

# Do imaging studies have value in a patient with acute, nonspecific low back pain?

**CYNTHIA D. SMITH, MD**

Senior Physician Educator, Medical Education,  
American College of Physicians, and Adjunct Associate Professor,  
Perelman School of Medicine, Philadelphia, PA

**PATRICK C. ALGUIRE, MD**

Senior Vice President for Medical Education,  
American College of Physicians, Philadelphia, PA

*See related commentary, page 464*

**Consider  
imaging only  
in patients  
who have a  
red flag for  
fracture or  
malignancy**

**A** 38-YEAR-OLD MAN is evaluated in an urgent care center for back pain. He is a high school mathematics teacher who reports the insidious onset of low back pain 3 weeks ago. Over the last week the pain has become constant, is worsened by movement, and does not respond to naproxen. He has no history of trauma, malignancy, fever, weight loss, or bladder or bowel symptoms. He does not use intravenous drugs. On examination, he appears uncomfortable and stiff, protecting his back against motion. He has intact sensation, strength, and reflexes. The straight-leg-raising maneuver reproduces his lower back pain but does not cause radicular pain. Should I now order an imaging study such as spinal radiography, computed tomography, or magnetic resonance imaging to direct therapy?

## IMAGING STUDIES ARE UNLIKELY TO HELP

This man with acute, nonspecific low back pain does not need spinal imaging. Imaging—ie, spine radiography, computed tomography, or magnetic resonance imaging—is unlikely

\*Dr. Smith has disclosed stock holdings and spousal employment at Merck and Company. Dr. Alguire has disclosed royalty payments from UpToDate and ownership interest in Amgen, Bristol-Myers Squibb, Covidien, Dupont, Express Scripts, GlaxoSmithKline, Medtronic, Stryker, Teva Pharmaceutical Industries, and Zimmer Orthopedics.

Smart Testing is a joint project of the *Cleveland Clinic Journal of Medicine* and the American College of Physicians (ACP). The series, an extension of the ACP High Value Care initiative ([hvc.acponline.org/index.html](http://hvc.acponline.org/index.html)), provides recommendations for improving patient outcomes while reducing unnecessary testing and treatment.

doi:10.3949/ccjm.81a.13160

to be helpful in a patient with nonspecific low back pain and may expose him unnecessarily to radiation and the anxiety of findings that are clinically insignificant.

Imaging studies are often ordered inappropriately as part of the evaluation of back pain in patients such as this. In 2008, the total national cost of treating spine (neck and back) problems was estimated to be \$86 billion, representing 9% of total health care costs, which is close to the estimated \$89 billion per year spent on cancer care.<sup>1</sup>

Spine imaging should be considered only in patients who have a “red flag” such as advanced age, history of trauma, history of cancer, and prolonged corticosteroid use, all of which have been associated with an increased probability (from 9% to 33%) of either spinal fracture or malignancy.<sup>2</sup> Other red flags include duration longer than 6 weeks, fever, weight loss, and progressive neurologic findings on examination. This patient has none of these.

## GUIDELINES AND CHOOSING WISELY

High-quality guidelines from different groups recommend against spine imaging in patients with low back pain.<sup>3–6</sup> These guidelines vary slightly in their patient populations and definitions of uncomplicated low back pain.

The American College of Radiology<sup>4</sup> and the American College of Occupational and Environmental Medicine<sup>6</sup> recommend against imaging for patients with both nonspecific and radicular low back pain in the first 6 weeks as long as no red flags are present.

The National Institute for Health and Clinical Excellence<sup>3</sup> and, jointly, the American College of Physicians and American Pain Society (ACP/APS)<sup>5</sup> recommend against im-

aging for patients with nonspecific low back pain in both the acute and chronic settings. Nonspecific low back pain is defined as pain without signs of a serious underlying condition (eg, cancer, infection, cauda equina syndrome), spinal stenosis or radiculopathy, or another specific spinal cause (eg, vertebral compression fracture, ankylosing spondylitis).

In addition, imaging in patients with nonspecific low back pain is one of the top five practices that should be questioned by physicians and patients, according to the American Board of Internal Medicine Foundation in its Choosing Wisely campaign ([www.choosingwisely.org](http://www.choosingwisely.org)).

