Lumbar Spine and Related Lower Extremity Radiating Pain

ICD-9-CM code: 724.3  Sciatica

ICF codes: Activities and Participation Domain code: d4104  Standing  (Getting into and out of a standing position or changing body position from standing to any other position, such as lying down or sitting down)

Body Structure codes:
- s76002  Lumbar vertebral column
- s7508  Structure of the lower extremity, other specified

Body Functions code:
- b28013  Pain in back
- b2803  Radiating pain in a dermatome

Common Historical Findings:
- Shooting, narrow band of pain - usually below the knee
- Paresthesias
- Numbness
- Weakness

Common Impairment Findings - Related to the Reported Activity Limitation or Participation Restrictions:
- May adopt postures or positions found to relieve nerve tension
- Symptoms are reproduced with SLR or other lower limb tension tests
- May have sensation deficits over medial calf, dorsal web space between 1st and 2nd metatarsals, or lateral foot to light touch or sharp/dull
- May have strength deficits of gastrocnemius/soleus complex (single leg heel raise), extensor hallucis longus (EHL manual muscle test), or tibialis anterior (TA manual muscle test)

Physical Examination Procedures:

Performance Cues:
- Raise leg until symptoms are slightly reproduced
Determine symptom alteration with hip flexion and extension; ankle dorsiflexion and plantarflexion

Performance Cues:
Utilize light touch or sharp/dull testing:
- L4 = Medial lower leg
- L5 = Dorsal web space
- S1 = Lateral foot (5th metatarsal)
Assess perianal region if you suspect cauda equina involvement

Segmental Muscle Strength Testing
Single Leg Heel Raise

Performance Cues:
Provide hand to hand contact to assist balance
First - perform bilateral heel raise and note amount of ankle plantarflexion
Second - perform single leg heel raise and determine if full ankle plantarflexion is achieved
Gastrocnemius/Soleus muscles = S1
Segmental Muscle Strength Testing
Tibialis Anterior

Performance Cues:
“Raise your foot and ankle up and in and hold it there”
Note ability to resist opposing manual force
Tibialis anterior = L4

Extensor Hallucis Longus Manual Muscle Tests

Performance Cues:
"Raise your big toes to the ceiling and hold"
Note ability to resist opposing manual force
May resist bilaterally and compare ability to resist
Extensor hallucis longus = L5

Lumbar Spine and Related Lower Extremity Radiating Pain
Description, Etiology, Stages, and Intervention Strategies

The below description is consistent with descriptions of clinical patterns associated with the vernacular term “Lumbar Radiculopathy”

Description: Lumbar radiculopathy is a disorder of the nerve root at the central canal involving a portion of the cauda equina or at the lateral forminal canal involving one or more nerve roots. The patient presentation is usually involves pain, numbness or paresthesia, and weakness of the lower extremities. The pain is typically described as a lancinating, narrow band or pain that radiates distally.

Etiology: Lumbar radiculopathy is suspected to occur as a result of arthritic spurs, displacement of the lumbar disc, fractures of the spine, and other pathology such as neoplasms. It is commonly believed that these disorders compress the nerves exiting the spinal cord producing impaired conduction of the involved nerves. In many patients, the inflammatory process around
the nerve root is believe to be the major cause of the pain and nerve conduction disturbances –
because the anatomical abnormalities persist (upon follow-up imaging) even after the symptoms
have been alleviated.

**Acute Stage / Severe Condition:** Physical Examinations Findings (Key Impairments)
*ICF Body Functions codes: b28013.3 SEVERE pain in back; and b2803.3 SEVERE radiating pain in a dermatome*

- Radicular pain limits movements are commonly seen that create a stretch to the
  involved nerve root – such as lumbar and hip flexion with a straightened knee
- Postures to limit the tension on the (such as a lateral shift) may be present
- Muscles associated with the level of the injury will often present with
  guarding/spasming
- Positive straight leg raising (SLR) where radicular pain is reproduced at about 30° of
  SLR and worsens with ankle dorsiflexion
- Positive contralateral SLR

**Sub Acute Stage / Moderate Condition:** Physical Examinations Findings (Key Impairments)
*ICF Body Functions codes: b28013.2 MODERATE pain in back; and b2803.2 MODERATE radiating pain in a dermatome*

- As above with the following differences
- Radicular pain typically diminishes as the inflammation is reduced
- Patient reports less pain in mid range/neutral postures and but pain remains with end
  range movement

**Settled Stage / Mild Condition:** Physical Examinations Findings (Key Impairments)
*ICF Body Functions codes: b28013.1 MILD pain in back; and b2803.1 MILD radiating pain in a dermatome*

- As above with the following differences
- The patient’s radicular symptoms are reproduced only at the extreme end ranges of
  SLR or forward bending while standing

When less acute the therapist should re-assess for strength and flexibility deficits that may be
present and predispose the patient to repeated or further injury.

**Intervention Approaches / Strategies**

**Acute Stage / Severe Condition**

Goals: Alleviate radicular symptoms
  Improve active movement range for the lumbar spine and lower extremities
- Patient Education/Re-injury Prevention
  Establish a movement or position that best relieves the patient’s radicular symptoms. (Positions that reduce nerve entrapment at the lateral foraminal canal are typically slight flexion, sidebending opposite the painful side, and slight rotation away from the painful side.) This positioning is usually done with the patient sidelying on a treatment or mat table – mimicking the patient’s bed positions.
  Advise the patient to follow the medication instructions provided by her/his physician – specifically emphasize the importance of proper administration of steroidal or non-steroidal antiflammatory medications in addressing the inflammation around the nerve root.
  Instruct the patient to avoid movements that may exacerbate their symptoms.

