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# Acute low back pain

## Beyond drug therapies

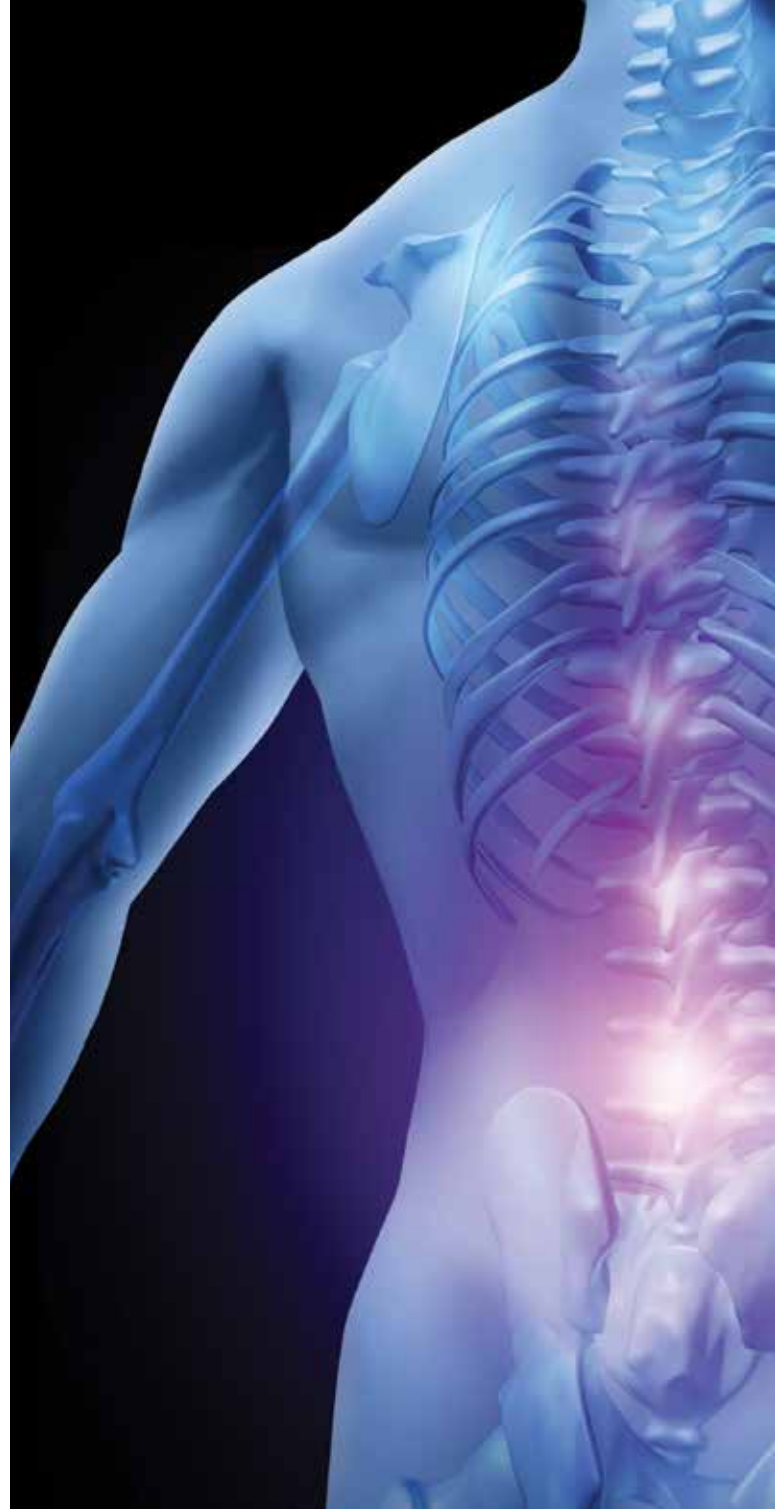
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An approach to low back pain should involve an initial triage to screen for serious pathology, assessment for psychosocial risk, clear explanations to reduce the sense of threat, active rehabilitation and discouragement of unwarranted radiological investigation.

