

Acute Low Back Pain

**Low Back Pain
Guideline Team**

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These guidelines should not be construed as including all proper methods of care or excluding other acceptable methods of care reasonably directed to obtaining the same results. The ultimate judgment regarding any specific clinical procedure or treatment must be made by the physician in light of the circumstances presented by the patient.

Patient population: Adults (>18 years) with pain <6 weeks.

Objectives: (1) Identify persons at risk for chronic disability and intervene early. (2) Detect dangerous, but uncommon lesions. (3) Utilize diagnostic tests efficiently. (4) Initiate treatment and refer when appropriate.

Key points:

- **Natural history.** Low back pain occurs in about 80% of people [evidence C*]. Within 6 weeks 90% of episodes will resolve satisfactorily regardless of treatment [C*]. Of all persons disabled for more than 1 year, 90% will never work again without intense intervention [C*].
- **Initial visit.**
 - Assess for “red flags” of serious disease, as well as psychological and social risks for chronic disability. Diagnostic tests are usually unnecessary [C*]
 - Educate about good prognosis [B*].
 - Treatment options include: ice [D*], NSAIDs [A*], and return to usual activities - bed rest is not recommended [A*]. (COX-2 inhibitors are no more effective than traditional NSAID agents and should be reserved for carefully selected patients. [A])
 - Close clinical follow up until return to work or key life activities [D*].
- **By 2 weeks** (acute). If work disability persists, consider psychiatric consultation [A*] especially if psychosocial risks to return to work exist.
- **For radicular pain, by 2-4 weeks:** If no improvement obtain MRI [B*]. If not diagnostic, obtain EMG. If pathology proven, consider acute physiatrist or anesthesiology pain specialist evaluation (for injection therapy) or surgical evaluation [A*]. If pathology not proven, consider physiatrist or anesthesiology pain specialist referral [D*].
- **By 6 weeks** (subacute). **If activities are still limited, consider anesthesiology pain specialist or psychiatric consultation regarding a complex rehabilitation program [A*].**
- **By 12 weeks** (chronic). If still disabled from major life activities or work, strongly consider referral to an anesthesiology pain specialist or physiatrist for a complex rehabilitation team [A*].

Special Circumstances (see discussion):

- Primary prevention
- Chronic low back pain
- Recurrent low back pain
- Pregnancy and low back pain

*** Levels of evidence for the most significant recommendations:**

A=randomized controlled trials; B=controlled trials, no randomization; C=observational trials; D=opinion of expert panel.

Clinical Background

Clinical Background

Definitions

Low back pain (LBP) is posterior trunk pain between the ribcage and the gluteal folds. It also includes lower extremity pain that results from low back disorder (sciatica/radiating low back pain), whether there is trunk pain or not. Sciatica is radiating, lower extremity pain and may not be associated with back pain. Sciatica should be clearly distinguished from axial low back pain.

- **Acute LBP:** Back pain <6 weeks duration
- **Subacute LBP:** Back pain >6 weeks but <3 months duration
- **Chronic LBP:** Back pain disabling the patient from some life activity >3 months

- **Recurrent LBP:** Acute LBP in a patient who has had previous episodes of LBP from a similar location, with asymptomatic intervening intervals.

Epidemiology

The one-year point prevalence of low back problems in the U.S. population is 15-20%. Eighty percent of the population will experience at least one episode of disabling low back pain during their lifetime. Approximately 40% of persons initially seek help from a primary care physician, 40% from a chiropractor, and 20% from a subspecialist.

(Continued on page 7)

