

CLINICAL GUIDELINE:

IMAGING UTILIZATION Low Back Pain



Physician Clinical Integration
Network, LLC

Scope

Low back pain (LBP) will affect up to 90% of the population and is one of the top five patient complaints in the Primary Care or Emergency setting [1]. Acute LBP is defined as pain <4 weeks in duration and subacute back pain lasting between 4 and 12 weeks. Greater than 85% of patients present to Primary Care without a specific underlying condition reliably identified. Less than 1% are attributed to serious systemic etiologies, such as malignancy or infection, and 10% have less serious, specific etiologies, such as vertebral compression fracture, radiculopathy, or spinal stenosis [2]. A large majority of patients who present with LBP will have resolution of their symptoms within 30 days [3].

This clinical guideline focuses on appropriate use of diagnostic imaging in adult patients presenting with LBP. The American College of Radiology (ACR) has developed clinical guidelines to assist physicians in selecting the most appropriate imaging study based on their assessments [17]. Providers should use their own clinical judgment and experience when assessing and treating patients with LBP. These guidelines are to be used to appropriately order imaging studies in this patient cohort.

Guidance

The PCIN Quality Committee and its designees reviewed the available information in medical literature and societal guidelines on the evaluation, management, and appropriate use of imaging for adult patients (>18 years) presenting with LBP in the Ambulatory care and Emergency setting, as well as information derived from their clinical practice to devise these guidelines.

Population Included

- Adult patients (>18 years)
 - Ambulatory care setting
 - Emergency care setting

Exclusions

- Pregnant females

Recommendations

- ✓ A focused history and physical examination should be performed on all patients presenting with a chief complaint of LBP.
- ✓ Red flags (Table 1) presented during patient history and physical examination may warrant further work-up and imaging studies.
- ✓ Routing imaging or diagnostic studies should **not** be performed in patients with non-specific LBP.
- ✓ Patients with non-traumatic LBP do **not** need diagnostic imaging in the absence of red flags.
- ✓ Tables 2-7 summarizes current appropriate use criteria for imaging patients with LBP.
- ✓ Evidence-based information and education on LBP should be provided to all patients.

Rationale

Assessment and Evaluation of Patients Presenting with Low Back Pain

A focused history and physical examination should be performed [4-7]. Each patient should be segmented into one of three broad categories: nonspecific LBP, back pain potentially associated with another specific spinal cause, or back pain potentially associated with radiculopathy or spinal stenosis [4-6]. Practitioners should include causes from social or psychological distresses that may amplify or prolong LBP [5,7].

Table 1 provides specific assessment findings that may indicate underlying causes of LBP [4,6]. Upon physical examination, a patient with fever, weakness, or obvious sensory deficits, with a true positive straight leg raise or in writhing pain, requires additional work-up and should not be considered routine “non-traumatic” back pain [4]. A systematic neurologic exam should be conducted to identify the patient’s baseline and any negative or positive findings should be noted [5].

Imaging Utilization for Patients with Low Back Pain

Clinicians should not routinely obtain imaging or other diagnostic test in patients with non-specific LBP [4-5, 8-10]. Clinicians should perform diagnostic imaging and testing for patients with LBP when severe or progressive neurologic deficit are present [4-5].

The American College of Physicians, the American Pain Society, and the ACR recommend selective imaging for clinically indicated patients (neurologic deficits, one or more red flags (Table 1) [9-10]). Routine advanced imaging is not associated with improved patient outcomes and identifies many radiographic abnormalities that are poorly correlated with symptoms [4]. Chou et al, found in a meta-analysis of six randomized control trials of 1,800 patients that no outcome difference occurred between routine care without imaging and patients who underwent imaging with plain X-ray, CT, or MRI [11]. MRIs reveal many abnormalities in asymptomatic patients. Boden et al, found of asymptomatic patients aged ≥ 60 years, 36% had a herniated disc, 21% had spinal stenosis, and 90% had a degenerated or bulging disc [12]. Based on the literature and evidence-based guidelines, patients with non-traumatic LBP do not need imaging [4, 9-10].

Radiography is recommended when any red flags (Table 1) are present [9]. Lumbar radiography may be sufficient for the initial evaluation of the following red flags: recent significant trauma, osteoporosis, and age >70 years. Further imaging is indicated for treatment planning if findings are abnormal or inconclusive [9]. Clinicians should consider the harmful effects of lumbar radiography because of exposure of the gonads to ionizing radiation. The radiation exposure of oblique views is double the exposure of standard views [8].

Uncomplicated acute LBP and/or radiculopathy without red flags do not warrant MRI, CT, or myelography [8-9]. MRI is the image of choice for issues concerning the spinal cord or epidural space including abscess, infection, or tumors [4, 13-16]. Please refer to Tables 2-7 which summarize current “Appropriate Use Criteria” recommended for patients with LBP by the ACR [9, 17].

