ASSESSMENT AND DIAGNOSIS

Overview

Overview of Acute Low Back Pain



Goertz M et al.. Adult Acute and Subacute Low Back Pain. Institute for Clinical Systems Improvement: 2012.

"Red Flags" Require Immediate Investigation and/or Referral

Potential condition	Red flags	
Cancer	Personal history of cancerWeight loss	• Age >50 years
Infection	FeverIntravenous drug use	Recent infection
Fracture	OsteoporosisSteroid use	TraumaOlder age
Focal neurologic deficit	 Progressive or disabling symptoms 	
Cauda equina syndrome	Urinary retentionMultilevel motor deficit	Fecal incontinenceSaddle anesthesia

Use Red Flags to Rule Out Serious Underlying Disease (1% of Patients)

One red flag is not enough to suggest serious underlying pathology.

- Patients <20 years or >55 years of age experiencing back pain for the first time
- Patients experiencing pain significantly different from previous episodes
- Pain that is constant over time and does not disappear during sleep
- General malaise and poor general condition
- Traumatic injuries, tumors, steroid use or improper use of immunosuppressants
- Neurological compromise
- Spinal deformity
- Pronounced morning stiffness lasting for longer than 1 hour and/or high erythrocyte sedimentation rate

Patients at Risk of Developing Chronic Pain

Yellow flags are patient characteristics that can indicate long-term problems requiring greater attention by the physician, particularly in terms of returning to work.

- Pessimistic attitude toward pain, excessive fear of movement and activity and little hope for improvement
- Work-related problems (e.g., dissatisfaction, conflicts)
- Emotional problems (e.g., depression, anxiety, worry)
- Generalized pain (e.g., headache, fatigue, dizziness)
- Desire for passive treatment, little ability to be proactive
- Previous episodes of low back pain that were followed for an extended period of time

Psychosocial Yellow Flags in Patients with Low Back Pain

Yellow flag	Examples
Affect	Anxiety, depression, feelings of uselessness, irritability
Behavior	Adverse coping strategies, impaired sleep caused by pain, passive attitude to treatment, activity withdrawal
Social	History of sexual abuse, physical or drug abuse, lack of support, advanced age, overprotective family
Work	Expectation that pain will increase when returning to work, pending litigation, problems with workers' compensation or claims, poor job satisfaction, unsupportive work environment
Beliefs	Thinks "the worst," that pain is harmful or uncontrollable, or it needs to be eliminated before returning to activities or work

Last AR, Hulbert K. Am Fam Physician 2009; 79:(12):1067-74.



Green Flags Patients with Low Back Pain

Green flags are characteristics of a patient with a good prognosis and rapid spontaneous recovery.

- Good general condition
- Short duration of symptoms
- No nerve root disease
- Absence of yellow and red flags

Clinical Examinations and Diagnostic Tests for Diagnosis of Low Back Pain

Clinical examination	Diagnostic tests	
Clinical history	Neurophysiological tests	
Pain mapping	Nerve conduction studies	
Screening tools	Electromyography	
	Evoked potentials	
Neurological examination	CNS imaging	
Focus in somatosensory system	• CT	
	• MRI	
	• Other (e.g., thermography, diagnostic blockades)	

Diagnosis of Low Back Pain

- Clinical history
- Pain evaluation
- Physical examination
- Complementary examinations

History

Pain Assessment: PQRST Mnemonic

- Provocative and Palliative factors
- Quality
- Region and Radiation
- Severity
- Timing, Treatment

Budassi Sheehy S, Miller Barber J (eds). Emergency Nursing: Principles and Practice. 3rd ed. Mosby; St. Louis, MO: 1992.

Determine Pain Intensity



International Association for the Study of Pain. *Faces Pain Scale – Revised*. Available at: <u>http://www.iasp-pain.org/Content/NavigationMenu/GeneralResourceLinks/FacesPainScaleRevised/default.htm</u>. Accessed: July 15, 2013; Iverson RE *et al. Plast Reconstr Surg* 2006; 118(4):1060-9.

Recognizing Neuropathic Pain

Be alert for common verbal descriptors of neuropathic pain.













Burning

Tingling

Electric shock-like

Numbness

- Various neuropathic pain screening tools exist
- Tools rely largely on common verbal descriptors of pain, though some tools also include physical tests
- Tool selection should be based on ease of use

Baron R et al. Lancet Neurol. 2010; 9(8):807-19; Bennett MI et al. Pain 2007; 127(3):199-203; Gilron I et al. CMAJ 2006; 175(3):265-75.

