Best Practice Model for Imaging of Low Back Pain

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Objectives:

- Describe the key concepts unique to over utilization in low back pain imaging
- Discuss nationally accepted guidelines for low back pain imaging
- Explain how individual radiologists may facilitate quality care for low back pain
WHEN TO IMAGE?
APPROPRIATE LOW BACK PAIN IMAGING

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OBJECTIVES

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- Review nationally accepted guidelines for low back pain imaging
- Outline how individual radiologists may facilitate quality care for low back pain patients
Appropriate Use of Lumbar Imaging for Evaluation of Low Back Pain

Roger Chou, MD, MD, Richard A. Deyo, MD, MPH, MPH, Jeffrey G. Jarvik, MD, MPH

Radiol Clin N Am 50 (2012) 569-585
IMAGING OVERUTILIZATION

ACUTE LOW BACK PAIN

- Symptoms < 4 Weeks
- Three main categories:
  - Nonspecific
  - Nonspecific w/ radiculopathy
  - Patients with a serious underlying condition (Red Flag)
ROUTINE LOW BACK PAIN IMAGING

- Does not improve patient outcomes
- Exposes patients to unnecessary harms
  (Labeling, radiation exposure, NSF)
- Downstream effects (i.e. unnecessary interventions)
- Contributes to rising healthcare costs
~40% of patients with acute low back pain underwent imaging

Median time to imaging was same day as diagnosis

Emergency Department use of CT or MR for low back pain patients tripled between 2002-2006
PRACTICE PATTERNS

• 1/3 of surveyed physicians would order imaging in uncomplicated low back pain if the patient insisted after the physician explained that it was unnecessary.

• Patient satisfaction surveys suggest “more satisfaction” if imaging is provided despite similar or worse outcomes.

• # of patient visits is relatively unchanged, yet cost is dramatically increasing and outcomes are not significantly changing.
PRACTICE PATTERNS

- Wide variations: high volume use areas >5x than low volume use areas
- High use areas do not have better outcomes
- Wide variation of use between and within medical specialties
LOW BACK PAIN PREVALENCE

- 2\textsuperscript{nd} most common symptom at US office visits
- 1/3 of adults report back pain during the last 3 months
- ~3/4 of adults report at least 1 episode of back pain during their lifetime
DEGENERATIVE IMAGING FINDINGS

- Most degenerative imaging findings are asymptomatic

Patients > 60 years old:
- 90% degenerated/bulging disc
- 36% herniated discs
- 21% spinal stenosis
HIGH YIELD IMAGING FINDINGS

- Moderate/severe spinal canal stenosis
- Nerve compression
- Disc extrusion
NATURAL HISTORY OF LOW BACK PAIN

- Most patients with acute low back pain with or without radiculopathy show significant improvement within 1st four weeks regardless of treatment.
- Low prevalence of serious underlying conditions.
- Most patients with a serious underlying condition will have a identifiable risk factor.
SOURCES OF LOW BACK PAIN

- 70% lumbar strain or sprain
- 10-14% degenerated/herniated disc
- 4% osteoporotic compression fractures
- 0.7% undiagnosed neoplasm
- 0.04% cauda equina syndrome
- 0.01% infectious
LOW BACK PAIN IMAGING

- Weak correlation between imaging findings and symptoms
- No improved outcomes when MRI or radiographs are performed in early setting (< 4 weeks) of acute low back pain
COST OF LOW BACK PAIN

DIRECT COSTS:
1998 total US healthcare expenditure for patients with back pain was estimated at $90 billion
1997 mean individual expense for low back pain care: $4,795
2005 mean individual expense for low back pain care: $6,096

INDIRECT COSTS:
Disability
Lost time from work
Decreased productivity
<table>
<thead>
<tr>
<th>Intervention</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumbar spine radiography (two or three views)(^a)</td>
<td>$54</td>
</tr>
<tr>
<td>Lumbar spine CT scan(^a)</td>
<td>$344 (without contrast)</td>
</tr>
<tr>
<td></td>
<td>$426 (with contrast)</td>
</tr>
<tr>
<td>Lumbar spine MRI(^a)</td>
<td>$645 (without contrast)</td>
</tr>
<tr>
<td></td>
<td>$794 (with contrast)</td>
</tr>
<tr>
<td>Fusion surgery(^b)</td>
<td>Without bone morphogenetic proteins: median, $57,393 (interquartile range, $39,660–$83,608)</td>
</tr>
<tr>
<td></td>
<td>With bone morphogenetic proteins: median, $74,254 (interquartile range, $54,737–$102,663)</td>
</tr>
</tbody>
</table>