Figure 1. Diagnosis and Treatment of Acute Low Back Pain

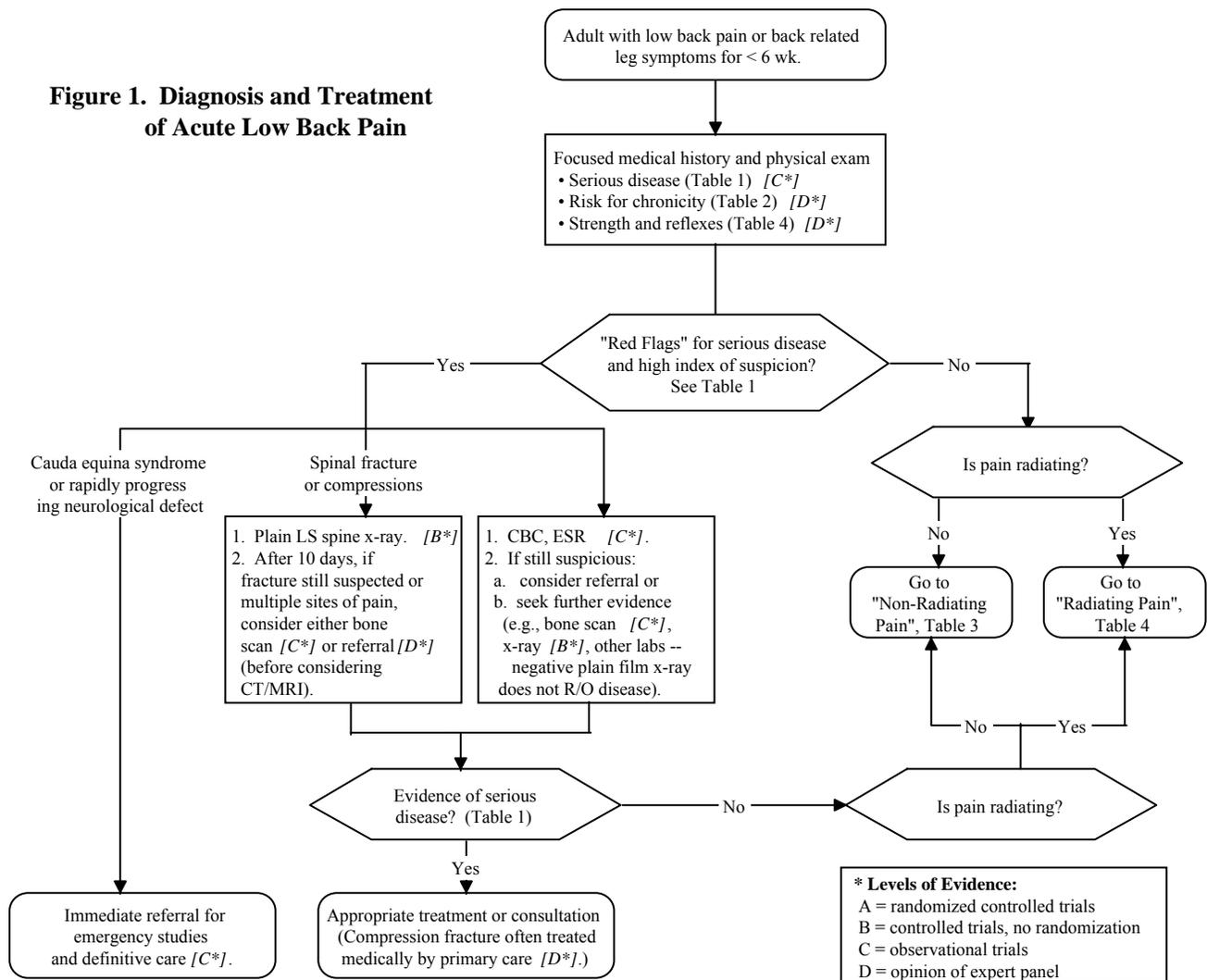


Table 1. "Red Flags" for Serious Disease

	Cauda Equina	Fracture	Cancer	Infection
Progressive neurologic deficit	X			
Recent bowel or bladder dysfunction	X			
Saddle anesthesia	X			
Traumatic injury/onset, cumulative trauma		X		
Steroid use history		X		X
Women age > 50		X	X	
Men age > 50			X	
Male with diffuse osteoporosis or compression fracture			X	
Cancer history			X	
Diabetes Mellitus				X
Insidious onset			X	X
No relief at bedtime or worsens when supine			X	X
Constitutional symptoms (e.g. fever, weight loss)			X	X
Hx UTI/other infection				X
Hx IV drug use				X
HIV				X
Immune suppression				X
Previous surgery				X

Table 2. Risks for Chronic Disability

Clinical Factors

- Previous episodes of back pain
- Multiple previous musculoskeletal complaints
- Psychiatric history
- Alcohol, drugs, cigarettes

Pain Experience

- Rate pain as severe
- Maladaptive pain beliefs
- Legal issues or compensation

Premorbid Factors

- Rate job as physically demanding
- Believe they will not be working in 6 months
- Don't get along with supervisors or coworkers
- Near to retirement
- Family history of depression
- Enabling spouse
- Are unmarried or have been married multiple times
- Low socioeconomic status
- Troubled childhood (abuse, parental death, alcohol, difficult divorce)