## HARMS ASSOCIATED WITH SPINE IMAGING

Several guidelines cite radiation exposure as a potential harmful consequence of spinal imaging by plain radiography and computed tomography. The American College of Radiology guideline<sup>4</sup> estimates that the radiation exposure of plain lumbar radiography or lumbar computed tomography ranges between 1 and 10 mSv (3 mSv is the annual amount of ambient radiation in the United States), placing both studies in the medium-range category for relative radiation exposure. The ACP/APS guideline<sup>5</sup> states that radiation exposure from imaging is a reason to dissuade clinicians from routine use.

Although lumbar magnetic resonance imaging does not carry the risk of radiation exposure, it may result in harm by detecting clinically insignificant abnormalities in more than 30% of patients.<sup>7</sup> These incidental findings increase with age and may lead to additional

and possibly unnecessary testing and invasive treatments. The American College of Occupational and Environmental Medicine guideline<sup>6</sup> also cites the high prevalence of abnormal findings on plain radiography, magnetic resonance imaging, and other diagnostic tests that are unrelated to symptoms.

## CLINICAL BOTTOM LINE

On the basis of current data, the patient described at the beginning of this article should not undergo spine imaging; the results are unlikely to affect his medical management and improve his clinical outcome, and imaging carries a small risk of harm.

A practical approach would be to treat his pain with simple analgesia (a different nonsteroidal anti-inflammatory drug or acetaminophen), address his functional challenges, and reassure him that his chance of having a serious underlying cause of back pain is low (< 1%). He should be told to expect significant improvement in his symptoms within 30 days, be encouraged to stay active, and should be offered patient-focused self-help resources.

The recommendation to conservatively manage patients at low risk without imaging is consistent among all four guidelines. Imaging can be considered for a small subset of patients at high risk with red-flag indications. Potential harms associated with routine imaging of all patients with low back pain include radiation exposure and the high rate of clinically insignificant abnormalities that may lead to unnecessary and invasive interventions that increase expense, patient risk, and anxiety without improving outcomes.

## REFERENCES

1. Martin BI, Deyo RA, Mirza SK, et al. Expenditures and health status among adults with back and neck problems. *JAMA* 2008; 299:656–664. Erratum in: *JAMA* 2008; 299:2630.
2. Downie A, Williams CM, Henschke N, et al. Red flags to screen for malignancy and fracture in patients with low back pain: systematic review. *BMJ* 2013; 347:f7095.
3. National Collaborating Centre for Primary Care. Low back pain. Early management of persistent non-specific low back pain. London (UK): National Institute for Health and Clinical Excellence (NICE); 2009 May. 25 p. (Clinical guideline; no. 88) <http://guidelines.gov/content.aspx?id=14699&search=low+back+pain>. <http://guidance.nice.org.uk/CG88>. Accessed May 23, 2014
4. Davis PC, Wippold FJ II, Cornelius RS, et al; Expert Panel on Neurologic Imaging. ACR appropriateness criteria® low back pain. Reston, VA: American College of Radiology (ACR); 2011. [www.guideline.gov/content.aspx?id=35145](http://www.guideline.gov/content.aspx?id=35145). Accessed May 23, 2014.
5. Chou R, Qaseem A, Snow V, et al; Clinical Efficacy Assessment Subcommittee of the American College of Physicians; American College of Physicians; American Pain Society Low Back Pain Guidelines Panel. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Ann Intern Med* 2007; 147:478–491. Erratum in: *Ann Intern Med* 2008; 148:247–248.
6. Low back disorders. In: Hegmann KT, editor. Occupational Medicine Practice Guidelines. Evaluation and Management of Common Health Problems and Functional Recovery in Workers. 3rd ed. Elk Grove Village, IL: American College of Occupational and Environmental Medicine (ACOEM); 2011:333–796. [www.guideline.gov/content.aspx?id=38438](http://www.guideline.gov/content.aspx?id=38438). Accessed May 23, 2014.
7. Boden SD, Davis DO, Dina TS, Patronas NJ, Wiesel SW. Abnormal magnetic-resonance scans of the lumbar spine in asymptomatic subjects. A prospective investigation. *J Bone Joint Surg Am* 1990; 72:403–408.

ADDRESS: Cynthia D. Smith, MD, Medical Associate for Content Development, Medical Education Division, American College of Physicians, 190 North Independence Mall West, Philadelphia, PA 19106; e-mail: [dsmith@acponline.org](mailto:dsmith@acponline.org)