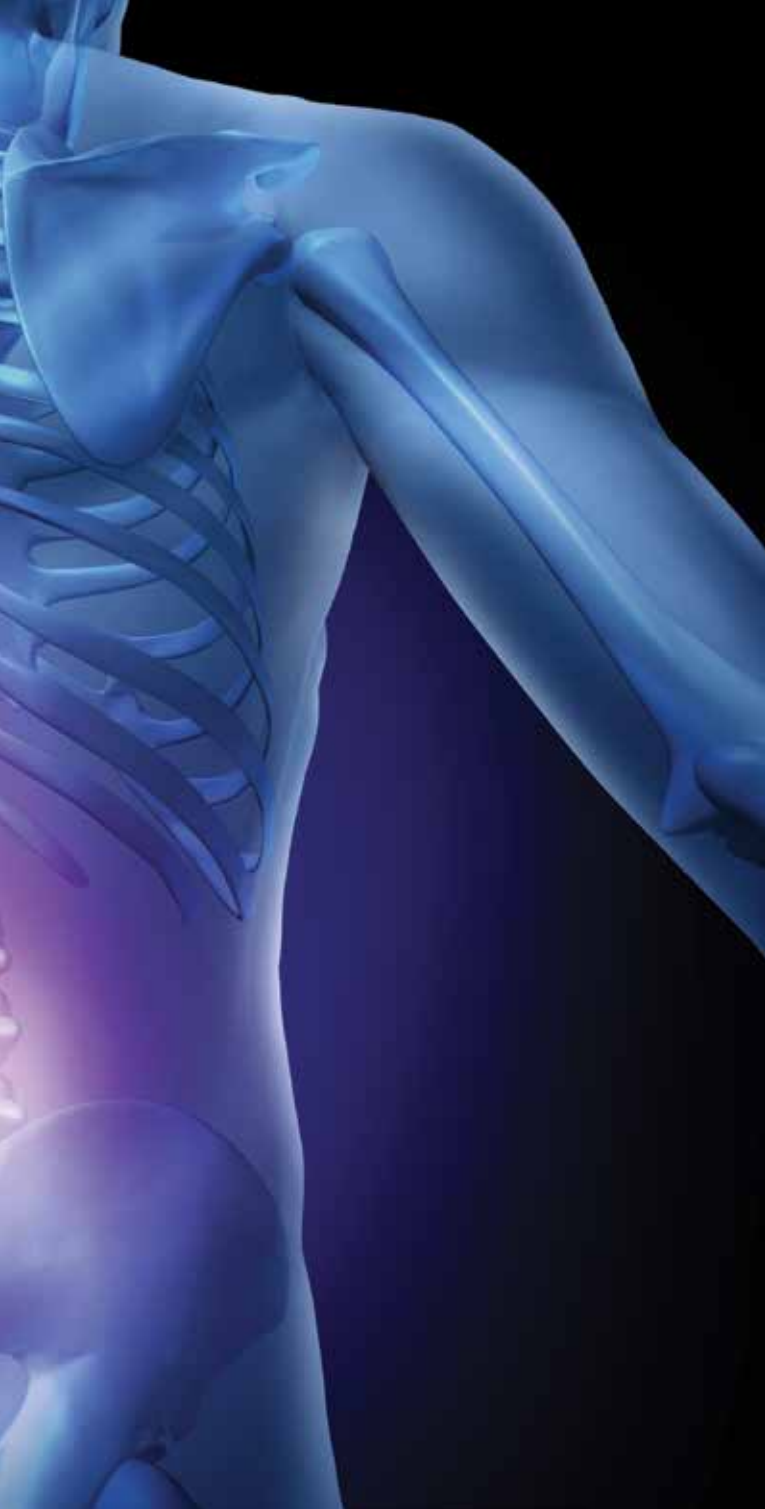
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Low back pain (LBP) is rated as one of the most disabling health disorders in the western world, resulting in an enormous personal, social and economic burden.<sup>1</sup> During adolescence there is an exponential increase in the reporting of LBP, almost reaching the adult rate at the age of 17 years, with a concurrent increase in disability, care seeking and activity avoidance associated with the disorder.<sup>2</sup> LBP is rarely reported before the age of 10 years. At any point in time, a quarter of all adults in Australia have LBP.<sup>3</sup> For a significant group, estimated between 10% and 40%, LBP becomes persistent and profoundly disabling.<sup>4</sup> LBP is also commonly comorbid with other pain disorders, such as other musculoskeletal pains, headache, migraine, pelvic girdle pain and irritable



bowel syndrome, as well as other health disorders such as depression and anxiety, highlighting its complex and multidimensional nature.