Table 3. Differential Diagnosis of Back Pain

Systemic Causes	Axial Back Pain	Radiating Low Back Pain
Aortic aneurysm Aortic atherosclerosis Renal infection Renal calculi Peritonitis Tumors Subacute bacterial endocarditis Metabolic disorders: Porphyria sickle cell disease renal osteodystrophy Seronegative spondylitic arthritis: Ankylosing spondylitis Reiter's syndrome Arthritis of ulcerative colitis Psoriatic arthritis Other arthritis: Diffuse Idiopathic Skeletal Hyperostosis (DISH) Scheuermann's epiphysitis Rheumatoid arthritis--uncommon Connective tissue disorders: Marfan's syndrome Ehlers-Danlos syndrome Myopathy Inflammatory radiculopathy AIDP/CIDP	<p>Dangerous local causes</p> Tumor Disk space infection Epidural abscess Fractures	<p>Causes</p> Disk herniation Spinal stenosis Arachnoiditis
	<p>Other causes</p> Osteoporosis with fracture Spondylolisthesis: Congenital Isthmic Degenerative Traumatic Tumor related Sacroiliac joint dysfunction and arthritis Facet joint syndrome and arthritis Internal disk disruption Failed back surgery syndrome	<p>Local pathology that mimics radiating low back pain</p> Osteoarthritis of the hip Aseptic necrosis of the femoral head Sciatic nerve injury due to pressure, stretch or piriformis muscle entrapment Cyclic radiating low back pain-- endometriosis on the sciatic nerve/sacral plexus Intrapelvic masses--benign or malignant Peroneal (fibular) nerve entrapment at the fibular head

Table 4. Assessing Muscle Strength and Reflexes

Location	Muscle Strength Test	Spinal Cord Level	Reflex Tests	Spinal Cord Level
Toe	Plantar flexion	S-1	Achilles	S-1
	Dorsi flexion	L-5	Medial Hamstring ^c Patella	L-5 L-4
Ankle	Plantar flexion	S-1 ^a	Babinski	Tests upper motor neurons
	Dorsi flexion	L-4, L-5		
Knee	Extension	L-3,4		
	Flexion	L-5, S-1		
Hip	Flexion	L-2, 3		
	Abduction	L-5, S-1		
	Internal Rotation Adduction	L-5, S-1 ^b L-3, 4		

^a Ankle plantar flexion--rise up on the toes of one leg 5 times while standing.

^b Internal rotation--while seated patient keeps knees together and ankles apart, examiner attempts to push ankles together.

^c While the patient is seated the examiner palpates the medial hamstring tendon and sharply percusses his/her hand. Contraction of the hamstring muscle is palpated.

**Table 5. Non-Radiating (Axial) Low Back Pain: Treatment and Follow-Up
(Pain Not Below the Knee)**

Initial Visit

Diagnostic Tests: Usually none.

Non-Medication Treatment:

- **Ice.** Ice (20 minutes at a time) to the painful area as frequently as needed [D*].
- **Stretching.** Gradual stretching may relieve a cramping feeling [D*].

Medication: (See Table 7 for specific medications.)

- **Make time contingent.** Except for very minor pain, prescribe medications on a time contingent basis (e.g., q.i.d.), not on a pain contingent basis [A*].
- **Medication strategy.** Medication treatment depends on pain severity, with more potent medications used in the order:
 1. Acetaminophen. No studies in acute LBP, Analgesic effect is known in other musculoskeletal disorders, and few side effects [D*].
 2. NSAIDs. Proven to be effective in treating LBP [A*]. COX-2 inhibitors are no more effective than traditional NSAID agents. They may offer a short-term, but probably no long-term advantage in GI tolerance for most patients [A*] and may increase heart attack risk [B*].
 3. Muscle relaxants. While probably more effective than placebo, muscle relaxants have not been shown to be more effective than NSAIDs [A*].

Activity Limitations:

- **Bed rest.** Avoid bed rest [A*].
- **Work restrictions.** Patients should not commonly be restricted from work [D*].
- **General activity.** Resume usual activities. Sometimes it is reasonable to restrict a person from long distance driving, heavy lifting, sitting for prolonged periods, or repetitive twisting and reaching [D*].

Patient Education [C*]: (review the following)

- **Epidemiology.** Most people have an episode of back pain. Though bothersome, it's rarely disabling.
- **Diagnosis.** No evidence of nerve damage or other dangerous disease. Diagnostic tests are rarely helpful for muscle or ligament problems.
- **Prognosis.** Prognosis is excellent regardless of treatment. Reoccurrences almost always resolve.
- **Activity.** Staying active keeps muscles from cramping.
- **Non-medication treatments.** Reinforce.
- **Medications.** Review risks and side effects.
- **Warnings.** Seek immediate medical care if true weakness, sensory loss, bowel or bladder incontinence occur. (All are quite uncommon.)

