

In cases where the abnormalities discussed above are present on imaging studies and are known or assumed to have preexisted an injury being rated, physicians should acknowledge these antecedent conditions. If requested, physicians may need to assess whether the condition was previously symptomatic and whether any aggravation occurred as a result of the injury. Physicians should be aware of the statutory definition in the involved jurisdiction pertaining to *aggravation* to ensure their use of the term is consistent with their state's legal interpretation.

DRE categories are discussed in the following three sections.

15.4 DRE: Lumbar Spine

The lumbar spine DRE categories are summarized in Table 15-3. Apart from category I, each category includes a range to account for the resolution or continuation of symptoms and their impact on the ability to perform ADL.

Table 15-3 Criteria for Rating Impairment Due to Lumbar Spine Injury

DRE Lumbar Category I 0% Impairment of the Whole Person	DRE Lumbar Category II 5%- 8% Impairment of the Whole Person	DRE Lumbar Category III 10%-13% Impairment of the Whole Person	DRE Lumbar Category IV 20%-23% Impairment of the Whole Person	DRE Lumbar Category V 25%-28% Impairment of the Whole Person
No significant clinical findings, no observed muscle guarding or spasm, no documentable neurologic impairment, no documented alteration in structural integrity, and no other indication of impairment related to injury or illness; no fractures	Clinical history and examination findings are compatible with a specific injury; findings may include significant muscle guarding or spasm observed at the time of the examination, asymmetric loss of range of motion, or nonverifiable radicular complaints, defined as complaints of radicular pain without objective findings; no alteration of the structural integrity and no significant radiculopathy or individual had a clinically significant radiculopathy and has an imaging study that demonstrates a herniated disk at the level and on the side that would be expected based on the previous radiculopathy, but no longer has the radiculopathy following conservative treatment or fractures: (1) less than 25% compression of one vertebral body; (2) posterior element fracture without dislocation (not developmental spondylolysis) that has healed without alteration of motion segment integrity; (3) a spinous or transverse process fracture with displacement without a vertebral body fracture, which does not disrupt the spinal canal	Significant signs of radiculopathy, such as dermatomal pain and/or in a dermatomal distribution, sensory loss, loss of relevant reflex(es), loss of muscle strength or measured unilateral atrophy above or below the knee compared to measurements on the contralateral side at the same location; impairment may be verified by electrodiagnostic findings or history of a herniated disk at the level and on the side that would be expected from objective clinical findings, associated with radiculopathy, or individuals who had surgery for radiculopathy but are now asymptomatic or fractures: (1) 25% to 50% compression of one vertebral body; (2) posterior element fracture with displacement disrupting the spinal canal; in both cases, the fracture has healed without alteration of structural integrity	Loss of motion segment integrity defined from flexion and extension radiographs as at least 4.5 mm of translation of one vertebra on another or angular motion greater than 15° at L1-2, L2-3, and L3-4, greater than 20° at L4-5, and greater than 25° at L5-S1 (Figure 15-3); may have complete or near complete loss of motion of a motion segment due to developmental fusion, or successful or unsuccessful attempt at surgical arthrodesis or fractures: (1) greater than 50% compression of one vertebral body without residual neurologic compromise	Meets the criteria of DRE lumbosacral categories III and IV; that is, both radiculopathy and alteration of motion segment integrity are present; significant lower extremity impairment is present as indicated by atrophy or loss of reflex(es), pain, and/or sensory changes within an anatomic distribution (dermatomal), or electromyographic findings as stated in lumbosacral category III and alteration of spine motion segment integrity as defined in lumbosacral category IV or fractures: (1) greater than 50% compression of one vertebral body with unilateral neurologic compromise

15.1b Description of Clinical Studies

General

The individual may have undergone a variety of special tests including electromyographic, cystometric, roentgenographic studies with or without dye, CT scans, and MRI studies with or without contrast. The physician should determine when, where, and by whom the studies were done, the findings, and who interpreted them. Whenever possible, the physician should personally review the studies and report agreement or disagreement with previous interpretations. A summary of the studies should be included as a separate paragraph or section.

