



When to order MRI for low back pain

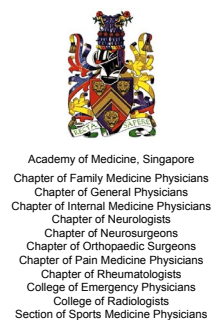


Objective	Scope	Target audience
To enhance appropriate use of magnetic resonance imaging (MRI)	MRI of the lumbar spine for diagnostic investigation of low back pain	This clinical guideline is relevant to all healthcare professionals ordering MRI of the lumbar spine

Globally, low back pain leads to more years lived with disability than any other symptom or condition.¹ The prevalence of low back pain is higher among the elderly, as well as in high-income countries, such as Singapore.² As low back pain is largely a self-limiting condition, imaging is not indicated in most cases. When indicated, magnetic resonance imaging (MRI) of the lumbar spine is one of several imaging modalities for low back pain. However, its clinical utility varies with the clinical presentation and working diagnosis.

Statement of Intent

This ACE Clinical Guideline (ACG) provides concise, evidence-based recommendations and serves as a common starting point nationally for clinical decision-making. It is underpinned by a wide array of considerations contextualised to Singapore, based on best available evidence at the time of development. The ACG is not exhaustive of the subject matter and does not replace clinical judgement. The recommendations in the ACG are not mandatory, and the responsibility for making decisions appropriate to the circumstances of the individual patient remains at all times with the healthcare professional.



Overall approach to low back pain assessment

The assessment of low back pain begins with thorough history taking and physical examination to triage according to the likelihood and type of underlying pathology.³

For low back pain that is likely to originate from the spine (some non-spinal pathologies may present as low back pain, such as abdominal aortic aneurysm, renal disease, or pancreatitis), patients can generally be grouped into those with:

- Non-specific low back pain, or
- Low back pain linked to a specific spinal pathology

A number of investigations, including imaging, are available for further evaluation of low back pain to confirm the diagnosis. In deciding the relevant investigation, it is important that there is shared decision making with patients. The focus of this clinical guideline is on the role of MRI of the lumbar spine for low back pain that is non-specific or linked to a specific spinal pathology.

MRI for non-specific low back pain

The largest group of patients with low back pain (approximately 90%) have non-specific low back pain.⁴ Typically, a diagnosis of non-specific low back pain is reached when a precise source or defined pathoanatomical cause of pain cannot be identified. For example, patient history and examination do not suggest trauma, nor features of a specific spinal pathology. Sometimes, non-specific low back pain occurs with radicular symptoms in one or both lower limbs, suggesting nerve root involvement.

Recommendation 1

Patients with non-specific low back pain, with or without radicular symptoms

MRI is not indicated


MRI is not recommended for patients with non-specific low back pain (even in the presence of radicular symptoms), particularly at initial presentation. This is because for non-specific low back pain, imaging findings tend to correlate poorly with symptoms, ultimately not altering the management decision or clinical outcomes.⁵⁻⁷ For these patients, the initial management approach is usually conservative, and symptoms typically regress soon after onset. Review after 4 to 6 weeks of conservative management (see Recommendation 2).



Non-specific low back pain: patient education and reassurance

Most patients with low back pain expect imaging and consider it essential for proper care.⁸ Timely education and reassurance help manage expectations and improve outcomes.⁹⁻¹⁰ After listening to their concerns about their pain and beliefs of MRI benefits, explain why imaging isn't needed now. Key communication strategies include:¹¹⁻¹⁴

- Demonstrating comprehensive understanding by summarising the patient's history and conducting thorough assessment
- Showing empathy by acknowledging their experience; avoiding generic phrases like 'nothing to worry about'
- Reassuring that back pain is common, serious causes are rare, and most non-specific low back pain resolves within 4–6 weeks
- Explaining that MRI is unlikely to identify pain causes or change the treatment, and may reveal incidental age-related spinal changes that don't cause pain but create unnecessary worry, procedures and costs
- Providing clear self-management plans to help patients understand and manage their condition, including when to return (e.g. if conservative management has not helped after 4-6 weeks)

Recommendation 2**Patients with non-specific low back pain despite 4 to 6 weeks of conservative management**MRI may be indicated 

Consider MRI when conservative management of 4 to 6 weeks has not reduced symptoms, as most patients with non-specific low back pain are expected to improve after this.¹⁵ Lack of improvement may point to an alternative diagnosis or management approach. When present, certain factors (such as psychological distress, prolonged inactivity, or older age) may perpetuate low back pain and lead to significant disability.¹⁶ Therefore, reassess the patient at this point to determine the need for an MRI, including the presence of aforementioned factors and the likelihood of a specific spinal pathology.

**Conservative management**

Conservative management of low back pain encompasses various strategies, such as use of nonsteroidal anti-inflammatory drugs (NSAIDs), exercise, or manual therapy. These should be accompanied by patient education, including advice to remain active and avoid prolonged bed rest. Evidence suggests that for most patients with non-specific low back pain, pharmacological treatment can be reserved for those who do not respond to non-pharmacological strategies.^{15,17} When used, medications should be prescribed for the shortest possible duration and at the lowest effective dose, after having assessed for possible contraindications and precautions.

MRI for low back pain linked to a specific spinal pathology

Low back pain can be the symptom of a specific spinal pathology, although this happens less commonly than non-specific low back pain. Examples include vertebral fractures, spinal cancer (primary or metastatic), spinal infections, and inflammatory diseases of the spine. The presence of symptoms, signs, previous diagnoses, or other features associated with a specific spinal pathology increases the likelihood of it being the cause (particularly when two or more features are present that suggest the same spinal pathology).¹⁸

Decision-making regarding further investigations, including imaging, should take into account whether the suspected spinal pathology would require urgent or specialised management (such as surgery), and potential consequences of missing or delaying the diagnosis. When there is significant suspicion of a specific spinal pathology, further investigations are usually indicated.