If at Risk: Chronic Disability Prevention [A*] (Table 2)

- **Address barriers.** Discuss with patient any barriers to success and ways to deal with them.
- **Maintain work.** Avoid time off work if at all possible.
- **Minimize restrictions.** Minimize any activity restrictions by consulting with the patient and possibly the employer about physical demands of the patient's job and the availability of alternative work. If restrictions are given, make them time limited (e.g., "no lifting over 30 lb. for 2 weeks, then unrestricted duty"). Specify an expiration date and the date of physician follow-up

Follow-Up Visits (chronic disability risk patient) [D*]:

- **Schedule**
 - **If kept out of work:** See in 2–3 days, then weekly.
 - **If moderate pain/restrictions:** See patient weekly.
 - **If pain resolved and no restrictions:** See patient prn.
- **Early aggressive intervention.** At 6 weeks of disability, in a patient at risk for chronic disability, strongly consider referral to a spine rehabilitation team.
- **Future prevention.** After episode resolves discuss preventing future disability.

Subsequent Visits

History and Physical: Update history and physical. If diagnostic impression changed, go to appropriate steps in Figure 1.

General Treatment:

- **If pain better:** Reduce medications, increase activity.
- **If pain worse:** Consider changing/adding medications, increasing restrictions.
- **Physical therapy.** If no improvement, at 1-2 weeks [A*] consider manual physical therapy (spinal manipulation).

If at Risk: Chronic Disability Prevention (Table 2)

- **Patient education [A*]**
- **Minimize restrictions**
- **At 6 weeks** consider referral to spine rehab program

Follow-Up: Same as at initial visit plus

- **At 2 weeks:** If positive dural tension sign (positive straight leg raising, or reverse straight leg raising) and no clinical improvement, consider physiatrist or pain specialist referral for intervention therapy (epidural injection, etc) [D*].
- **At 6 weeks and disabled:** Consider referral to non-surgical spine specialist [A*]
- **At 12 weeks and disabled:** Consult spine rehabilitation program [A*].

* Levels of evidence for the most significant recommendations:

A=randomized controlled trials; B=controlled trials, no randomization; C=observational trials; D=opinion of expert panel.

Table 6. Radiating Low Back Pain: Treatment and Follow-Up
(Sciatica – Pain Below the Knee)