Neuropathic Pain Screening Tools

	LANSS	DN4	NPQ	painDETECT	ID Pain
Symptoms	_				
Pricking, tingling, pins and needles	x	x	x	×	X
Electric shocks of shooting	X	Neuropathic pain screening tools rely largely on common verbal			ools Dal
Hot or burning	X	X descriptors of pain			
Numbness		х	Х	Х	Х
Pain Select tool(s) based on <i>ease of use</i> and validation in the local language			×		
Clinicar examination					
Brush allodynia		V		oning to also	
Raised soft touch threshold	include bedside neurological		al		
Altered pin prick threshold	J _X examination				
N4 = Douleur Neuropathique en 4 Questions (DN4) questionnaire;	- Nouropathic Pa	in Question	naira	1 1 1	

Bennett MI et al. Pain 2007; 127(3):199-203; Haanpää M et al. Pain 2011; 152(1):14-27.

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Physical Examination

Physical Examination for Low Back Pain



Simple Bedside Tests for Neuropathic Pain

Stroke skin with brush, cotton or apply acetone





Sharp, burning superficial pain



Light manual pinprick with safety pin or sharp stick





Very sharp, superficial pain



Baron R. Clin J Pain 2000; 16(2 Suppl):S12-20; Jensen TS, Baron R. Pain 2003; 102(1-2):1-8.

Physical Examination Findings Associated with Specific Nerve Root Damage

Nerve root	Muscle (movement)	Sensitivity	Tendon reflexes
L1	Inguinal region	Groin	Cremaster
L2	lliopsoas (hip flexor)	Anterior thigh, groin	Cremaster
L3	Quadriceps (leg extension)	Anterior and lateral thigh	Patellar
L4	Quadriceps, dorsiflexors of the ankle (walking on heels)	Mid-ankle/foot	Patellar
L5	Dorsiflexors of the ankle (large toe dorsiflexion)	Dorsum of the foot	None
S1	Gastrocnemius (walking on tiptoe)	Lateral plantar zone/foot	Achilles

Levin KH et al (eds). Neck and Low Back Pain. Continuum; New York, NY: 2001.

Nerve Tension Test (Lasègue Test) for Low Back Pain



Nerve Tension Test (Bragard's Sign) for Low Back Pain



Nerve Tension Test (Reverse Lasègue Test) for Low Back Pain



Devereaux MW. Neurol Clin 2007; 25(2):331-51.

Faber (Patrick) Test for Low Back Pain



Devereaux MW. Neurol Clin 2007; 25(2):331-51.

Forced Flexion and Extension (Gaenslen Test) for Low Back Pain



Devereaux MW. Neurol Clin 2007; 25(2):331-51.

Graduated Scale of Myotatic Reflexes

Response	Score
None	0
Slightly diminished	1/+
Normal	2/++
More intense than normal	3/+++
Over-excitement (clonus)	4/++++

Levin KH et al (eds). Neck and Low Back Pain. Continuum; New York, NY: 2001.

FAIR Examination for Piriformis Syndrome



FAIR = flexion, adduction, and internal rotation

Levin KH et al (eds). Neck and Low Back Pain. Continuum; New York, NY: 2001.

Freiberg Sign for Piriformis Syndrome



Pace Sign for Piriformis Syndrome



Imaging and Other Tests

Plain X-Rays for Low Back Pain

- Recommended for initial evaluation of possible vertebral compression fracture in select high-risk patients
- No guidelines available for optimal imaging strategies for low back pain lasting longer than 1–2 months without symptoms suggesting radiculopathy or spinal stenosis

- Plain radiography may be a reasonable initial option

 Thermography and electrophysiologic testing are not recommended for evaluation of non-specific low back pain

CT or MRI for Diagnosis of Low Back Pain

- Prompt work-up with MRI or CT is recommended in the presence of severe or progressive neurologic deficits or suspected serious underlying condition
 - Delayed diagnosis and treatment are associated with poorer outcomes
- MRI is generally preferred over CT if available
 - MRI does not use ionizing radiation
 - MRI provides better visualization of soft tissue, vertebral marrow and spinal canal

ACR Appropriateness Criteria on for Imaging for Low Back Pain

Criteria	Recommendation	
Uncomplicated, acute low back pain	Imaging usually not appropriate	
Low-velocity trauma, osteoporosis or age >70 years	MRI of lumbar spine without contrast usually appropriate	
Low back pain and/or radiculopathy in surgical or interventional candidate		
Suspicion of cancer, infection or immunosuppression	MRI of lumbar spine with and without contrast usually appropriate	
Prior lumbar surgery		
Cauda equina syndrome		

ACR = American College of Rheumatology; MRI = magnetic resonance imaging Chou R *et al. Lancet* 2009; 373(9662):463-72; Davis PC *et al. J AM Coll Radiol* 2009; 6(6):401-7.

