, shoulder straps, pendulous abdomen design, prefabricated item that has been trimmed, bent, molded, assembled, or otherwise customized to fit a specific patient by an individual with expertise

HCPCS	Description
L0627	Lumbar orthosis, sagittal control, with rigid anterior and posterior panels, posterior extends from L-1 to below L-5 vertebra, produces intracavitary pressure to reduce load on the intervertebral discs, includes straps, closures, may include padding, shoulder straps, pendulous abdomen design, prefabricated item that has been trimmed, bent, molded, assembled, or otherwise customized to fit a specific patient by an individual with expertise
L0628	Lumbar-sacral orthosis, flexible, provides lumbo-sacral support, posterior extends from sacrococcygeal junction to t-9 vertebra, produces intracavitary pressure to reduce load on the intervertebral discs, includes straps, closures, may include stays, shoulder straps, pendulous abdomen design, prefabricated, off-the-shelf
L0629	Lumbar-sacral orthosis, flexible, provides lumbo-sacral support, posterior extends from sacrococcygeal junction to T-9 vertebra, produces intracavitary pressure to reduce load on the intervertebral discs, includes straps, closures, may include stays, shoulder straps, pendulous abdomen design, custom fabricated
L0630	Lumbar-sacral orthosis, sagittal control, with rigid posterior panel(s), posterior extends from sacrococcygeal junction to T-9 vertebra, produces intracavitary pressure to reduce load on the intervertebral discs, includes straps, closures, may include padding, stays, shoulder straps, pendulous abdomen design, prefabricated item that has been trimmed, bent, molded, assembled, or otherwise customized to fit a specific patient by an individual with expertise
L0631	Lumbar-sacral orthosis, sagittal control, with rigid anterior and posterior panels, posterior extends from sacrococcygeal junction to T-9 vertebra, produces intracavitary pressure to reduce load on the intervertebral discs, includes straps, closures, may include padding, shoulder straps, pendulous abdomen design, prefabricated item that has been trimmed, bent, molded, assembled, or otherwise customized to fit a specific patient by an individual with expertise
L0632	Lumbar-sacral orthosis, sagittal control, with rigid anterior and posterior panels, posterior extends from sacrococcygeal junction to T-9 vertebra, produces intracavitary pressure to reduce load on the intervertebral discs, includes straps, closures, may include padding, shoulder straps, pendulous abdomen design, custom fabricated

HCPCS	Description
L0633	Lumbar-sacral orthosis, sagittal-coronal control, with rigid posterior frame/panel(s), posterior extends from sacrococcygeal junction to T-9 vertebra, lateral strength provided by rigid lateral frame/panels, produces intracavitary pressure to reduce load on intervertebral discs, includes straps, closures, may include padding, stays, shoulder straps, pendulous abdomen design, prefabricated item that has been trimmed, bent, molded, assembled, or otherwise customized to fit a specific patient by an individual with expertise
L0634	Lumbar-sacral orthosis, sagittal-coronal control, with rigid posterior frame/panel(s), posterior extends from sacrococcygeal junction to T-9 vertebra, lateral strength provided by rigid lateral frame/panel(s), produces intracavitary pressure to reduce load on intervertebral discs, includes straps, closures, may include padding, stays, shoulder straps, pendulous abdomen design, custom fabricated
L0635	Lumbar-sacral orthosis, sagittal-coronal control, lumbar flexion, rigid posterior frame/panel(s), lateral articulating design to flex the lumbar spine, posterior extends from sacrococcygeal junction to t-9 vertebra, lateral strength provided by rigid lateral frame/panel(s), produces intracavitary pressure to reduce load on intervertebral discs, includes straps, closures, may include padding, anterior panel, pendulous abdomen design, prefabricated, includes fitting and adjustment
L0636	Lumbar sacral orthosis, sagittal-coronal control, lumbar flexion, rigid posterior frame/panels, lateral articulating design to flex the lumbar spine, posterior extends from sacrococcygeal junction to T-9 vertebra, lateral strength provided by rigid lateral frame/panels, produces intracavitary pressure to reduce load on intervertebral discs, includes straps, closures, may include padding, anterior panel, pendulous abdomen design, custom fabricated
L0637	Lumbar-sacral orthosis, sagittal-coronal control, with rigid anterior and posterior frame/panels, posterior extends from sacrococcygeal junction to T-9 vertebra, lateral strength provided by rigid lateral frame/panels, produces intracavitary pressure to reduce load on intervertebral discs, includes straps, closures, may include padding, shoulder straps, pendulous abdomen design, prefabricated item that has been trimmed, bent, molded, assembled, or otherwise customized to fit a specific patient by an individual with expertise