\(^a\) Without bone morphogenetic proteins

\(^b\) With bone morphogenetic proteins

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HARMS OF IMAGING

DIRECT:
- Radiation exposure
- NSF
- Nephrotoxicity

INDIRECT:
- Labeling (sick role/alter activity levels)
- Downstream costs (increased # of unnecessary procedures)
2007 American college of physicians (ACP) & American pain society (APS) published guidelines:

Do not routinely obtain imaging or other diagnostic tests in patients with nonspecific low back pain

Perform imaging and other diagnostic tests when there is a severe or progressive neurological deficit or when there is a serious underlying condition suspected.
<table>
<thead>
<tr>
<th><strong>Disease or condition</strong></th>
<th>Imaging for low back pain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target audience</strong></td>
<td>Internists, family physicians, and other clinicians</td>
</tr>
<tr>
<td><strong>Target patient population</strong></td>
<td>Adults with low back pain</td>
</tr>
<tr>
<td><strong>Interventions</strong></td>
<td>Radiography, Computed tomography, Magnetic resonance imaging</td>
</tr>
<tr>
<td><strong>Indications for diagnostic imaging</strong></td>
<td>Immediate imaging is recommended in patients with acute low back pain who have major risk factors for cancer, risk factors for spinal infection, risk factors for or signs of the cauda equina syndrome, or severe or progressive neurologic deficits. Imaging after a trial of therapy is recommended in patients with minor risk factors for cancer, risk factors for inflammatory back disease, risk factors for vertebral compression fracture, signs or symptoms of radiculopathy, or risk factors for or symptoms of symptomatic spinal stenosis. Repeated imaging is only recommended in patients with new or changed low back symptoms.</td>
</tr>
<tr>
<td><strong>Evidence that expanding imaging to patients without these indications does not improve outcomes</strong></td>
<td>Randomized trials of routine imaging versus usual care without routine imaging in patients without indications for diagnostic imaging suggest no clinically meaningful benefits on outcomes related to pain, function, quality of life, or mental health. Other supporting evidence includes the weak correlation between most imaging findings and symptoms, the favorable natural history of acute low back pain with or without imaging, the low prevalence of serious or specific underlying conditions, and unclear effects of imaging on treatment decisions.</td>
</tr>
<tr>
<td><strong>Harms of unnecessary imaging</strong></td>
<td>Radiation exposure (for lumbar radiography and computed tomography), Labeling, Hypersensitivity reactions and contrast nephropathy (for iodinated contrast with computed tomography), Potential association with subsequent unnecessary, invasive, and expensive procedures</td>
</tr>
<tr>
<td><strong>Approaches to overcome barriers to evidence-based practice</strong></td>
<td>Patient expectations or preferences for routine imaging: Use talking points based on evidence-based guidelines to aid in patient education, Time constraints: Use evidence-based online or print education material to supplement face-to-face education, Clinician uncertainty: Recognize the low likelihood of serious conditions in the absence of clinical risk factors and the evidence that shows no benefit associated with routine imaging, Clinician incentives based on patient satisfaction: Advocate for incentives that are based on providing appropriate care</td>
</tr>
<tr>
<td><strong>Talking points for clinicians when discussing low back pain imaging with patients</strong></td>
<td>Risk factor assessment can almost always identify patients who require imaging, The prevalence of serious underlying conditions is low in patients without risk factors, The natural history of acute low back pain is quite favorable, but patients require reevaluation if they are not better after about 1 month, Routine imaging does not improve clinical outcomes but increases costs and may lead to potentially unnecessary invasive treatments, such as surgery, Imaging abnormalities are extremely common, especially in older adults, but most are poorly correlated with symptoms, In most cases, treatment plans do not change after imaging studies, Back imaging is associated with radiation exposure, which can increase the risk for cancer in the case of lumbar radiography and computed tomography.</td>
</tr>
</tbody>
</table>
National Guidelines

2009 American College of Radiology (ACR) appropriateness criteria:

For uncomplicated low back pain with or without radiculopathy it is inappropriate to routinely image in the absence of a red flag criteria.
Low Back Pain/Radiculopathy
Imaging Red Flags