The biomedical approaches to managing LBP over the past 15 years have led to an exponential increase in physical therapies, MRI imaging, spinal injections, surgical interventions and pharmacological treatments, with a massive increase in health care costs.<sup>5</sup> This is despite evidence that only 8 to 15% of patients with LBP have an identified pathoanatomical diagnosis, leaving most patients diagnosed as having 'nonspecific' LBP, resulting in a management vacuum. Ironically, this has also been associated with a concurrent increase in disability and chronicity relating to LBP, highlighting the failure of the current approaches to management.<sup>5</sup>

## Key points

- **The burden of low back pain can be reduced if management is more aligned with evidence.**
- **The evidence supports a patient-centred approach to low back pain care that addresses the biopsychosocial influences on the disorder and empowers patients to actively self-manage.**
- **Radiological imaging should only be undertaken when there are clear indications for its use.**
- **Short, easy-to-use, evidence-based tools are available to assist clinicians in managing patients with low back pain.**

It has been proposed that the reason for the failure of current clinical practice to effectively manage LBP is in part associated with a lack of adherence to current evidence. This is related to a dominant biomedical approach to managing LBP and the failure to adequately consider and manage LBP from a biopsychosocial perspective. There is also a lack of patient-centred targeted management based on this knowledge. Best practice for the management of acute LBP incorporates:

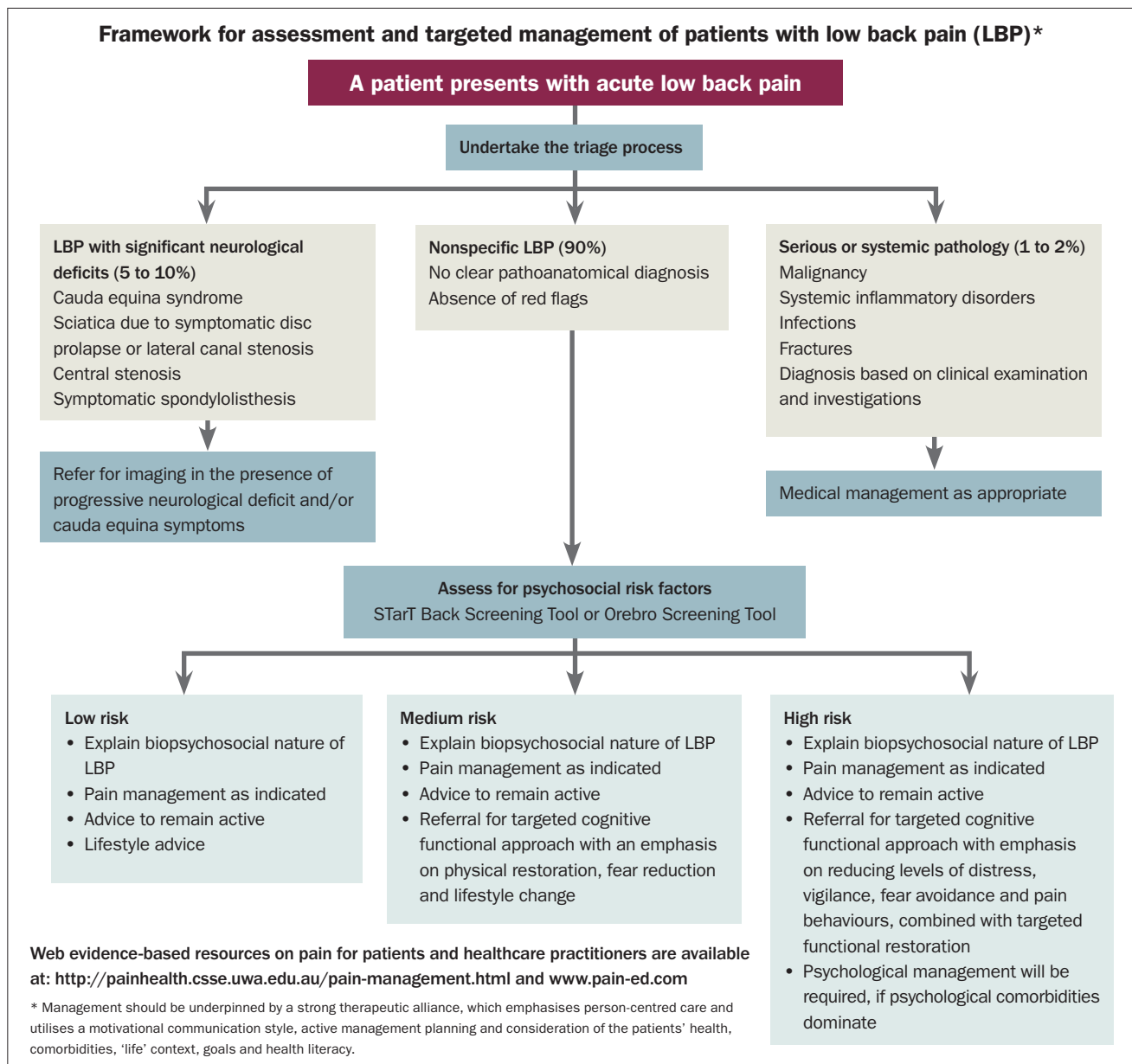
- initial diagnosis based on a triage process
- interpreting an LBP disorder from a biopsychosocial perspective (including screening patients according to the risk of ongoing disabling LBP)
- tailoring management according to the presentation and in a way that empowers patients as active participants in their recovery.<sup>6</sup>