HCPCS	Description
L0638	Lumbar-sacral orthosis, sagittal-coronal control, with rigid anterior and posterior frame/panels, posterior extends from sacrococcygeal junction to T-9 vertebra, lateral strength provided by rigid lateral frame/panels, produces intracavitary pressure to reduce load on intervertebral discs, includes straps, closures, may include padding, shoulder straps, pendulous abdomen design, custom fabricated
L0639	Lumbar-sacral orthosis, sagittal-coronal control, rigid shell(s)/ panel(s), posterior extends from sacrococcygeal junction to T-9 vertebra, anterior extends from symphysis pubis to xyphoid, produces intracavitary pressure to reduce load on the intervertebral discs, overall strength is provided by overlapping rigid material and stabilizing closures, includes straps, closures, may include soft interface, pendulous abdomen design, prefabricated item that has been trimmed, bent, molded, assembled, or otherwise customized to fit a specific patient by an individual with expertise
L0640	Lumbar-sacral orthosis, sagittal-coronal control, rigid shell(s)/ panel(s), posterior extends from sacrococcygeal junction to T-9 vertebra, anterior extends from symphysis pubis to xyphoid, produces intracavitary pressure to reduce load on the intervertebral discs, overall strength is provided by overlapping rigid material and stabilizing closures, includes straps, closures, may include soft interface, pendulous abdomen design, custom fabricated
L0641	Lumbar orthosis, sagittal control, with rigid posterior panel(s), posterior extends from L-1 to below L-5 vertebra, produces intracavitary pressure to reduce load on the intervertebral discs, includes straps, closures, may include padding, stays, shoulder straps, pendulous abdomen design, prefabricated, off-the-shelf
L0642	Lumbar orthosis, sagittal control, with rigid anterior and posterior panels, posterior extends from L-1 to below L-5 vertebra, produces intracavitary pressure to reduce load on the intervertebral discs, includes straps, closures, may include padding, shoulder straps, pendulous abdomen design, prefabricated, off-the-shelf
L0643	Lumbar-sacral orthosis, sagittal control, with rigid posterior panel(s), posterior extends from sacrococcygeal junction to t-9 vertebra, produces intracavitary pressure to reduce load on the intervertebral discs, includes straps, closures, may include padding, stays, shoulder straps, pendulous abdomen design, prefabricated, off-the-shelf

HCPCS	Description
L0648	Lumbar-sacral orthosis, sagittal control, with rigid anterior and posterior panels, posterior extends from sacrococcygeal junction to t-9 vertebra, produces intracavitary pressure to reduce load on the intervertebral discs, includes straps, closures, may include padding, shoulder straps, pendulous abdomen design, prefabricated, off-the-shelf
L0649	Lumbar-sacral orthosis, sagittal-coronal control, with rigid posterior frame/panel(s), posterior extends from sacrococcygeal junction to t-9 vertebra, lateral strength provided by rigid lateral frame/panels, produces intracavitary pressure to reduce load on intervertebral discs, includes straps, closures, may include padding, stays, shoulder straps, pendulous abdomen design, prefabricated, off-the-shelf
L0650	Lumbar-sacral orthosis, sagittal-coronal control, with rigid anterior and posterior frame/panel(s), posterior extends from sacrococcygeal junction to t-9 vertebra, lateral strength provided by rigid lateral frame/panel(s), produces intracavitary pressure to reduce load on intervertebral discs, includes straps, closures, may include padding, shoulder straps, pendulous abdomen design, prefabricated, off-the-shelf
L0651	Lumbar-sacral orthosis, sagittal-coronal control, rigid shell(s)/panel(s), posterior extends from sacrococcygeal junction to t-9 vertebra, anterior extends from symphysis pubis to xyphoid, produces intracavitary pressure to reduce load on the intervertebral discs, overall strength is provided by overlapping rigid material and stabilizing closures, includes straps, closures, may include soft interface, pendulous abdomen design, prefabricated, off-the-shelf
L0720	Cervical-thoracic-lumbar-sacral-orthoses (ctlso), anterior-posterior-lateral control, prefabricated item that has been trimmed, bent, molded, assembled, or otherwise customized to fit a specific patient by an individual with expertise
L1000	Cervical-thoracic-lumbar-sacral orthosis (ctlso) (milwaukee), inclusive of furnishing initial orthosis, including model
L1005	Tension based scoliosis orthosis and accessory pads, includes fitting and adjustment

