Clinical Assessment of the Patient with Back Pain

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Overview
- Back pain is common
- Simple mechanical pain is the most common cause but the differential diagnosis is extensive
- The triage approach facilitates appropriate diagnosis and management

The different flag systems are useful tools to support the diagnostic triage. Simple standardized assessment tools may be used to aid diagnosis and assess patient progress.

Introduction
Back pain is the third most common symptom presented to general practitioners after headache and fatigue. While most patients with back pain seen in primary care will have 'simple mechanical back pain', there is a long list of potential diagnoses, some of them serious and life threatening. The concept of diagnostic triage has been developed to facilitate the efficient and effective diagnosis and management of patients presenting with back pain in primary and secondary care.

Diagnostic triage
When we are talking to patients and colleagues it is important to make sure that we are using words in the same way. Confusion frequently arises because of simple misunderstandings (Box 1.1). The clinical assessment should aim to place the patient into one of three diagnostic groups. When taking the history, be alert for flag features (Box 1.2).

Box 1.1 Some important definitions

Where is the back?
From the point of view of diagnostic triage 'the back' means 'the low back' or lumbosacral region, defined as the area on the dorsal surface of the body from the bottom of the 12th rib to the gluteal folds (Figure 1.1).

Where is the leg?
In common parlance 'the leg' is frequently used to mean 'the lower limb' but this is anatomically incorrect. In relation to referred and nerve root pain, the leg is the structure between the knee and the ankle; between the hip and the knee is the thigh. There is an analogous situation in the upper limb; the arm is between the shoulder and the elbow, and the forearm is between the elbow and the wrist.

What is sciatica?
Sciatica is a misnomer. The pain that we now know to originate from the lumbar nerve roots was originally thought to be due to pressure on the sciatic nerve. The name ‘sciatica’ persists, even though the pain has nothing to do with the sciatic nerve.

What is pain?
Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage. Source: (International Association for the Study of Pain)

Box 1.2 Flags in back pain

| Red flags | Indicate potential serious pathology |
| Yellow flags | Risk factors for chronicity, the psychosocial barriers to recovery |
| Orange flags | Psychiatric issues in patients with back pain |
| Blue flags | Occupational issues |
| Black flags | Organizational barriers to recovery |
Simple mechanical back pain

Simple mechanical back pain accounts for more than 90% of acute episodes of back pain in primary care.

- Onset (first episode) is generally between 20 and 55 years.
- Pain is felt in the lumbosacral region (Figure 1.1). Pain may be referred to the buttocks and thighs but back pain dominates over limb pain (Box 1.3).

<table>
<thead>
<tr>
<th>Referred pain and root pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referred</td>
</tr>
<tr>
<td>Back &gt; limb</td>
</tr>
<tr>
<td>Dull ache</td>
</tr>
<tr>
<td>Above knee</td>
</tr>
<tr>
<td>Unilateral or bilateral</td>
</tr>
<tr>
<td>Non-dermatomal</td>
</tr>
<tr>
<td>No aspect (front/back/side)</td>
</tr>
<tr>
<td>or edge</td>
</tr>
<tr>
<td>No sensory symptoms</td>
</tr>
<tr>
<td>No neurological signs</td>
</tr>
<tr>
<td>Straight leg raise (SLR) –</td>
</tr>
</tbody>
</table>

- Pain is ‘mechanical’ in nature, i.e. it varies with physical activity and posture over time (within and between episodes) and during the examination.
- The quality of the pain and its location within the lumbosacral region are highly variable and frequently unhelpful in diagnosis.
- The patient is systemically well, with no risk factors for serious pathology (see below).
- Prognosis is good with 90% recovery from the acute attack in 6 weeks.

Nerve root pain

Nerve root pain is associated with 5–10% of acute episodes of back pain in primary care.

- Unilateral leg pain is present below the knee (but S1 pain is occasionally felt in the buttock/ thigh only).
- Leg pain (‘lancinating’ or shooting pain) dominates over back pain.
- Pain generally radiates to the ankle, foot or toes in a dermatomal distribution.
- Nummular and paraesthesia in the same distribution may be present (not always).
- Nerve irritation signs are reduced by straight leg raising (SLR), which worsens the leg pain but not the back pain.
- Motor, sensory or reflex change is unradicular. E.g. S1 nerve root – pain (and sensory symptoms if present) in the buttock, posterior thigh, calf, ankle, sole of foot, with or without weakness of buttock clenching, knee flexion, ankle plantar flexion, or without diminished or absent ankle reflex.
- Prognosis is excellent with 50% recovery in 6 weeks.

Possible serious pathology (red flags)

Possible serious pathology accounts for less than 1% of back pain in primary care.