While imaging and other studies may assist physicians in making a diagnosis, it is important to note that a positive imaging study in and of itself does not make the diagnosis. Several reports indicate approximately 30% of persons who have never had back pain will have an imaging study that can be interpreted as positive for a herniated disk, and 50% or more will have bulging disks. Further, the prevalence of degeneration changes, bulges, and herniations increases with advancing age.⁶⁻¹¹ To be of diagnostic value, clinical symptoms and signs must agree with the imaging findings. In other words, an imaging test is useful to confirm a diagnosis, but an imaging result alone is insufficient to qualify for a DRE category. Individuals with electromyography (EMG) studies that are clearly positive support a diagnosis of radiculopathy and therefore qualify for at least DRE category III.¹⁴

Motion Segment Integrity

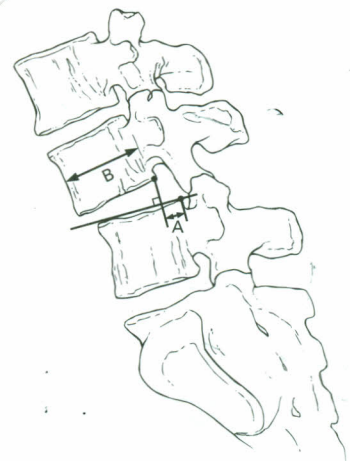
A motion segment of the spine is defined as two adjacent vertebrae, the intervertebral disk, the apophyseal or facet joints, and ligamentous structures between the vertebrae. The range of motion from segment to segment varies. In the upper cervical spine (occiput to C2), there is little flexion-extension, while the lower cervical spine permits increasing flexion-extension movements from about 10° at C2 to C3 to about 20° at C5 to C6 and C6 to C7. Flexion-extension movements are about 4° in the upper thoracic spine, 6° in the midthoracic spine, and 12° in the lower thoracic spine segments. In the lumbar spine there is a gradual increase from about 12° at L1 to L2 to 20° at the L5 to S1 level.¹³

Lateral bending is 5° to 6° in the lower cervical spine and about 6° in the upper thoracic spine. In the lumbar spine, lateral bending is greatest at L3 to L4, where it is about 8° to 9°. Axial rotation is 30° to 40° in each direction in the upper cervical spine, 5° to 6° in the lower cervical and upper thoracic spine, and minimal in the lumbar spine.

Throughout the spine, movements are coupled; this means that the primary motion in one direction always is accompanied by a secondary motion in another direction. For example, rotation is almost always combined with side bending. The dominant motions at both the lower cervical and entire lumbar spine, where most clinical pathology occurs, are flexion-extension.

Alteration of motion segment integrity can be either loss of motion segment integrity (increased translational or angular motion) or decreased motion resulting mainly from developmental changes, fusion, fracture healing, healed infection, or surgical arthrodesis. An attempt at arthrodesis may not necessarily result in a solid fusion, but it may significantly limit motion at a motion segment and qualify for alteration of motion segment integrity.

Figure 15-3a Loss of Motion Segment Integrity, Translation

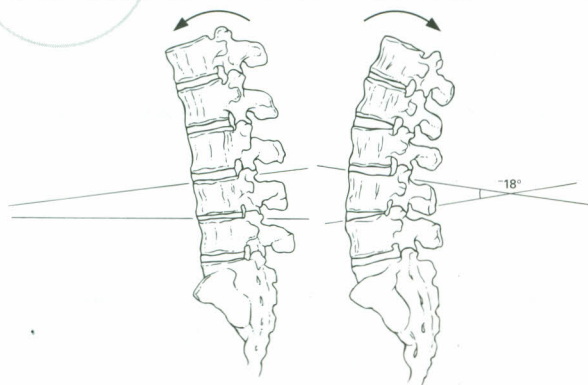


A line is drawn along the posterior bodies of the vertebrae below and above the motion segment in question on dynamic (flexion and extension), lateral roentgenograms of the spine. The distance between lines A and B and the distance between lines B and C at the level of the posteroinferior corner of the upper vertebral body are summed. A value greater than 2.5 mm in the thoracic spine, greater than 4.5 mm in the lumbar spine, and greater than 3.5 mm in the cervical spine qualifies as loss of structural integrity.