HCPCS	Description
L1006	Scoliosis orthosis, sagittal-coronal control provided by a rigid lateral frame, extends from axilla to trochanter, includes all accessory pads, straps and interface, prefabricated item that has been trimmed, bent, molded, assembled, or otherwise customize
L1007	Scoliosis orthosis, sagittal-coronal control provided by a rigid lateral frame, extends from axilla, to trochanter, includes all accessory pads, straps, and interface, custom fabricated
L1200	Thoracic-lumbar-sacral-orthosis (tlso), inclusive of furnishing initial orthosis only
L1300	Other scoliosis procedure, body jacket molded to patient model
L1310	Other scoliosis procedure, post-operative body jacket
L1320	Thoracic, pectus carinatum orthosis, sternal compression, rigid circumferential frame with anterior and posterior rigid pads, custom fabricated
L1330	Thoracic orthosis, sternal and/or sternocostal compression, may include anterior and/or posterior pads, panels, with or without frame, prefabricated, includes fitting and adjustment
L0984	Protective body sock, prefabricated, off-the-shelf, each

References

Alsoof, D., Anderson, G., McDonald, C. L., Basques, B., Kuris, E., & Daniels, A. H. (2022). Diagnosis and management of vertebral compression fracture. *American Journal of Medicine*, 135(7), 815–821. <https://doi.org/10.1016/j.amjmed.2022.02.035>

Annaswamy, T. M., Cunniff, K. J., Kroll, M., Yap, L., Hasley, M., Lin, C. K., & Petrasic, J. (2021). Lumbar Bracing for Chronic Low Back Pain: A Randomized Controlled Trial. *American journal of physical medicine & rehabilitation*, 100(8), 742–749. <https://doi.org/10.1097/PHM.0000000000001743>

Bakhsheshian, J., Dahdaleh, N. S., Fakurnejad, S., Scheer, J. K., & Smith, Z. A. (2014). Evidence-based management of traumatic thoracolumbar burst fractures: A systematic review of nonoperative management. *Neurosurgical Focus*, 37(1), E1. <https://doi.org/10.3171/2014.4.FOCUS1415>

Borg, M. M. B., Battaglia, M. M., Invernizzi, M. I. M., & Baricich, A. (2024). Efficacy of different spinal orthoses for pain management, functional improvement, and quality

of life in osteoporotic vertebral fractures: A mini review. *Frontiers in Rehabilitation Sciences*, 5, Article 1506279. <https://doi.org/10.3389/fresc.2024.1506279>

Choo, Y. J., & Chang, M. C. (2020). Effectiveness of orthoses for treatment in individuals with spinal pain. *Yeungnam University Journal of Medicine*, 37(2), 84–89. <https://doi.org/10.12701/yujm.2020.00150>

Hacquebord, J. H., & Leopold, S. S. (2012). In brief: The Risser classification: a classic tool for the clinician treating adolescent idiopathic scoliosis. *Clinical orthopaedics and related research*, 470(8), 2335–2338. <https://doi.org/10.1007/s11999-012-2371-y>

Kaiser, M. G., Eck, J. C., Groff, M. W., Watters, W. C., 3rd, Dailey, A. T., Resnick, D. K., Choudhri, T. F., Sharan, A., Wang, J. C., Mummaneni, P. V., Dhall, S. S., & Ghogawala, Z. (2014). Guideline update for the performance of fusion procedures for degenerative disease of the lumbar spine. Part 1: introduction and methodology. *Journal of neurosurgery. Spine*, 21(1), 2–6. <https://doi.org/10.3171/2014.4.SPINE14257>