- Recent Significant Trauma
- Unexplained Weight loss
- Unexplained Fever (history of infection)
- Immunosuppressed (Diabetes Mellitus)
- Cancer History
- IV Drug Use
- Prolonged Corticosteroid/ Age >50 with Osteoporosis
- Age >70
- Focal Deficit with Progressive or Disabling Symptoms, Cauda Equina
- Duration > 6 weeks
- Prior Surgery
WHICH TEST

- MRI should almost always be the initial test
- CT should be first line test with moderate/significant trauma
- CT, myelography, or bone scan used as alternative when there is a contraindication to MRI
 WHICH TEST

Lumbar radiographs could be used as the initial test:

- Recent mild/mod trauma
- History of osteoporosis
- >70 of age
- Ankylosing spondylitis
REPEAT IMAGING

- Not usually beneficial unless there are new or significant changes in clinical features (i.e. progressive neurologic symptoms or trauma)
OBSTACLES OF APPROPRIATE USE OF IMAGING

- Patient expectations
- Financial incentives
- Medico-legal implications
- Time for education of patients
EFFECTING CHANGE

- Passive dissemination of guidelines to clinicians (has not been helpful to effect change)
- Imposed prior authorization (viewed as onerous)
- Educational sessions (local peer leaders)
- Clinician audit and feedback
- Computer based decision support (information and/or restrictions at the time of order)
- Same day physical therapy
- Mandatory radiologist consultation if requests are not consistent with guidelines
Effectiveness of Clinical Decision Support in Controlling Inappropriate Imaging

C. Craig Blackmore, MD, MPH, Robert S. Mecklenburg, MD, Gary S. Kaplan, MD

Journal of the American College of Radiology/Vol. 8 No. 1 January 2011
EFFECTING CHANGE

- Standardized reporting with appropriate language (clinical significance or insignificance)
- Epidemiologic statement describing prevalence of disease in asymptomatic patients
- Management recommendations for primary care
- National efforts to decrease incentives that influence overuse
- Financial incentives based on adherence to guidelines rather than patient satisfaction surveys
Spinal MRI: Order Form

Patient Name: | Gender: | DOB: | Age: |
---|---|---|---|
Pt. Phone #: | Pt. Address: |

Procedure requested:  
☑️ MR lumbar spine  
☐ MR cervical spine  
☐ MR thoracic spine  
☐ With contrast (suspected infection, cancer, post-op)  
Pt. weight: | Lbs (may affect MRI equipment considerations) |

Pt. uncomfortable in closed spaces?  
☐ No | Yes: ☐ Can tolerate exam, even if uncomfortable  
☐ Oral meds provided  
☐ Moderate sedation required

Pt. able to lie on back for 30 min?  
☐ Yes | No: ☐ Oral meds provided  
☐ Moderate sedation required

Indications

Please identify the indication(s) below—or if the indication is not listed, use the “Not Listed” box.

☐ Radiculopathy (focal neurologic deficit with progressive or disabling features): Pain in the distribution of the nerve root (often extending below the knee), with:  
☐ Motor deficit, reflex deficit, and/or sensory deficit  
☐ Positive dural tension signs: positive straight leg raise, positive prone femoral stretch

☐ Myelopathy (Babinski or sustained clonus—cervical or thoracic MRI)

☐ Suspected cauda equina syndrome  
☐ New bowel or bladder dysfunction  
☐ Perineal numbness / saddle anesthesia  
☐ Persistent or increasing motor weakness  
☐ Significant loss of coordination in one or both legs

☐ Suspected compression fracture: osteoporosis or osteoporosis risk

☐ Suspected spinal fracture: significant recent trauma or fall

☐ Suspected cancer, infection, or immunosuppression  
☐ Cancer history  
☐ Age >70 years  
☐ Unexplained weight loss  
☐ Immunocompromised patient (Diabetes Mellitus, IV drug use, prolonged corticosteroid use)  
☐ Unexplained fever/chills, UTI

☐ Prior surgery or planned surgery or injection

☐ Not Listed: Other clinical indication (specific signs and symptoms) to perform exam (please describe below). Note: a spinal MRI will likely not be helpful if none of the indications above are present.

Printed name of ordering provider with credentials: __________________________ MD DO NP PA
Signature of provider (no stamp): __________________________ Sig Date: __________ Sig Time: __________
Procedure Date: __________________________ Scheduled Time: __________________________
Facility: __________________________
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