- Age of onset is <20 years or first episode occurs in >55 years.
- Violent trauma, e.g. road traffic accident (RTA) or fall from a significant height.
- Systemically unwell; ask about fever, weight loss, anorexia, rigors, malaise and sweats (remember Fever WARMS).
- Non-mechanical pain is constant, progressive, not related to posture/activity and is associated with disturbed sleep, nerve root pain, which switches sides; the pain is not helped at all by simple analgesia.
- History of cancer – lung, breast, prostate, kidney and thyroid are the most common primary sources; back pain may be the first presentation of cancer elsewhere with pain from metastases – examine the possible primary sites.
- Systemic steroids (increased risk of osteoporotic vertebral collapse, infection).
- Drug abuse and immunosuppression by disease or drugs (increased risk of infection).
- Anticoagulated (increased risk of spinal bleed/haematoma).
- Persisting severe restriction of lumbar flexion.
- Thoracic pain (often mechanical in young primary care patients, beware older patients).
- Worse on lying down (spinal tumour).
- Widespread (polyradicular) neurology and/or upper motor neuron signs.
- Structural deformity (Figure 1.2).
- If there are suspicious clinical features or the pain has not settled in 6 weeks, review and consider arranging investigations (Box 1.4).
Clinical Assessment of the Patient with Back Pain

Box 1.4 Investigations for red flags

Blood tests
- Full blood count
- ESR/CRP/plasma viscosity
- Renal function tests
- Liver function tests
- Prostate specific antigen (men)
- Immunoglobulin electrophoresis (and urine for Bence Jones protein)

Imaging
- Plain X-rays if fracture (e.g. osteoporotic wedge fracture) suspected
- Isotope bone scan (if infection or widespread metastases suspected)
- MRI scan
- CT scan

• Don’t forget that serious visceral disease may present with back pain – e.g. aortic aneurysm, pancreatic cancer, peptic ulcer, renal disease (cancer, stones, infection).

Examination of the lumbar spine

General observation
General observation is through watching the patients as they walk into the consulting room, looking at their face (pain behaviour and emotional state), posture (pain behaviour, sciatic tilt and simian posture of spinal stenosis), gait (pain behaviour, foot drop, antalgic gait of hip osteoarthritis (OA) and neurological gait)

Standing (patient undressed)
- Ask the patient to indicate the location of their pain.
- Look for deformity (Figure 1.2).
- Look for any scars.
- Kyphosis – look for compensatory hyperextension of the neck.
- Muscle spasm – palpate for hypertonic paraspinal muscles (they feel solid, not soft).
- Schober’s test (McRae’s modification) – the only validated test in back pain; persistent restriction correlates with significant spinal pathology (Figure 1.3).
- Active lumbar extension/side flexions are not diagnostically informative. Some believe that back pain worse with flexion originates in the disc and that back pain worse with extension comes mainly from the facet joints. There is little supportive evidence.
- Walking on the tiptoes screens for S1 myotome strength.
- Walking on the heels screens for L4/5 myotome strength.
- Romberg’s Test – can the patient stand steadily with feet slightly apart and eyes closed? Inability to do so suggests a posterior column lesion.
- Walking heel-to-toe tests cerebellar function.

• Waddell’s Tests (Figure 1.4) – If you suspect abnormal illness behaviour, perform vertical skelton compression, and rotation of the lumbar spine; pinch a fold of skin over the lumbar area (‘ground glass back’).

The three other Waddell tests are the flip test (see below) and widespread non-anatomical sensory change in the lower limbs and widespread non-myotomatal weakness (often jerky, giving way on isometric testing).

If the patient’s symptoms are confined to the back such that there are no limb symptoms, the patient has a normal gait and you do not suspect abnormal illness behaviour, then it is unlikely that examining the lower limbs will contribute any further useful diagnostic information.

Supine
- Exclude the hips – flex the hip and knee to 90 degrees and rotate the hip laterally and medially (in OA hip, medial rotation will be more painful and limited).
- SLR – with the knee fully extended, cup the heel in the hand and slowly raise the limb to 90 degrees; if the test is positive it usually reproduces or exacerbates the pain in the leg (not the back) in the first 30 degrees. Flex the knee and the pain in the leg should diminish, allowing further hip flexion with increased leg pain on extending the knee again. If you suspect abnormal illness behaviour and cannot perform the SLR because of pain (often bilaterally restricted and making the back pain worse), ask the patient to sit up while you ostensibly palpate the lumbar spine; if they can sit fully forward while their legs extended while distracted, you have a positive ‘flip test’ (another Waddell test). The SLR may be limited by hamstring tightness (they will tell you it is stretching in the back of the thigh).
- ‘Crossed pain’ (i.e. SLR on the asymptomatic side increases the symptoms on the symptomatic side) is pathognomonic of a large disc prolapse. This sign has high specificity but very low sensitivity.
- Isometric muscle strength testing for nerve root dysfunction (you are looking for weakness; CAVEAT; pain may sometimes cause apparent weakness).

N.B. There is considerable overlap between the nerve supply to the muscles and the areas of skin supplied by individual nerve roots in individuals – look for the overall pattern of neurological features.