Risk Factors or Red Flags Can Direct Imaging for Mechanical Low Back Pain

Mechanical low back pain (90%)	Imaging
 Musculoskelatal strain 1. Ligament 2. Muscle 3. Fascia 4. Pregnancy and posterior pelvic ring pain 	• N/A
Herniated disc1. Herniated nucleus pulposus2. Impingement of exiting nerves	• MRI
 Discogenic causes of pain Replacement of elastic tissue with fibrous tissue Tears and degeneration of disc 	• MRI
Facet degeneration1. Degeneration and calcification of facet joint2. Decreased motion of facet joint	 Plain films MRI CT scan
Spinal stenosis	• CT and MRI equal
Spondylolisthesis/spondylolitholysis	Plain films
Scoliosis >25°	Plain films
Osteoporotic fracture	Plain films

CT = computed tomography; MRI = magnetic resonance imaging; N/A = not applicable Adapted from: Jarvik JG, Deyo RA. *Ann Intern Med* 2002; 137(7):586-97.

Risk Factors or Red Flags Can Direct Imaging for Non-mechanical Low Back Pain

Non-mechanical low back pain (1%)	Imaging
Neoplasm 1. Multiple myeloma 2. Lymphoma and leukemia 3. Spinal cord tumors 4. Retroperitoneal tumors 5. Retroperitoneal tumors 6. Osteoma	 Plain films MRI Radionuclide
Injection1. Osteomyelitis2. Discitis3. Epidural or paraspinous abscess4. Shingles	Plain filmsMRI
Inflammatory arthritis (HLAB27)1. Ankylosing spondylitis2. Psoriatic spondylitis3. Reiter syndrome4. Inflammatory bowel disease	 Plain films CT scan
Scheuermann disease (osteochondrosis)	Plain films
Paget disease	

CT = computed tomography; MRI = magnetic resonance imaging

Adapted from: Jarvik JG, Deyo RA. Ann Intern Med 2002; 137(7):586-97.

Risk Factors or Red Flags Can Direct Imaging for Low Back Pain Due to Visceral Disease

Visceral disease (2%)	Imaging
Diseases of pelvic organs 1. Prostatis 2. Endometriosis 3. Chronic pelvic inflammatory disease	• N/A
Renal disease 1. Nephrolithiasis 2. Pyelonephritis 3. Perinephric abscess	Intravenous pyelographyUltrasonography
Vascular 1. Aortic aneurysm	Ultrasonography MRI with contrast
Gastrointestinal disease 1. Pancreatitis 2. Cholecystitis 3. Penetrating ulcer	

MRI = magnetic resonance imaging; N/A = not applicable Adapted from: Jarvik JG, Deyo RA. *Ann Intern Med* 2002; 137(7):586-97.

Diagnosis

Classification of Low Back Pain by Signs and Symptoms

Non-specific Low Back Pain (85% of cases)

- Radiates to buttocks
- Diffuse pain
- No specific maneuver to increase or reduce pain

Radicular (7% of cases)

- Pain radiates below the knee
- Unilateral (disc herniation)
- Bilateral (spinal stenosis)
- Worse with sitting
- Improves with lying and knees bent to reduce tension on sciatic nerve

Worrisome Red Flags

- Major trauma
- Age >50 y
- Persistent fever
- History of cancer
- Metabolic disorder
- Major muscle weakness
- Saddle anesthesia
- Decreased sphincter tone
- Unrelenting night pain

Clinical Classification Criteria for Suspected Neuropathic Pain

	Pain in a neuroanatomical area and fulfilling at least two of the following:
Definite Neuropathic	 Decreased sensibility in all or part of the painful area
Pain	 Present or former disease knowing to cause nerve lesion relevant for the pain
	 Nerve lesion confirmed by neurophysiology, surgery or neuroimaging
	Pain in a neuroanatomical area and fulfilling at least two of the following:
	 Decreased sensibility in all or part of the painful area
Possible Neuropathic	Unknown etiology
Pain	 Present or former diseases knowing to cause either nociceptive or
	neuropathic pain relevant for the pain
	Radiating pain or paroxysms
	Pain fulfilling at least two of the following:
Unlikely Neuropathic	 Pain located in a non-neuroanatomical area
Pain	• Present or former disease knowing to cause nociceptive pain in the painful area
	No sensory loss
	-

Differential Diagnosis of Acute Low Back Pain

Intrinsic Spine	Systemic	Referred
 Compression fracture Lumbar strain/sprain Herniated disc Spinal stenosis Spondylolisthesis Spondylolysis Spondylosis (degenerative disc or facet joint 	 Malignancy Infection (e.g., vertebral discitis/osteomyelitis) Connective tissue disease Inflammatory spondyloarthropathy 	 Gastrointestinal conditions (e.g., pancreatitis, peptic ulcer disease, cholecystitis) Pelvic conditions (e.g., endometriosis, pelvic inflammatory disease, prostatitis) Retroperitoneal conditions (e.g., renal colic, pyelonephritis) Herpes zoster

It is important to identify and treat the underlying causes of pain whenever possible!