## Diagnosis and assessment

### Triage process

In most people, LBP is benign and represents a simple back sprain associated with a mechanical loading incident or a 'pain flare' associated with psychosocial or lifestyle stresses. On the initial visit, triage is required to eliminate the small possibility of serious or specific pathology.<sup>7</sup>

Only 1 to 2% of people presenting with LBP will have a serious or systemic disorder, such as systemic inflammatory disorders, infections, spinal malignancy or spinal fracture. Features such as an insidious onset of pain, constant and nonmechanical nature of pain (not clearly provoked by postures and movement), night pain, morning stiffness, past history of malignancy, age over 65 years and/or declining general health warrant further investigation. Recent evidence suggests that the best predictors of fracture are the presence or 'cluster' of a history of severe traumatic injury, the presence of abrasions or contusion, prior corticosteroid use and being a woman over 74 years of age.<sup>8</sup> The factor that best predicts malignancy is a previous history of malignancy. It should also be noted that a number of systemic, abdominal and pelvic pathologies



may also cause people to present with spinal pain.<sup>7</sup>

In approximately 5 to 10% of people with LBP, the pain may be associated with radicular features with or without neurological deficit. This is associated with compression of the nerve root spinal cord or cauda equina syndrome, which is linked to an underlying pathology, such as disc prolapse, lateral recess and canal stenosis or advanced grade spondylolisthesis (see the flowchart on this page). A presentation of progressive neurological deficits or signs of cauda equina syndrome (new urine retention, faecal incontinence or saddle anaesthesia) warrants further investigation.<sup>7</sup>

Nonspecific low back pain in which a definitive pathoanatomical diagnosis cannot be made accounts for 90% of people who experience LBP.<sup>7</sup>

**The role of imaging**

Radiological imaging for LBP, in the absence of red flags, progressive neurological deficits and traumatic injury, is not warranted and may in fact be detrimental. However, over-imaging for LBP is endemic in primary care.<sup>9</sup> Although advanced disc degeneration, spondylolisthesis and modic changes of the vertebral end plate (changes to the bone structure of the vertebral body that may be seen on MRI) are associated with an increased risk of LBP, they do not predict future LBP.<sup>10,11</sup> Further confounding the problem of diagnosis is the high prevalence of 'abnormal' findings on MRI in pain-free populations (disc degeneration [91%], disc bulges [56%], disc protrusion [32%], annular tears [38%]).<sup>12</sup> Furthermore, these findings correlate poorly with pain and disability levels.<sup>5</sup> Critically, there is strong evidence

## 1. Messages that can harm in patients with nonspecific low back pain

### Promote beliefs about structural damage/dysfunction

'You have degeneration/arthritis/disc bulge/disc disease/  
a slipped disc'  
'Your back is damaged'  
'You have the back of a 70-year-old'  
'It's wear and tear'

### Promote fear beyond acute phase

'You have to be careful/take it easy from now on'  
'Your back is weak'  
'You should avoid bending/lifting'

### Promote a negative future outlook

'Your back wears out as you get older'  
'This will be here for the rest of your life'  
'I wouldn't be surprised if you end up in a wheelchair'

### Hurt equals harm

'Stop if you feel any pain'  
'Let pain guide you'