- Therapeutic Exercises
  Nerve mobility exercises for the involved lower extremity in the painfree ranges (e.g., ankle dorsiflexion/plantarflexion in painfree ranges – with varying amounts of knee extension)

- Physical Agents
  Ice
  Electrical stimulation

Sub Acute Stage / Moderate Condition

Goal: Restore painfree active spinal and lower extremity movement

- Approaches / Strategies listed above

- Therapeutic Exercises
  Progress nerve mobility exercises for the involved lower extremity in the painfree ranges
  If the patient is suspected to have an underlying disc disorder, attempt to centralizes the patient’s pain in the lower extremity through the use of positions and repeated movements/exercises (usually lateral shift maneuvers combined with extension exercises)

- Manual Therapy
  Manual overpressures or mobilization techniques may be utilized to facilitate and maintain the centralization of lower extremity pain

Settled Stage / Mild Condition

Goals: Restore normal, painfree active spinal movement to enable the patient to perform activities of daily living
Normalize lumbar, pelvis, hip, knee and ankle strength and flexibility

- Approaches / Strategies listed above

When less acute the therapist should re-assess for strength and flexibility deficits that may be present and predispose the patient to repeated or further injury.

- Therapeutic Exercises
  - Continue to progress nerve mobility exercises for the involved lower extremity in the painfree ranges
  - Continue to progress the use of positions and repeated movements/exercises that centralize the patient’s symptoms
  - Stretching exercises for relevant tight musculature
  - Strengthening exercises for relevant weak musculature

Intervention for High Performance / High Demand Functioning in Workers or Athletes

Goal: Return to desired occupational or recreational activities

- Approaches / Strategies listed above

- Therapeutic Exercises
  - Add muscular and cardiovascular endurance activities to the current exercise program

- Ergonomic Instruction
  - Provide job/sport specific training to lessen strain on the lumbar spine and to maximize activity tolerance

Selected References


# Exercise and Movement Re-Education Interventions for Patients with Lumbar Spine Impairments

<table>
<thead>
<tr>
<th>Body Function Label</th>
<th>Critical Impairments</th>
<th>Other Supportive Criteria</th>
<th>Interventions</th>
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<tbody>
<tr>
<td>Lumbar Spine Mobility Deficits</td>
<td>End-range pain</td>
<td>Acute low back pain</td>
<td>End-range stretching to maintain segmental ROM gained from manipulative procedures. Ergonomic instruction, trunk &amp; pelvic girdle strengthening &amp; stretching, as indicated, to prevent future disability.</td>
</tr>
<tr>
<td>Other vernacular terms:</td>
<td>ROM limitations</td>
<td>Minimal/no previous history of LBP</td>
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<tr>
<td>“Facet Syndrome”</td>
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<tr>
<td>Mobilization Exercises</td>
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<tr>
<td>Lumbar Spine Stability Deficits</td>
<td>Symptoms reproduced with sustained end range positions</td>
<td>Long history of progressively worsening symptoms (i.e., less tolerance to end range positions – such as sitting)</td>
<td>Isometric mobilizations to normalize pelvic girdle symmetry. Ergonomic cuing to maintain mid-range lumbar and pelvic girdle positions. Proprioceptive training and trunk/pelvic girdle strengthening to improve ability to stay in mid-range positions. Taping or bracing as indicated.</td>
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<tr>
<td>Other vernacular terms:</td>
<td>Symptoms eased with neutral positions and midrange movements</td>
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<tr>
<td>“Ligamentous Instability”</td>
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<td>Stabilization Exercises</td>
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<tr>
<td>Lumbar Spine and Related Lower Limb Pain</td>
<td>Location of symptoms move centrally with repeated lumbar extension or with repeated lateral trunk shifts</td>
<td>Difficulty with sitting and forward bending</td>
<td>Manual procedures, postures, or exercises that centralize the symptoms. Ergonomic cuing to maintain lumbar lordosis prevent peripheralization. Progress to treatment of underlying segmental instability.</td>
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<tr>
<td>Other vernacular terms:</td>
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<tr>
<td>“Disc Derangement”</td>
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<tr>
<td>Extension Exercise, or Specific Exercise Group</td>
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<tr>
<td>Lumbar Spine and Related Lower Extremity Radicular Pain</td>
<td>Narrow band of lancinating pain</td>
<td>Nerve mobility deficits with lower limb tension testing</td>
<td>Dural and nerve mobility exercises as indicated to address the patient’s key impairments. Soft tissue and/or joint mobilization to areas of potential spinal and peripheral nerve entrapments</td>
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<tr>
<td>Other vernacular terms:</td>
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<tr>
<td>“Nerve Root Adhesion”</td>
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<tr>
<td>or “Dural Adhesion”</td>
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<tr>
<td>Nerve Mobility Exercises</td>
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Mobilization Exercises


Stabilization Exercises


Extension Exercises and Lateral Shift Correction/Exercises


Nerve Mobility Exercises