• Motor
  - L2 – Resisted hip flexion
  - L3 – Resisted knee extension
  - L4 – Resisted ankle dorsiflexion
  - L5 – Resisted big toe dorsiflexion
  - S1 – Resisted ankle plantar flexion

• Sensation
  - Check light touch/pin prick
  - L3 – Anterior thigh
  - L4 – Inner leg
Figure 1.2 Photographs or diagrams of spinal tilt, (a) scoliosis, (b) thoracic kyphosis, (c) spondylolisthesis and (d) simian posture of spinal stenosis.

Figure 1.3 Diagram illustrating Schober’s test: ‘A 10-cm line is marked on the patient, extending from the posterior superior iliac spines towards the head. On forward flexion, this line should increase in length by at least 5 cm.’

L5 – Outer leg/top of foot
S1 – Back of calf, bottom of foot
• Pulpation – palpate the pedal pulses to help differentiate vascular and spinal claudication (spinal stenosis)
• Reflexes – knee (L3)

Prone
• Isometric muscle strength testing
  S1 – ask the patient to clench their buttocks tight
  S1 – resisted knee flexion
Clinical Assessment of the Patient with Back Pain

Figure 1.4 Waddell’s tests – photographs of doctor and patient to illustrate vertical skull compression, pseudorotation and the ground glass back.

- **Femoral stretch test** (L3 nerve root)
  - Flex the knee to 90 degrees and lift the knee from the couch – positive if flexion reproduces/exacerbates pain in anterior thigh from L3 nerve root lesion – uncommon

- **Reflexes** – ankle (S1)

**Palpation**
Palpation of the lumbar spine is surprisingly unhelpful in reaching a diagnosis, as pain is so poorly localized.

- The step deformity of a spondylolisthesis is typically best felt (and seen) in standing.
- Localized tenderness of the vertebrae is highly sensitive for osteomyelitis, but unfortunately, it has very poor specificity.
  - If there is widespread superficial tenderness to palpation (and pinching of skin folds), this is often a feature of abnormal illness behaviour.
- Palpate along the course of the sciatic and peroneal (at the head of the fibula) nerves for lumps. Neuromas of these nerves may cause distal neurological symptoms and signs.

**Yellow, orange and blue flags**
In patients with back pain that is not settling after 6 weeks, a biopsychosocial assessment should be made. In practice, this means that besides making a search for red flags, a search should also be made for psychosocial, psychiatric and occupational obstacles to recovery (Box 1.5). Chronic pain is often accompanied by depression (Box 1.6). The relationship between chronic pain and depression is complex. Treating the depression decreases pain as well as improves functional status and quality of life.

Box 1.5. Yellow, orange and blue flags

**Certificate**

Interview prompts to elicit psychosocial, psychiatric and occupational obstacles to recovery.

C – What do you understand is the **Cause** of your back pain?
E – Have you **Ever** had any other chronic pain problem (chronic whiplash, irritable bowel syndrome, tension headaches, fibromyalgia, RSI, PMS etc.) and what happened?

T – Have you ever had **Time** off work in the past with back pain?
I – If you are currently off work when do you expect to return?Ever? What do you feel about your job?
F – **Financial** – time off work causing financial hardship? Any outstanding legal/insurance claims? Receiving benefits (including disabled parking badges)?
I – **Investigations** have you had so far and what did they show?
C – What are you doing to **Cope** with the back pain?

Figure 1.5 Pain drawings; one anatomical, one distressed.
A – Affective – some people with long-term pain get low, down or depressed, how is your mood at the moment? (Box 1.6)
T – What have you been told about your back pain by your GP/physiotherapist/osteopath, etc?
E – Expectations – what were you hoping we might be able to do?

Box 1.6 Screening questions for depression
• Have you often been bothered by feeling down, depressed, or hopeless?
• Have you often had little interest or pleasure in doing things?
When both answers are no, people are unlikely to be depressed, i.e. the screen is highly sensitive, but positive replies to the questions have lower specificity, requiring further questioning from the clinician to confirm the diagnosis. If the answer to either question is ‘yes’, then a positive response to a third question increases specificity.
• Is this something you would like help with?

Black flags
Organizational factors frequently manifest as barriers to recovery, e.g. long waiting times for outpatient appointments, physiotherapy and imaging tests. These issues frequently emerge when assessing patients with back pain.

Standard assessment tools
These forms are simple and straightforward to complete and a selection can be stapled together and given to the patient to fill in before the consultation. They are helpful diagnostically and can provide useful consecutive measures of pain, disability, somatization and depression during follow-up (Box 1.7).

Box 1.7 Some standardized back pain assessment tools
Visual analogue pain scales for back and limb pain
Oswestry Disability Index
Low Back Outcome Score
Roland and Morrison Back Pain Questionnaire
Fear Avoidance Beliefs Questionnaire
Main’s Somatic Index
Zung Depression Index
Pain drawing (Figure 1.5)

Further reading