Dolan, L. A., Weinstein, S. L., Abel, M. F., Bosch, P. P., Dobbs, M. B., Farber, T. O., Halsey, M. F., Hresko, M. T., Kregel, W. F., Mehlman, C. T., Sanders, J. O., Schwend, R. M., Shah, S. A., & Verma, K. (2019). Bracing in Adolescent Idiopathic Scoliosis Trial (BrAIST): Development and Validation of a Prognostic Model in Untreated Adolescent Idiopathic Scoliosis Using the Simplified Skeletal Maturity System. *Spine deformity*, 7(6), 890–898.e4. <https://doi.org/10.1016/j.jspd.2019.01.011>

Dunn, J., Henrikson, N. B., Morrison, C. C., Blasi, P. R., Nguyen, M., & Lin, J. S. (2018). Screening for adolescent idiopathic scoliosis: Evidence report and systematic review for the US Preventive Services Task Force. *JAMA*, 319(2), 173–187. <https://doi.org/10.1001/jama.2017.11669>

Fiani, B., Newhouse, A., Sarhadi, K. J., Arshad, M., Soula, M., & Cathel, A. (2021). Special considerations to improve clinical outcomes in individuals with osteoporosis undergoing spine surgery. *International Journal of Spine Surgery*, 15(2), 386–401. <https://doi.org/10.14444/8050>

Gammon, S. R., Mehlman, C. T., Chan, W., Heifetz, J., Durrett, G., & Wall, E. J. (2010). A comparison of thoracolumbosacral orthoses and SpineCor treatment of adolescent idiopathic scoliosis individuals using the Scoliosis Research Society standardized criteria. *Journal of Pediatric Orthopaedics*, 30(6), 531–538. <https://doi.org/10.1097/BPO.0b013e3181e4f761>

Gepstein, R., Leitner, Y., Zohar, E., Angel, I., Shabat, S., Pekarsky, I., Friesem, T., Folman, Y., Katz, A., & Fredman, B. (2002). Effectiveness of the Charleston bending brace in the treatment of single-curve idiopathic scoliosis. *Journal of pediatric orthopaedics*, 22(1), 84–87.

Guo, J., Lam, T. P., Wong, M. S., Ng, B. K., Lee, K. M., Liu, K. L., Hung, L. H., Lau, A. H., Sin, S. W., Kwok, W. K., Yu, F. W., Qiu, Y., & Cheng, J. C. (2014). A prospective

randomized controlled study on the treatment outcome of SpineCor brace versus rigid brace for adolescent idiopathic scoliosis with follow-up according to the SRS standardized criteria. *European spine journal: official publication of the European Spine Society, the European Spinal Deformity Society, and the European Section of the Cervical Spine Research Society*, 23(12), 2650–2657. <https://doi.org/10.1007/s00586-013-3146-1>

Gutman, G., Benoit, M., Joncas, J., Beauséjour, M., Barchi, S., Labelle, H., Parent, S., & Mac-Thiong, J.-M. (2016). The effectiveness of the SpineCor brace for the conservative treatment of adolescent idiopathic scoliosis: Comparison with the Boston brace. *The Spine Journal*, 16(5), 626–631. <https://doi.org/10.1016/j.spinee.2016.01.020>

Harrop, J. S., Chi, J. H., Anderson, P. A., Arnold, P. M., Dailey, A. T., Dhall, S. S., Eichholz, K. M., Hoh, D. J., Qureshi, S., Rabb, C. H., Raksin, P. B., Kaiser, M. G., & O'Toole, J. E. (2019). Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Evaluation and Treatment of Patients With Thoracolumbar Spine Trauma: Neurological Assessment. *Neurosurgery*, 84(1), E32–E35. <https://doi.org/10.1093/neuros/nyy370>