Treatment of Low Back Pain

Providers should provide patients with evidence-based information on the course of treatment and effective self-care options [4]. Providers should also inform all patients of the generally favorable prognosis of acute LBP with or without sciatica, including a high likelihood for substantial improvement in the first month [4, 9].



References

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Appendix

Table 1

Potential Red Flags in History and Physical Examination of Patients with Low Back Pain

Underlying Cause	Key Features in History	Possible Findings in Physical Examination
Possible Malignancy	Older adults, gradual increase in pain, history of cancer, unintentional weight loss, no relief with bed rest or conservative therapy, >1 month of pain, HIV or immunocompromised, prolonged steroid use	Cachectic appearance, signs and symptoms related to the underlying malignancy
Possible Infection	History of IV drug use; recent immigration to the United States (especially a major risk factor for tuberculosis or Pott disease); history of urinary tract or skin infection, HIV or immunocompromised, prolonged steroid use	Fever, malaise, spinal tenderness to percussion, night sweats
Possible Compression Fracture	Older adults, women, osteoporotic, history of mild trauma or no history of trauma	Local pain on the fracture site
Cauda Equine Syndrome	Bladder dysfunction (usually urinary retention or overflow incontinence) with leg pain and weakness, bowel incontinence	Saddle anesthesia
Ankylosing Spondylitis	Younger age, morning stiffness, improvement of pain with exercise, pain >3 months, pain not relieved in supine position	Restriction in chest expansion, limited spine movement
Retroperitoneal Rupture	Known aortic aneurysm	Hypotension, diaphoresis, syncope

Chou, R., Qaseem, A., Snow, V., Casey, D., Cross, J. T., Shekelle, P., and Owens, D. K. (2007). Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Annals of Internal Medicine*, 147(7), 478-491. doi: 10.7326/0003-4819-147-7-200710020-00006

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Table 2**Acute, Subacute, or Chronic Uncomplicated Low Back Pain or Radiculopathy. No Red Flags. No Prior Management**

Radiologic Procedure	Rating	Comments
MRI lumbar spine without contrast	2	
X-ray lumbar spine	2	
X-ray myelography and post myelography CT lumbar spine	2	
Tc-99m bone scan with Single-Photon Emission Computerized Tomography (SPECT) spine	2	If there is concern for spondylolysis in a young patient, SPECT/CT remains Global Initiative for Chronic Obstructive Lung Disease's (GOLD) standard
CT lumbar spine without contrast	2	
CT lumbar spine with contrast	2	
MRI lumbar spine without and with contrast	2	
CT lumbar spine without and with contrast	1	
Rating Scale: 1,2,3 = usually not appropriate 4,5,6 = may be appropriate 7,8,9 = usually appropriate		

Patel, N. D., Broderick, D. F., Burns, J., Deshmukh, T. K., Fries, I. B., Harvey, H. B., & Corey, A. S. (2015). ACR appropriateness criteria: low back pain. *American College of Radiology*. Retrieved from <http://www.acr.org/Quality-Safety/Appropriateness-Criteria>

Table 3**Acute, Subacute, or Chronic Uncomplicated Low Back Pain or Radiculopathy. One or More of the Following: Low Velocity Trauma, Osteoporosis, Elderly Individual, or Chronic Steroid Use**

Radiologic Procedure	Rating	Comments
X-ray lumbar spine	7	This procedure is recommended as the initial imaging study, especially in patients with osteoporosis or history of steroid use.
CT lumbar spine without contrast	7	If there remains concern for vertebral body fracture, detailed osseous analysis with CT can be performed for further evaluation.
MRI lumbar spine without contrast	7	CT is preferred. MRI can be useful to evaluate for ligamentous injury or worsening neurologic deficit. MRI can depict marrow edema in these scenarios.
Tc-99m bone scan with SPECT spine	3	Bone scan with SPECT/CT can be useful for radiographically occult fractures and problem solving.
CT lumbar spine with contrast	3	
CT lumbar spine without and with contrast	1	
X-ray myelography and post myelography CT lumbar spine	1	
X-ray discography and post-discography CT lumbar spine	1	
Rating Scale: 1,2,3 = usually not appropriate 4,5,6 = may be appropriate 7,8,9 = usually appropriate		

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Table 4

Acute, Subacute, or Chronic Low Back Pain or Radiculopathy. One or More of the Following: Suspicion of Cancer, Infection, or Immunosuppression