## 2. Messages that can heal in patients with nonspecific low back pain

### Promote a biopsychosocial approach to pain

'Back pain does not mean your back is damaged – it means it is sensitised'  
'Your back can be sensitised by awkward movements and postures, muscle tension, inactivity, lack of sleep, stress, worry and low mood'  
'Most back pain is linked to minor sprains that can be very painful'  
'Sleeping well, exercise, a healthy diet and cutting down on your smoking will help your back as well'  
'The brain acts as an amplifier – the more you worry and think about your pain the worse it gets'

### Promote resilience

'Your back is one of the strongest structures of the body'  
'It's very rare to do permanent damage to your back'

### Encourage normal activity and movement

'Relaxed movement will help your back pain settle'  
'Your back gets stronger with movement'  
'Motion is lotion'  
'Protecting your back and avoiding movement can make you worse'

### Address concerns about imaging results and pain

'Your scan changes are normal, like grey hair'  
'The pain does not mean you are doing damage – your back is sensitive'  
'Movements will be painful at first – like an ankle sprain – but they will get better as you get active'

### Encourage self-management

'Let's work out a plan to help you help yourself'  
'Getting back to work as you're able, even part time at first, will help you recover'

that unwarranted imaging makes patients worse; MRI scans for nontraumatic LBP lead to poorer health outcomes, greater disability and work absenteeism due to the pathologising of the problem.<sup>10</sup>

## It's not just about the back

There is growing evidence that factors such as sleep disturbance, sustained high stress levels, depressed mood and anxiety are strong predictors of LBP.<sup>13</sup> This highlights growing evidence for the role that lifestyle and negative emotional factors play in sensitising spinal structures via the central nervous system and dysregulation of the hypothalamic–pituitary–adrenal axis. This may reflect clinically as a patient presenting with acute LBP, reporting high levels of pain, distress and muscle guarding associated with a 'minor' mechanical trigger.

It is also important to note that negative beliefs about LBP are predictive of pain intensity, disability levels and work absenteeism as well as chronicity.<sup>14</sup> Beliefs that independently increase disability and impair recovery in an episode of LBP are having a negative future outlook (e.g. 'I know it will just get worse') and believing that 'hurt equals harm' and that 'movements that hurt should be avoided' because of fear of pain and/or harm.<sup>14</sup> Many of these beliefs gain their origins from healthcare practitioners,<sup>15,16</sup> highlighting the critical role of communication in the acute care of people with LBP (see Boxes 1 and 2).

There is also evidence that, in the absence of a clear traumatic injury, pain behaviours, such as limping, protective muscle guarding and grimacing, are more reflective of catastrophic thinking (e.g. 'my back is damaged', 'I am never going to get better' and 'I am going to end up in a wheel chair'), fear and distress.<sup>17</sup> These behaviours can result in abnormal loading of sensitised spinal structures, feeding a

vicious cycle of pain. They are also linked to poor coping styles, such as avoidance and excessive rest, and leave the person feeling helpless and disabled. In contrast, people who have positive beliefs about LBP and its future consequences are less disabled.<sup>14</sup>

In contrast to popular belief, there is little evidence that LBP is associated with a loss of 'core' or trunk stability. Rather, there is growing evidence that altered movement patterns and increased trunk muscle co-contraction are associated with the recurrence and persistence of LBP, providing opportunities for targeted management.<sup>6</sup>

## Screening patients with nonspecific LBP

There is evidence suggesting that healthcare practitioners are poor at identifying psychological risk factors (depression, anxiety, catastrophising and fear) associated with LBP.<sup>18</sup> This highlights the need to screen patients with LBP for psychological risk factors in primary care. Simple screening tools such as the STarT BackScreening Tool (see <http://painhealth.csse.uwa.edu.au/pain-self-checks>).

### 3. Activities and exercises to recommend to patients with acute low back pain

#### Advice for patients

- 'Pain with movement does not mean you are doing harm'
- 'Gradually increase your activity levels based on time rather than the levels of pain'
- 'It is safe to exercise and work with back pain – you may just have to modify what you do in the first few days'

#### The guidelines below may assist this process

#### Relaxation

- Encourage breathing to the lower chest wall and stomach – diaphragm breathing
- Facilitate awareness of tension in the muscles of the trunk and encourage mindful relaxation

#### Mobility exercises

- Encourage gentle flexibility-based exercises for spine and hips progressing from nonweight bearing to weight bearing (e.g. hip and back stretches lying down, progress to sitting and standing)