Age-Related Probabilities for Internal Disc Disruption, Facet or Sacroiliac Joint Pain and Other Sources of Low Back Pain



Potential Sites of Muscular Pain



Wheeler AH. Am Fam Physician 1995; 52(5):1333-41, 1347-8.

Soft Tissue Conditions Generating Low Back Pain

Soft tissue condition	Clinical features	Pain pattern	
Myofascial pain syndrome	Rope-like nodularity on physical examination	Localized or regional in low back, buttock, thighs	
Paraspinal muscle injury	 Muscle atrophy on magnetic resonance imaging, ultrasound and computed tomography 	Low back	
Quadratus lumborum injury	Decreased painful lumbar flexion and rotation	Flank, low back, buttock, lateral hip	
Hip abductor pain syndrome	 Tender gluteal muscles lateralto postero-superior iliac spine Hip abductor muscle weakness Trendelenburg sign 	Buttock, lateral aspect of thigh	
Psoas bursitis	 Most painful movement is passive adduction in flexion Appearance on musculoskeletal ultrasound is consistent with inflammation 	Groin, anterior thigh, knee, leg	
Trochanteric bursitis	 Positive "jump" sign secondary to thumb pressure over most prominent ridge of greater trochanter 	Pseudoradiculopathy (i.e., pain does not extend distal to the proximal tibia [insertion of iliotibial tract at Gerdy's tubercle])	
Gluteal bursitis	 Pain on: Passive external rotation and passive abduction Passive abduction and either resisted external rotation or resisted abduction 	Gluteal and trochanteric region, sometimes spreading to outer or posterior thigh and down to calf and lateral malleolus	
Ischial bursitis	Local tenderness at ischial tuberosity	Buttock	
Cluneal nerve entrapment	Resolution of pain with local nerve block	Unilateral; iliac crest and buttock	

Borg-Stein J, Wilkins A. Curr Pain Headache Rep 2006; 10(5):339-44.

Anatomic Variation of Sciatic Nerve Root and Piriformis Syndrome



Symptoms of Piriformis Syndrome

- Buttock pain
- Low back pain
- Pain aggravated by sitting, walking or walking up inclines
- Internal and external tenderness
- Most common physical signs
 - Limited straight leg raising
 - Positive Lasègue sign
 - Diminished ankle and/or hamstring reflexes
 - Motor weakness in L4-S1 myotomes

Facet Pain (Osteoarthritis)



rapped nerve

one spur

Faceted atrophy

Pain Referral Patterns Produced by Intra-articular Injections of Hypertonic Saline



Classification of Peripheral Neuropathies

	INHERITED	ACQUIRED "MINI"				
	Motor or sensorimotor	Metabolic Sensory > motor	Immune Variable	Neoplastic	Infectious	
"What"	PNS uncommon	PNS very common				
"Where"	Distal, s	ymmetric Not distal, symmetric				
"When"	Insidious/gradual onset, slow progression		Definite date of onset, more rapid progression			
"What setting"	Family history, foot deformities, foot ulcers	Risk factors, diseases or exposures?	Symptoms of vasculitis or systemic illness?	Symptoms of cancer? Paraproteinemia?	Symptoms/risks for infection?	
Differential diagnosis	Charcot-Marie-Tooth/ Hereditary motor sensory neuropathy Hereditary neuropathy with liability to pressure palsies	Diabetic Uremic Alcohol B12 deficiency B1 deficiency Hypothyroid Meds	Non-vasculitic: Guillain-Barré syndrome CIDP MMN Sarcoid Sjogren's Vasculitic: Polyarteritis nodosa Wegner's granulomatosis Churg-Strauss SLE Rheumatoid arthritis	Paraneoplastic Paraproteinemic (monoclonal gammopathies)	Hepatitis B&C Lyme HIV West Nile Syphilis Diphtheria Leprosy	

CIDP = chronic inflammatory demyelinating polyneuropathy; HIV = human immunodeficiency disease;

MMN = multifocal motor neuropathy; PNS = paraneoplastic neurological syndrome; SLE = systemic lupus erythematosus Kraychete DC, Sakata RK. *Rev Bras Anestesiol* 2011; 61(5):641-58, 351-60.

Diagnostic and Treatment Algorithm for Sciatica



Jarvik J, Deyo R. Ann Intern Med 2002; 137(7):586-95.

Summary

Assessment and Diagnosis of Low Back Pain: Summary

- It is important to identify the underlying pathophysiology of pain in patients presenting with low back pain
 - Verbal descriptors and screening tools may help identify patients with a neuropathic component to the pain
- Red flags requiring immediate action should be assessed in all patients presenting with low back pain
- Yellow flags may help identify those at risk for chronic pain