

Track changes are based on suggestions provided during the comment period.

August 18, 2025

Measure Title: Anatomical Landmark-Based Vertebral Numbering in Spine MRI Reports

Measure Purpose	To improve diagnostic accuracy and reduce wrong-level spine surgery by ensuring MRI reports of the spine consistently number vertebra using anatomical landmarks visible on radiographs and describe any irregularities or anomalies with reference to radiographic anatomical landmarks. This approach supports safer surgical planning, improves communication among care teams, and strengthens care coordination.
Measure Description	All reports for diagnostic MRI studies of the spine (total, thoracic, and lumbar) that include vertebral numbering based on radiographic (identifiable on Xray) anatomical landmarks.
Rationale	<p>Care Gap</p> <p>Despite the well-documented risks associated with inaccurate vertebral labeling, there is currently no widely accepted standard for labeling or evaluating the spine in MRI reporting. Many radiology practices rely on limited-field imaging, which may miss critical anatomical landmarks and fail to identify transitional vertebrae or other anomalies.^{2,5,6,8} This lack of standardized reporting can lead to miscommunication and increases the risk of wrong-level spine surgery (WLSS), a preventable error with serious clinical and legal consequences.^{4,9} To address these challenges, professional organizations such as the Academic Medical Center Patient Safety Organization (AMC PSO) have issued consensus guidelines. These include protocols such as the Time-Out for Level Localization (TOLL), a thorough preoperative imaging review, and close collaboration between radiologists and surgeons.^{9,12} However, the adoption of these practices remains inconsistent, revealing a persistent gap between evidence-based recommendations and routine clinical implementation.</p> <p>Clinical Justification</p> <p>Standardized vertebral labeling in MRI reports using anatomical landmarks is crucial for enhancing diagnostic accuracy and minimizing the risk of WLSS. Vertebral segmentation anomalies and numbering variants are present in nearly 30 percent of individuals¹¹ and are often missed in limited-field imaging, increasing the likelihood of spinal level misidentification.^{1,3} WLSS is estimated to occur in approximately one in 3,110 surgeries, with spinal procedures accounting for about five percent of wrong-site cases.^{4,9} These figures underscore the need for standardized reporting that incorporates the use of radiographically visible anatomical landmarks so that they can be referenced on Operating Room imaging studies (limited field xray, fluoroscopy). There is a strong professional consensus supporting WLSS prevention strategies, including TOLL, adherence to standardized protocols, and interdisciplinary collaboration.^{4,12}</p>

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	<p>Health Care Cost Implications Standardizing vertebral counting in MRI reports can enhance care quality while reducing healthcare costs. This approach helps avoid repeat imaging, unnecessary procedures, and medicolegal risk. A review of malpractice claims found that failure to follow established protocols (83.8%) and inadequate review of medical records (41.2%) were major contributors to WLSS. These issues not only compromise patient safety but also result in significant financial liability, with average closed claims exceeding \$136,000 and over 60% resulting in settlements.¹⁰ Additionally, analyses and modeling studies emphasize the value of reviewing prior imaging for lumbar spine anomalies before ordering new MRIs. This practice supports informed decision-making, reduces redundant imaging, and improves diagnostic accuracy.</p>
<p>Denominator</p>	<p>All patients, regardless of age, undergoing diagnostic MRI studies of the spine (total, thoracic and lumbar).</p> <p>Denominator Criteria (Eligible Cases): All patients, regardless of age AND Patient procedure during the performance period (CPT): 72141, 72146, 72148, 72149, 72156, 72157, 72158, 72082</p>
<p>Exclusions</p>	<p>Cases with segmentation anomalies of the imaged part of the spine.</p>
<p>Exceptions</p>	<p>Studies in which image quality is insufficient, preventing accurate identification of anatomical landmarks required for vertebral numbering. (e.g., motion artifact, poor image quality, or stitching errors).</p>
<p>Numerator</p>	<p>All final reports include vertebral numbering based on anatomical landmarks identifiable on Xray.</p> <p>Numerator Note: The landmarks used in the description should be visible on intraoperative x-ray such as ribs, lowest fully formed vertebral body, lumbosacral angle.</p> <p>Numerator Codes:</p> <p>Performance Met: PM0XX: Final report includes vertebral numbering based on anatomical landmarks U, if the count is abnormal, a description of the anatomical landmark used.</p> <p>OR</p> <p>Performance Not Met: NM0XX: Final report does not include landmark-based numbering, OR, if count is abnormal, does not include a description of the anatomical landmark.</p> <p>OR</p> <p>Denominator Exception: PE0XX: Documentation of technical or medical reasons for not including landmark-based numbering, such as studies in which</p>

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	<p>image quality is insufficient to provide landmark-based numbering. Denominator exception does not include instances of incomplete anatomical coverage.</p>
Guidance	<p>The most reliable strategy for accurate vertebral body counting involves inclusion of a sagittal localizer image of the entire spine for patients undergoing total, thoracic, lumbar spine MR imaging. If counting localizer scans are not performed, the report should give ample reference to landmarks that are radiographically visible, such as the lowest rib, the lowest fully formed intervertebral disc space, or the lumbosacral angle.</p> <p>The iliolumbar ligament is the most accurate anatomical structure on MRI that identifies the L5 vertebral body, but it cannot be visualized in the Operating Room. Therefore, the ligament can be used to identify L5, but additional radiographic landmarks should be included.</p> <p>To determine whether reports meet the measure criteria:</p> <ol style="list-style-type: none">1. Include a coded field in the reporting template “Anatomical Details” (or similar)2. The field can default to a normal statement, examples:<ol style="list-style-type: none">a. MRI Total: There is a normal complement of vertebral bodies when counting from top to bottom, the lowest fully formed disc space is L5/S1.b. MRI Thoracic: There is a normal complement of thoracic vertebral bodies, with 12 ribs bilaterally (or (based on prior [other imaging study] review.c. MRI lumbar:<ol style="list-style-type: none">i. With whole spine localizer: There is a normal complement of vertebral bodies when counting from top to bottom, the lowest fully formed disc space is L5/S1.ii. Without full spine localizer: There are [number] non-rib-bearing lumbar vertebral bodies. What appears to be the first non-rib-bearing vertebral body on MRI was labeled as L1, the lowest fully formed disc is at [Level], the lumbosacral angle is at [Level]. [Add any variants, such as transitional anatomy]. <p>Educational Resources:</p> <p>Schlobohm, K., Warstadt, M. B., Tannoury, C., & Kadom, N. (2017). Wrong-Site Spine Surgery: What Radiologists Can Do. <i>Neurographics</i>, 7, 9–14. https://doi.org/10.3174/ng.1170184</p>
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