The choice of imaging modality mainly depends on the type of suspected spinal pathology. MRI is an appropriate choice for investigating soft-tissue pathologies of the spine. The following recommendations pertain to spinal pathologies or clinical features that require MRI of the lumbar spine as diagnostic investigation of low back pain. The type of MRI performed will depend on the suspected spinal pathology.

**Imaging for suspected vertebral fragility fracture**

Plain radiography is the initial diagnostic investigation of choice for patients with a suspected vertebral fragility fracture, such as elderly patients with a history of low velocity trauma accompanied by osteoporosis or chronic steroid use. Other imaging modalities, including CT and MRI, could be considered after evaluation with plain radiography.

Recommendation 3**Patients with low back pain and progressive neurological symptoms or signs**MRI is indicated 

Progressive neurological deficits, such as deteriorating motor power or worsening numbness, may be due to a space-occupying lesion including herniation of a lumbar intervertebral disc, cancer, infection, and epidural haematoma. MRI is indicated to identify the underlying spinal pathology, especially when the progression is rapid.

Recommendation 4**Patients with low back pain and suspected cauda equina syndrome**MRI is indicated

Cauda equina syndrome is rare, but warrants urgent management. It may result from disc herniation or other spinal pathologies including cancer, infection, spinal stenosis, spondylolisthesis, and epidural haematoma. Suspect cauda equina syndrome when low back pain presents with associated features, such as bilateral lower limb symptoms or signs (like pain, motor weakness, or sensory changes), bladder or bowel dysfunction, saddle anaesthesia or sexual dysfunction.^{19,20}

Recommendation 5**Patients with low back pain and cancer or infection (suspected or known)**MRI is indicated

One should suspect cancer or infection of the spine when a patient with low back pain presents with associated features such as history of cancer, unexplained weight loss, pain at rest or at night, fever or chills, immunosuppression, intravenous drug use or bacteraemia. MRI can localise the area and extent of disease, and hence it is indicated to investigate lumbar spinal involvement when cancer or infection is suspected.

Recommendation 6**Patients with new or progressive low back pain following an invasive procedure on the lumbar spine**MRI is indicated

Free disc fragments or scarring may result from invasive spinal procedures. For patients with new or progressive low back pain following an invasive procedure on the lumbar spine, MRI is indicated to examine potential abnormalities, for example to distinguish between scar tissue and recurrent disc herniation.

**Imaging for inflammatory back pain**

Radiographs of the sacroiliac joint and the spine area of interest are the initial diagnostic imaging tools for patients with concerns of inflammatory back pain/suspected axial spondyloarthritis. These patients have a younger age of onset of low back pain, are often awakened during the second part of the night due to the pain, and experience improvement in the pain with movement and use of non-steroidal anti-inflammatory drugs. They may also have other associated symptoms such as morning stiffness, alternating buttock pain, current or previous history of arthritis, enthesitis, uveitis or psoriasis. MRI of the sacroiliac joint and spine can be considered after evaluation with plain radiography, for example to clarify diagnostic uncertainties or inform the treatment plan.

References

Click or scan the QR code for the reference list to this clinical guideline



Evidence-to-Recommendation Framework

Click or scan the QR code to view the Evidence-to-Recommendation Framework for the recommendations in this clinical guideline



Expert group

Chairperson

Adj A/Prof Gamaliel Tan Yu-Heng, Orthopaedic Surgery (Orthopaedic Associates)

Members

Clin Assoc Prof Chan Lai Peng, Diagnostic Radiology (SGH)

Prof Goh Siang Hiong, Emergency Medicine (CGH)

Adj Prof Gabriel Liu, Orthopaedic Surgery (NUH)

Dr Vincent Ng Yew Poh, Neurosurgery (Neurosurgery Partners)

Dr Ong Joo Haw, Sports Medicine (Orthopaedics International)

Clin Asst Prof Gilbert Tan Choon Seng, Family Medicine (SHP)

Project lead

A/Prof Tan Cher Heng, Diagnostic Radiology (TTSH)

About the Agency

Established by the Ministry of Health, the Agency for Care Effectiveness (ACE) is Singapore's national health technology assessment (HTA) and clinical guidelines agency. We support providers, patients, and payers make better-informed decisions about patient care. We achieve this by conducting health technology assessments (HTAs), developing clinical guidelines and technology guidance, and providing education. ACE Clinical Guidelines (ACGs) inform specific areas of clinical practice. ACGs are usually reviewed around five years after publication, or earlier, if new evidence emerges that requires substantive changes to the recommendations. To access this ACG online, along with other ACGs published to date, please visit www.ace-hta.gov.sg/acg

Find out more about ACE at www.ace-hta.gov.sg/about-us

© Agency for Care Effectiveness, Ministry of Health, Republic of Singapore

All rights reserved. Reproduction of this publication in whole or in part in any material form is prohibited without the prior written permission of the copyright holder. Application to reproduce any part of this publication should be addressed to: ACE@moh.gov.sg

Suggested citation:

Agency for Care Effectiveness (ACE). When to order MRI for low back pain. ACE Clinical Guideline (ACG), Ministry of Health, Singapore. 2026. Available from: go.gov.sg/acg-mrilbp

The Ministry of Health, Singapore disclaims any and all liability to any party for any direct, indirect, implied, punitive or other consequential damages arising directly or indirectly from any use of this ACG, which is provided as is, without warranties.

Agency for Care Effectiveness (ACE)
College of Medicine Building
16 College Road Singapore 169854