Radiologic Procedure	Rating	Comments
MRI lumbar spine without and with contrast	8	Contrast is useful for neoplasia patients suspected of epidural or intraspinal disease.
MRI lumbar spine without contrast	7	Non-contrast MRI can be sufficient if there is low risk of epidural and/or intraspinal disease.
CT lumbar spine with contrast	6	MRI is preferred. CT is useful if MRI is contraindicated or unavailable and/or for problem solving.
CT lumbar spine without contrast	6	MRI is preferred. CT is useful if MRI is contraindicated or unavailable and/or for problem solving.
X-ray lumbar spine	5	
Tc-99m bone scan whole body with SPECT spine	4	SPECT/CT can be useful for anatomic localization and problem solving, in particular if looking for widespread tumor burden. It is valuable when multifocal metastases are suspected.
Fluorodeoxyglucose-Positron Emission Tomography (FDG-PET)/CT whole body	4	MRI is preferred. This procedure can be indicated if MRI is contraindicated or nondiagnostic. It can distinguish benign versus malignant compression fractures.
CT lumbar spine without and with contrast	3	MRI is preferred. This procedure can be indicated if MRI is contraindicated or nondiagnostic.
X-ray myelography and post myelography CT lumbar spine	3	MRI is preferred. This procedure can be indicated if MRI is contraindicated or nondiagnostic and can be useful for anatomic localization and problem solving.
Rating Scale: 1,2,3 = usually not appropriate 4,5,6 = may be appropriate 7,8,9 = usually appropriate		

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Table 5

Acute, Subacute, or Chronic Low Back Pain or Radiculopathy. Surgery or Intervention Candidate with Persistent or Progressive Symptoms During or Following Six Weeks of Conservative Management

Radiologic Procedure	Rating	Comments
MRI lumbar spine without contrast	8	
CT lumbar spine with contrast	5	MRI is preferred. CT is useful if MRI is contraindicated or unavailable and/or for problem solving.
CT lumbar spine without contrast	5	MRI is preferred. CT is useful if MRI is contraindicated or unavailable and/or for problem solving.
MRI lumbar spine without and with contrast	5	This procedure is indicated if non-contrast MRI is nondiagnostic or indeterminate. Contrast is indicated if patient has history of prior lumbar surgery (see Table 6).
X-ray myelography and post myelography CT lumbar spine	5	MRI is preferred. This procedure can be indicated if MRI is contraindicated or nondiagnostic.
X-ray lumbar spine	4	This procedure is usually not sufficient for decision making without MRI and/or CT imaging but can be helpful in surgical planning.
Tc-99m bone scan with SPECT spine	4	This procedure can be particularly useful for facet arthropathy or stress fracture. SPECT/CT can be useful for anatomic localization and problem solving.
X-ray discography and post-discography CT lumbar spine	3	Although controversial, this can be useful in patients with >3 months of LBP (chronic LBP patients).
CT lumbar spine without and with contrast	3	
Rating Scale: 1,2,3 = usually not appropriate 4,5,6 = may be appropriate 7,8,9 = usually appropriate		

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Table 6**Low Back Pain or Radiculopathy. New or Progressing Symptoms or Clinical Findings with History of Prior Lumbar Surgery**

Radiologic Procedure	Rating	Comments
MRI lumbar spine without and with contrast	8	This procedure can differentiate disc from scar.
CT lumbar spine with contrast	6	This is most useful in post-fusion patients or when MRI is contraindicated or indeterminate.
CT lumbar spine without contrast	6	This is most useful in post-fusion patients or when MRI is contraindicated or indeterminate.
MRI lumbar spine without contrast	6	Contrast is often necessary.
X-Ray myelography and post myelography CT lumbar spine	5	
X-ray lumbar spine	5	Flexion and extension views can be useful.
Tc-99m bone scan with SPECT spine	5	This procedure helps detect and localize painful pseudarthrosis. SPECT/CT can be useful for anatomic localization and problem solving.
X-ray discography and post-discography CT lumbar spine	5	
CT lumbar spine without and with contrast	3	
Rating Scale: 1,2,3 = usually not appropriate 4,5,6 = may be appropriate 7,8,9 = usually appropriate		

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Table 7**Low Back Pain with Suspected Cauda Equina Syndrome or Rapidly Progressive Neurologic Deficit**

Radiologic Procedure	Rating	Comments
MRI lumbar spine without contrast	9	Use of contrast depends on clinical circumstances
MRI lumbar spine without and with contrast	8	Use of contrast depends on clinical circumstances
X-ray myelography and post myelography CT lumbar spine	6	This procedure is useful if MRI is nondiagnostic or contraindicated.
CT lumbar spine with contrast	5	
CT lumbar spine without contrast	5	
X-ray lumbar spine	3	
CT lumbar spine without and with contrast	3	
Tc-99m bone scan with SPECT spine	2	
Rating Scale: 1,2,3 = usually not appropriate 4,5,6 = may be appropriate 7,8,9 = usually appropriate		

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