Initial Visit	
<p>Diagnostic Tests: Usually none.</p> <p>Non-Medication Treatment:</p> <ul style="list-style-type: none"> • Ice. 20 minutes at a time to the painful area as frequently as needed [D*]. • Stretching. Gradual stretching may relieve a cramping feeling [D*]. <p>Medication: (See <i>Table 7</i> for specific medications.)</p> <ul style="list-style-type: none"> • Make time contingent. Except for very minor pain, prescribe medications on a time contingent basis (e.g., q.i.d.) not on a pain contingent basis [A*]. • Medication strategy. Medication treatment depends on pain severity. <ol style="list-style-type: none"> 1. Acetaminophen. No studies in acute LBP, Analgesic effect is known in other musculoskeletal disorders, and few side effects [D*]. 2. NSAIDs and COX-2 inhibitors. Not yet been shown to be more effective than placebo in acute sciatica [D*]. 3. Acetaminophen with codeine or other narcotic analgesics [D*] 4. Muscle relaxants. No studies in sciatica [D*]. <p>Activity Limitations:</p> <ul style="list-style-type: none"> • Bed rest. Up to 3-5 days of bed rest may provide comfort . Longer duration of bed rest may lead to debilitation. Resume usual activities as soon as possible [D*]. • Work restrictions. Restrict from work depending on neurologic findings, pain, and work demands [D*]. • General activity restrictions. Sometimes it is reasonable to restrict a person from long distance driving, heavy lifting, sitting for prolonged periods, or repetitive twisting and reaching [D*]. • Minimize restrictions. Minimize any activity restrictions by consulting with the patient and possibly the employer about physical demands of the patient’s job and the availability of alternative work [D*]. • Timetable. For all activity limits specify an expiration date and the date of physician follow-up [D*]. <p>Patient Education:</p> <ul style="list-style-type: none"> • Diagnosis. Most likely diagnosis is disk herniation. Diagnostic tests will not change the initial treatment. Tests will be ordered if the pain does not change or symptoms worsen. • Prognosis. Chances of spontaneous recovery are good. About half of people are better within 6 weeks. • Activity. A few days of bed rest may help with discomfort, but staying active will speed recovery. Avoid highly physical activity until pain is less. • Non-medication treatments. Reinforce. • Medications. Review risks and side effects. • Warnings. Seek medical care if pain or weakness worsens and seek immediate medical care if bowel or bladder incontinence occurs. <p>* Levels of evidence for the most significant recommendations: A=randomized controlled trials; B=controlled trials, no randomization; C=observational trials; D=opinion of expert panel.</p>	<p>If at Risk: Chronic Disability Prevention [D*] (Table 2)</p> <ul style="list-style-type: none"> • Address barriers. Discuss with patient any barriers to success and ways to deal with them. • Maintain work. Avoid time off work if at all possible. • Minimize work restrictions. Consider contacting employer (with patient permission) to discuss how to minimize work restrictions. Any restriction should be time limited (e.g., “no lifting over 30 lb. for 2 weeks, then unrestricted duty”). <p>Follow-Up Visits (for patients at risk for chronic disability) [D*]:</p> <ul style="list-style-type: none"> • Schedule <ul style="list-style-type: none"> - If kept out of work: See in 2–3 days, then weekly. - If moderate pain/restrictions: See patient weekly. - If pain resolved and no restrictions: See patient prn • Early aggressive intervention. At 2-3 weeks of disability strongly consider referral to a spine rehabilitation team. • Future prevention. After episode resolves discuss preventing future disability. <div style="text-align: center; border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Subsequent Visits</p> </div> <p>History and Physical: Update history and physical. If diagnostic impression is changed, go to appropriate steps in Figure 1.</p> <p>If pain better: Reduce medications, increase activity [D*].</p> <p>If no improvement:</p> <ul style="list-style-type: none"> • At 1-2 weeks [D*] consider physical therapy McKenzie exercises [A*]. • At 2-4 weeks obtain MRI [B*]. If MRI is not diagnostic, obtain EMG [B*]. (Plain X-rays are usually not helpful.) <ul style="list-style-type: none"> - If pathology proven by MRI/EMG: consider acute physiatric or pain specialist evaluation (for injection therapy) or surgical evaluation [A*]. - If pathology not proven by MRI/EMG: consider physiatrist referral [D*]. <p>If at Risk: Chronic Disability Prevention (Table 2)</p> <ul style="list-style-type: none"> • Patient education: See relevant information under “initial visit” above. • Minimize restrictions • At 6 weeks consider referral to spine rehab program. <p>Follow-Up (in patient at risk for chronic disability)</p> <ul style="list-style-type: none"> • If kept out of work: See in 2–3 days, then weekly. • If moderate pain/some restrictions: See patient weekly. • At 6 weeks and disabled [A*]: Consider referral to spine specialist -- leg pain to surgeon, back pain or psychosocial issues to physiatrist. • At 12 weeks and disabled [B*]: Consult spine rehabilitation program. Consider surgical consultation.

Table 7. Medications for Low Back Pain (Non-Radiating and Radiating) [UMHS Preferred Agents in **Bold**]

Class	NSAID	Brand Name	Typical Oral Dose (mg)	Cost/Month (\$)		Side Effects
				Brand	Generic	
Propionic Acids	Ibuprofen	Motrin	600 QID or 800 TID	19 19	9 11	Aseptic meningitis Avoid in renal disease
	Fenoprofen	Nalfon	600 TID	81	19	
	Flurbiprofen	Ansaid	100 TID	180	47	
	Ketoprofen	Orudis	75 TID	NA	33	
	Naproxen	Naprosyn	500 BID	94	12	
	Oxaprozin	Daypro	1200 QAM	110	31	
Carbolic Acids	Aspirin	Multiple	975 TID	15	7	Tinnitus
	Salsalate	Disalcid	1500 BID	87	10	Lower GI effect/renal risk
	Choline magnesium trisalicylate	Trilisate, Tricosal	1500 BID	140	56	Lower GI effect/renal risk
	Diflunisal	Dolobid	500 BID	80	51	Lower GI effect/renal risk
Acetic Acids	Diclofenac	Voltaren , Arthrotec Cataflam	75 BID 50 TID-QID	108 135-180	16 42-54	Worse risk for liver disease
	Etodolac	Lodine	300 BID	92	34	Low GI effect
	Indomethacin	Indocin	50 TID	89	14	Risk of headaches Avoid in renal disease
	Sulindac	Clinoril	200 BID	81	27	Better for renal disease
	Tolmetin	Tolectin	400 TID	122	83	
	Ketorolac	Toradol, Acular	10 QID	119	80	
	Enolic Acids	Phenylbutazone	N.A.	100 TID	NA	NA
Piroxicam		Feldene	20 daily	86	5	
Meloxicam		Mobic	7.5-15 daily	63 - 70	NA	
Fenamic Acids	Meclofenamate	Meclofenamate	50 QID	NA	30	
Naphthylkanones	Nabumetone	Relafen	1000 daily	81	56	Low gastric irritation (comparable to using Etodolac)
“Muscle Relaxants”	Cyclobenzaprine	Flexeril	10 TID	103	11	Anticholinergic
	Carisprodol	Soma	350 QID	400	26	Drowsiness
	Baclofen	Lioresal	10 QID	NA	33	Drowsiness
	Diazepam	Valium	10 QHS	48	4	Drowsiness, depression, addiction
COX-2 Inhibitor (See Table 8)	Celecoxib	Celebrex	200 daily	74	NA	