Motion of the individual spine segments cannot be determined by a physical examination but is evaluated with flexion and extension roentgenograms (see Figures 15-3a through 15-3c).^{13,14} Loss of motion segment integrity is defined as an anteroposterior motion of one vertebra over another that is greater than 3.5 mm in the cervical spine, greater than 2.5 mm in the thoracic spine, and greater than 4.5 mm in the lumbar spine (Figure 15-3a). Loss of motion segment integrity is also defined as a difference in the angular motion of two adjacent motion segments greater than 15° at L1-2, L2-3, and L3-4 and greater than 20° at L4 to L5. Loss of integrity of the lumbosacral joint is defined as angular motion between L5 and S1 that is greater than 25°. In the cervical spine, loss of motion segment integrity is defined as motion at the level in question that is more than 11° greater than at either adjacent level.

When routine x-rays are normal and severe trauma is absent, motion segment alteration is rare; thus, flexion and extension x-rays are indicated *only* when the physician suspects motion segment alteration from history or findings on routine x-rays.¹⁴

Figure 15-3b Loss of Motion Segment Integrity, Angular Motion (Sagittal Rotation), Lumbar Spine



Lines are drawn along the superior border of the vertebral body of the lower vertebrae and the superior border of the body of the upper vertebrae and the lines extended until they join. The angles are measured and subtracted. Note that lordosis (extension) is represented by a negative angle and kyphosis (flexion) by a positive angle. Loss of motion segment integrity is defined as motion greater than 15° at L1-2, L2-3, and L3-4 and greater than 20° at L4 to L5. Loss of integrity of the lumbosacral joint is defined as angular motion between L5 and S1 that is greater than 25°. The flexion angle is +8° and the extension angle is -18°. Therefore $(+8) - (-18) = +26^\circ$ and would qualify for loss of structural integrity at any lumbar level.

15.2 Determining the Appropriate Method for Assessment

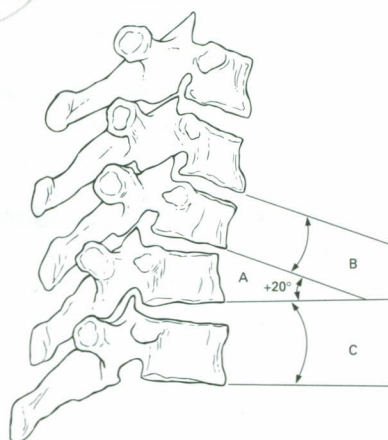
Spinal impairment rating is performed using one of two methods: the diagnosis-related estimate (DRE) or range-of-motion (ROM) method.

The DRE method is the principal methodology used to evaluate an individual who has had a distinct injury. When the cause of the impairment is not easily determined and if the impairment can be well characterized by the DRE method, the evaluator should use the DRE method.

The ROM method is used in several situations:

1. When an impairment is not caused by an injury, if the cause of the condition is uncertain and the DRE method does not apply, or an individual cannot be easily categorized in a DRE class. It is acknowledged that the cause of impairment (injury, illness, or aging) cannot always be determined. The reason for using the ROM method under these circumstances must be carefully supported in writing.

Figure 15-3c Loss of Motion Segment Integrity, Cervical Spine



Lines are drawn along the inferior borders of the two vertebral bodies adjacent to the level in question and of the vertebral bodies above and below those two vertebrae. Angles A, B, and C are measured on both flexion and extension x-rays and the measurements subtracted from one another. Note that lordosis (extension) is represented by a negative angle and kyphosis (flexion) is represented by a positive angle. Loss of motion segment integrity is defined as motion at the level in question that is more than 11° greater than at either adjacent level.