#### Functional movement training

- Encourage relaxed movements and avoidance of guarded movements, and discourage breath holding and propping off the hands with load transfer
- Encourage patients to incorporate movement training into their usual daily activities (e.g. walking, bending, twisting) and strengthening and conditioning if relevant to the patient (e.g. squatting for someone who is involved in manual work)

#### Physical activity

- Aim for patients to undertake aerobic exercise for 20 to 30 minutes each day that does not excessively exacerbate pain (e.g. walking, cycling [leg or arm cycling] or swimming based on comfort and preference)
- Explain to patients that they may need to exercise for a shorter duration initially, or exercise for short periods throughout the day to build exercise tolerance
- Advise patients to increase activity gradually (e.g. 10% per week)

**Refer patient to a physiotherapist if pain and functional impairments persist and/or if the patient is at moderate to high risk of chronicity**

html) and the Short Form Orebro Musculoskeletal Pain Screening Questionnaire ([www.mnbnml.com.au/icms\\_docs/168340\\_Orebro\\_Questionnaire.pdf](http://www.mnbnml.com.au/icms_docs/168340_Orebro_Questionnaire.pdf)) have been developed to identify risk status based on a short questionnaire.

The STaT Back Screening Tool is designed for use in a primary care setting and is a validated tool that stratifies patients into risk groups: low risk (LBP with little distress), medium risk (moderate levels of pain, disability and distress) and high risk patients (high levels of pain, disability and distress). These risk groups are predictive of chronicity, disability and work absenteeism, providing a basis for targeted stratified care.<sup>19</sup>

The Short Form Orebro Musculoskeletal Pain Screening Questionnaire also identifies people with high psychosocial risk status.<sup>20</sup> As this questionnaire includes occupational risk factors it may be more suited to use for work-related LBP.

## Management

### Specific pathology

For the small group of patients (5%) who present with LBP due to disc herniation and associated radicular pain with or without neurological deficit, the natural history is very good. Prospective studies demonstrate high recovery rates (over 80%) and reduction of the herniation in most of these patients at 12 months of follow up.<sup>21</sup> Only in people with progressive neurology and cauda equina symptoms is a surgical opinion immediately warranted. Pain management in the acute stage of radiculopathy is important when pain levels are distressing. Reinforcing the excellent natural history for the disorder is crucial to reassure the patient. As pain settles, a graduated rehabilitation program can be instituted to normalise movement and return the patient to activities of daily living. In the case of lateral recess and central canal stenosis when pain is disabling, review for decompression surgery may be indicated if conservative rehabilitation, targeting hip and spinal flexibility, exercises to reduce extension spinal loading and lifestyle factors (obesity and activity levels), has failed. Low-grade (1 to 2) spondylolisthesis can be managed well conservatively with targeted exercise programs.<sup>22</sup>

### Nonspecific LBP

Best practice management for LBP, once the triage process has been conducted, is guided by screening for psychosocial risk factors and addressing maladaptive beliefs and behaviours to better target care.

In the acute phase of LBP, short-term pain management is indicated if the pain is distressing. There is also growing evidence that targeting the beliefs and behaviours that drive disability is more effective than simply treating the symptoms of LBP. Acute LBP may be associated with high levels of fear and distress, and providing a clear and effective explanation to the patient with an effective management plan is crucial.<sup>19</sup>

### Explain and empower patients about their LBP

Patients are often worried about why they are in pain and their expected prognosis. Sensitive, patient-centred communication is needed to:<sup>23</sup>

- understand patient concerns
- identify and address negative beliefs about LBP
- reassure patients regarding the benign nature of LBP
- discuss the limitations of radiological examinations
- carefully explain the biopsychosocial pain mechanisms relevant to the patient
- advise patients to keep active and normalise movement.

If radiology has been performed, emphasis should be placed on the fact that common findings (disc degeneration, disc bulges, annular tears and facet joint arthrosis) are normal in the pain-free population,

are not a sign of damage or injury and do not predict outcome.<sup>24</sup> Sensitive, motivational communication builds health literacy about LBP and empowers patients to take an active role in their rehabilitation rather than rely on passive treatments (see Boxes 1 and 2). Excellent online resources for consumers with information about LBP and other types of pain are now available (see: <http://painhealth.csse.uwa.edu.au/> and <http://www.pain-ed.com/>).