Hettchen, M., Willert, S., von Stengel, S., Kohl, M., & Kemmler, W. (2022). Effects of the Spinomed active orthosis on chronic back pain in kyphotic women with osteoporotic vertebral fractures three months and older: A randomized controlled study. *Frontiers in Pain Research*, 3. <https://doi.org/10.3389/fpain.2022.1038269>

Jones, J. J., Oduwole, S., Feinn, R., & Yue, J. J. (2021). Postoperative bracing on pain, disability, complications, and fusion rate following 1–3+ level lumbar fusion in degenerative conditions: A meta-analysis. *Clinical Spine Surgery*, 34(2), 56–62. <https://doi.org/10.1097/BSD.0000000000001060>

Kaijser Alin, C., Uzunel, E., Grahn Kronhed, A. C., Alinaghizadeh, H., & Salminen, H. (2019). Effect of treatment on back pain and back extensor strength with a spinal orthosis in older women with osteoporosis: A randomized controlled trial. *Archives of Osteoporosis*, 14(1), 5. <https://doi.org/10.1007/s11657-018-0555-0>

Karimian, M. R., Yeowell, G., Saberi, S., & Sadeghi-Demneh, E. (2021). A comparison of the effectiveness of three types of trunk orthoses on the balance performance of older people with osteoporotic hyperkyphosis: A cross-over study. *Musculoskeletal Science & Practice*, 55, 102430. <https://doi.org/10.1016/j.msksp.2021.102430>

Keshavarzi, F., Azadinia, F., Talebian, S., Khalkhali Zavieh, M., & Rasouli, O. (2023). Effect of a semi-rigid backpack-type thoracolumbar orthosis on thoracic kyphosis angle and muscle performance in older adults with hyperkyphosis: A randomized controlled trial. *Disability and Rehabilitation*, 45(9), 1488–1497. <https://doi.org/10.1080/09638288.2022.2065541>

- Kuznia, A. L., Hernandez, A. K., & Lee, L. U. (2020). Adolescent Idiopathic Scoliosis: Common Questions and Answers. *American family physician*, 101(1), 19–23.
- LeBoff, M. S., Greenspan, S. L., Insogna, K. L., Lewiecki, E. M., Saag, K. G., Singer, A. J., & Siris, E. S. (2022). The clinician's guide to prevention and treatment of osteoporosis. *Osteoporosis international: a journal established as result of cooperation between the European Foundation for Osteoporosis and the National Osteoporosis Foundation of the USA*, 33(10), 2049–2102. <https://doi.org/10.1007/s00198-021-05900-y>
- Lee, C. S., Hwang, C. J., Kim, D. J., Kim, J. H., Kim, Y. T., Lee, M. Y., Yoon, S. J., & Lee, D. H. (2012). Effectiveness of the Charleston night-time bending brace in the treatment of adolescent idiopathic scoliosis. *Journal of pediatric orthopedics*, 32(4), 368–372. <https://doi.org/10.1097/BPO.0b013e3182561193>
- McGuire, R. (2011). AAOS Clinical Practice Guideline: The treatment of symptomatic osteoporotic spinal compression fractures. *Journal of the American Academy of Orthopaedic Surgeons*, 19(3), 183–184.
- Menger, R. P., & Sin, A. H. (2025). Adolescent idiopathic scoliosis. In StatPearls. *StatPearls Publishing*. <https://www.ncbi.nlm.nih.gov/books/NBK499908>
- Mulcahy, M. J., Dower, A., & Tait, M. (2021). Orthosis versus no orthosis for the treatment of thoracolumbar burst fractures: A systematic review. *Journal of Clinical Neuroscience*, 85, 49–56. <https://doi.org/10.1016/j.jocn.2020.11.044>
- Nachemson, A. L., & Peterson, L. E. (1995). Effectiveness of treatment with a brace in girls who have adolescent idiopathic scoliosis. *Journal of Bone and Joint Surgery*, 77(6), 815–822. <https://doi.org/10.2106/00004623-199506000-00001>
- Negrini, S., Donzelli, S., Aulisa, A. G., Czaprowski, D., Schreiber, S., de Mauroy, J. C., Diers, H., Grivas, T. B., Knott, P., Kotwicki, T., Lebel, A., Marti, C., Maruyama, T., O'Brien, J., Price, N., Parent, E., Rigo, M., Romano, M., Stikeleather, L., Wynne, J., ... Zaina, F. (2018). 2016 SOSORT guidelines: orthopaedic and rehabilitation treatment of idiopathic scoliosis during growth. *Scoliosis and spinal disorders*, 13, 3. <https://doi.org/10.1186/s13013-017-0145-8>
- Pizones, J., Boissiere, L., Moreno-Manzanaro, L., et al. (2023). Does the use of postoperative brace help prevent mechanical complications following adult deformity surgery? *European Spine Journal*, 32(3), 914–925. <https://doi.org/10.1007/s00586-022-07521-3>
- Price, C. T., Scott, D. S., Reed, F. E., & Riddick, M. F. (1990). Nighttime bracing for adolescent idiopathic scoliosis with the Charleston bending brace. *Spine*, 15(12), 1294–1299. <https://doi.org/10.1097/00007632-199012000-00011>
- Qaseem, A., Wilt, T. J., McLean, R. M., Forciea, M. A., Clinical Guidelines Committee of the American College of Physicians, Denberg, T. D., Barry, M. J., Boyd, C., Chow, R. D.,