### **Movement, exercise, manual therapy and work participation**

A primary aim for the management of acute LBP is the restoration of normal, confident spinal movement and functional capacity (e.g. participation in work, family and recreational activities). This is crucial to facilitate a return to the whole health (physical, mental and social) of the patient. Activity modification should only be recommended in the acute phase if there is evidence of tissue strain. Otherwise, advice to keep active in a graded manner contingent on time rather than based on pain is important to reduce the pain avoidance vicious cycle. Pain behaviours and guarded movement patterns should be discouraged in the absence of a traumatic injury mechanism and in the case of trauma as tissue healing occurs.<sup>23</sup> This can be facilitated via clear exercise advice (see Box 3) that consists of:

- relaxation exercises to reduce trunk muscle guarding – diaphragm breathing
- gentle mobility exercises for the spine and hips to normalise movement impairments
- functionally targeted movement training linked to strengthening and conditioning where indicated
- general aerobic exercise guided by levels of comfort and patient preference.

People with nonspecific LBP more commonly increase trunk muscle guarding and have stiffness, which paradoxically increases spinal loading and pain.<sup>6</sup> Therefore, practising relaxation of trunk muscles incorporated with graded movement training is important to unload sensitised spinal structures and allow normal movements to occur. Manual therapies may be more suitable in the acute/subacute phase when movement limitations are present to help facilitate return to normal movement patterns and functional restoration. Addressing lifestyle factors (e.g. sedentary behaviours, inactivity, stress, poor sleep hygiene, smoking and obesity) may also be important.

The importance of work should be emphasised and patients should be encouraged not to engage in avoidance behaviours related to work.<sup>25</sup> Short-term modification of work environments may be indicated initially in the acute phase.

### **Targeted care for nonspecific LBP**

Targeted care can be facilitated by a careful patient assessment in conjunction with screening tools.

For the low-risk group in which LBP is associated with low levels of distress, best practice management consists of suitable pain management if needed, advice regarding the benign nature of LBP, guidance to keep active and normalise movements, and modification

of lifestyle factors. This group should need minimal intervention and has a good prognosis. Over-investigating and treating this group may result in worse outcomes.<sup>19</sup>

For the medium-risk group in which LBP is associated with moderate distress levels, best practice management consists of suitable pain management if pain is distressing, advice regarding the benign nature of LBP and reinforcing the importance of keeping active. Physiotherapy interventions that include dealing with the cognitive aspects of LBP, targeted functional restoration and lifestyle advice are shown to be more effective than traditional therapies, such as manipulation, stabilising and/or general exercises to reduce disability, work absenteeism and the need for ongoing healthcare.<sup>19,23</sup>

The high-risk group in which LBP is associated with high distress levels requires special attention, directing management to reduce high levels of fear, anxiety, depressed mood, catastrophising and distress. Interventions that incorporate motivational interviewing techniques, careful explanations regarding biopsychosocial pain mechanisms pertaining to the individual, exposure training for feared movements and restoration of normal movement based on the patient's presentation require a higher level of training.<sup>19,23</sup> Allocating greater healthcare resources (in terms of time and clinicians with greater expertise) has long-term clinical and healthcare cost benefits.<sup>19</sup>

If LBP is linked to panic attacks, post-traumatic stress and depression, consideration for psychological referral of the patient may be indicated. In the case of severe and distressing pain that persists, pain management that addresses central pain mechanisms may be required. In this case, it is important that all interventions are used in an integrated way to change behaviour linked to functional restoration, rather than as treatments in isolation.

### **Conclusion**

An approach to managing patients with LBP to reduce the burden in the community involves: an initial triage to screen for serious pathology; assessment of psychosocial risk; provision of clear explanations to reduce the sense of threat; encouragement of active rehabilitation; and discouragement of unwarranted radiological investigation.

Screening and targeting management for more complex cases when psychosocial risk factors and pain behaviours dominate, and using interventions that target the cognitive and functional impairments associated with the disorder, reduces the burden of disability, work absenteeism and associated health and societal costs. Pain management and psychological interventions should be incorporated if pain levels and psychological distress dominate the disorder. **PMT**

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### **References**

A list of references is included in the website version ([www.medicinetoday.com.au](http://www.medicinetoday.com.au)) of this article.

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COMPETING INTERESTS: None.

# Acute low back pain

## Beyond drug therapies

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### References

- Vos T, Flaxman AD, Naghavi M, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012; 380: 2163-2196.
- O'Sullivan PB, Beales DJ, Smith AJ, Straker LM. Low back pain in 17 year olds has substantial impact and represents an important public health disorder: a cross-sectional study. *BMC Public Health* 2012; 12: 100.
- Walker BF. The prevalence of low back pain in Australian adults. A systematic review of the literature from 1966-1998. *Asia Pac Public Health* 1999; 11: 45-51.
- Dillingham T. Evaluation and management of low back pain: an overview. *State Art Rev* 1995; 9: 559-574.
- Deyo RA, Mirza SK, Turner JA, Martin BI. Overtreating chronic back pain: time to back off? *J Am Board Fam Med* 2009; 22: 62-68.
- O'Sullivan P. It's time for change with the management of non-specific chronic low back pain. *Br J Sports Med* 2012; 12: 224-227.
- Haldeman S, Kopansky-Giles D, Hurwitz EL, et al. Advancements in the management of spine disorders. *Best Pract Res Clin Rheumatol* 2012; 26: 263-280.
- 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: f7045.
- Runciman WB, Hunt TD, Hannaford NA, et al. CareTrack: assessing the appropriateness of health care delivery in Australia. *Med J Aust* 2012; 197: 100-105.
- Deyo RA. Real help and red herrings in spinal imaging. *N Engl J Med* 2013; 368: 1056-1058.
- Jarvik JG, Hollingworth W, Heagerty PJ, Haynor DR, Boyko EJ, Deyo RA. Three-year incidence of low back pain in an initially asymptomatic cohort. *Spine* 2005; 30: 1541-1548.
- McCullough BJ, Johnson GR, Brook MI, Jarvik JG. Lumbar MR imaging and reporting epidemiology: do epidemiologic data in reports affect clinical management? *Radiology* 2012; 262: 941-946.
- Gatchel RJ, Peng YB, Peters ML, Fuchs PN, Turk DC. The biopsychosocial approach to chronic pain: scientific advances and future directions. *Psychol Bull* 2007; 133: 581-624.
- Main CJ, Foster N, Buchbinder R. How important are back pain beliefs and expectations for satisfactory recovery from back pain? *Best Pract Res Clin Rheumatol* 2010; 24: 205-217.
- Darlow B, Dowell A, Baxter GD, Mathieson F, Perry M, Dean S. The enduring impact of what clinicians say to people with low back pain. *Ann Fam Med* 2013; 11: 527-534.
- Lin IB, O'Sullivan PB, Coffin JA, Mak DB, Toussaint S, Straker LM. Disabling chronic low back pain as an iatrogenic disorder: a qualitative study in Aboriginal Australians. *BMJ Open* 2013; 3: e002654.
- Sullivan MJ, Thorn B, Haythornthwaite JA, et al. Theoretical perspectives on the relation between catastrophizing and pain. *Clin J Pain* 2001; 17: 52-64.
- Hill JCP, Vohora KB, Dunn KMP, Main CJP, Hay EM. Comparing the STarT Back Screening Tool's subgroup allocation of individual patients with that of Independent Clinical Experts. *Clin J Pain* 2010; 26: 783-787.
- Hill JC, Whitehurst DGT, Lewis M, et al. Comparison of stratified primary care management for low back pain with current best practice (STarT Back): a randomised controlled trial. *Lancet* 2011; 378: 1560-1571.
- Linton SJP, Nicholas MP, MacDonald SMA. Development of a Short Form of the Orebro Musculoskeletal Pain Screening Questionnaire. *Spine* 2011; 36: 1891-1895.
- el Barzouhi A, Vleggeert-Lankamp CL, Lycklama à Nijeholt GJ, et al. Magnetic resonance imaging in follow-up assessment of sciatica. *N Engl J Med* 2013; 368: 999-1007.
- O'Sullivan PB, Twomey LT, Allison GT. Evaluation of specific stabilizing exercise in the treatment of chronic low back pain with radiologic diagnosis of spondylolysis or spondylolisthesis. *Spine* 1997; 22: 2959-2967.
- Vibe Fersum K, O'Sullivan P, Skouen JS, Smith A, Kvåle A. Efficacy of classification-based cognitive functional therapy in patients with non-specific chronic low back pain: a randomized controlled trial. *Eur J Pain* 2013; 17: 916-928.
- Chou R, Deyo RA, Jarvik JG. Appropriate use of lumbar imaging for evaluation of low back pain. *Radiol Clin North Am* 2012; 50: 569-585.
- Waddell G, Burton K. *Is work good for your health and well-being?* London; The Stationery Office; 2006.