Fitterman, N., Harris, R. P., Humphrey, L. L., & Vijan, S. (2017). Noninvasive Treatments for Acute, Subacute, and Chronic Low Back Pain: A Clinical Practice Guideline From the American College of Physicians. *Annals of internal medicine*, 166(7), 514–530. <https://doi.org/10.7326/M16-2367>

Risser, J. C. (1958). The iliac apophysis; an invaluable sign in the management of scoliosis. *Clinical Orthopaedics*, 11, 111–119.

Takasaki, H., & Miki, T. (2017). The impact of continuous use of lumbosacral orthoses on trunk motor performance: A systematic review with meta-analysis. *Spine Journal*, 17(6), 889–900. <https://doi.org/10.1016/j.spinee.2017.03.003>

US Preventive Services Task Force, Grossman, D. C., Curry, S. J., et al. (2018). Screening for adolescent idiopathic scoliosis. *JAMA*, 319(2), 165–172. <https://doi.org/10.1001/jama.2017.19342>

Virkki, E., Holstila, M., Mattila, K., Pajulo, O., & Helenius, I. (2021). Radiographic outcomes of immobilization using Boston brace for pediatric spondylolysis. *Scandinavian Journal of Surgery*, 110(2), 271–275. <https://doi.org/10.1177/1457496919896998>

Weinstein, S. L., Dolan, L. A., Wright, J. G., & Dobbs, M. B. (2013). Effects of bracing in adolescents with idiopathic scoliosis. *New England Journal of Medicine*, 369(16), 1512–1521. <https://doi.org/10.1056/NEJMoa1307337>

Weiss, H. R., Çolak, T. K., Lay, M., & Borysov, M. (2021). Brace treatment for individuals with scoliosis: State of the art. *South African Journal of Physiotherapy*, 77(2), 1573. <https://doi.org/10.4102/sajp.v77i2.1573>

Willner, S. (1985). Effect of a rigid brace on back pain. *Acta Orthopaedica Scandinavica*, 56(1), 40–42. <https://doi.org/10.3109/17453678508992977>

Wood, K. B., Li, W., Lebl, D. R., & Ploumis, A. (2014). Management of thoracolumbar spine fractures. *Spine Journal*, 14(1), 145–164. <https://doi.org/10.1016/j.spinee.2012.10.041>

Zhou, L., Zhao, L., Gong, T., Yu, D., & Zan, X. (2025). Research on the efficacy of scoliosis orthosis in adolescent idiopathic scoliosis individuals. *International Journal of Clinical and Experimental Medicine Research*, 9(9), 1–8. <https://doi.org/10.26855/ijcemr.2025.09.005>

Zhu, M. P., Tetreault, L. A., Sorefan-Mangou, F., Garwood, P., & Wilson, J. R. (2018). Efficacy, safety, and economics of bracing after spine surgery: A systematic review. *Spine Journal*, 18(9), 1513–1525. <https://doi.org/10.1016/j.spinee.2018.01.011>