For brand drugs, Average Wholesale Price minus 10%. AWP from Amerisource Bergen Wholesale Catalog 10/02. For generic drugs, Maximum Allowable Cost plus \$3 from BCBS of Michigan MAC List, 1/15/03. Those generic drugs where MAC is not established, cost is based upon double the Wholesale Acquisition Cost (WAC) from the Amerisource Bergen Wholesale Catalog 10/02 plus \$3.

Table 8. COX-2 Criteria and Precautions

Patient:

- | | |
|---|---|
| 1) has a history of upper GI bleeding | 4) is receiving anticoagulants |
| 2) is receiving chronic, high dose systemic corticosteroids | 5) has a documented intolerance to traditional NSAIDs |
| 3) has presence of a bleeding disorder | 6) elderly patients with multiple comorbidities |

Note: Do not prescribe COX-2s to patients with known coronary heart disease. Exercise extreme caution in prescribing to patients with multiple risk factors for coronary heart disease.

Clinical Background (continued)

Acute LBP is the second most common symptomatic reason for office visits to primary care physicians, and the most common reason for office visits to orthopedic surgeons, neurosurgeons, and occupational medicine physicians. Recurrence of LBP is common, 60-80% of patients experience recurrence within two years.

Financial Impact

The personal, social, and financial effects of back pain are substantial. In America the direct annual cost is 40 billion dollars, with indirect costs--lost wages and productivity, legal and insurance overhead, and impact on family--at over 100 billion dollars. Important acute care costs result from over utilization of diagnostic and treatment modalities, and inappropriate activity restrictions. The small number of persons who become chronically disabled consume 80% of the cost.

Acute vs. Chronic Pain Prognosis

A great majority of persons with non-radiating low back pain will have resolution of symptoms within 6 weeks. Half of all persons with radiating low back pain recover spontaneously in the same time period. As time passes, the prognosis worsens to the point where the small group of persons who remain disabled with LBP at three months has less than a 50% chance of recovery, and those out of work at one year have a 10% chance of ever returning to gainful employment if left untreated.

Rationale for Recommendations

Diagnosis

Diagnostic difficulties. The medical model of "diagnose, treat, cure" does not easily fit low back pain, given the state of our knowledge. An anatomical diagnosis cannot be made in most persons. A differential diagnosis of back pain is presented in Table 3 as background. Currently no diagnostic test can verify the presence of muscle strains, ligament sprains, or small tears of the annulus fibrosis of the disk, which seem intuitively plausible as causes of pain. Other possible diagnoses such as facet joint arthritis (degenerative joint "disease"), sacroiliac joint asymmetry, or disk "bulges" do not correlate statistically with the presence of pain in large populations or with reproduction/alleviation of pain on examination or injection.

Other patients fit into well documented syndromes such as disk herniation, spondylolisthesis, or spinal stenosis. Even in these cases the diagnosis is often not simple. For example one-third of asymptomatic volunteers have disk changes on MRI. The correlation of spinal canal diameter and symptoms is highly variable in stenosis patients. Low-grade spondylolisthesis noted on x-ray are most often

asymptomatic. In these cases diagnostic tests must be interpreted in conjunction with the clinical history and physical examination.

Finally, a small number of patients will have dangerous cases of LBP. Cauda equina syndrome – progressive loss of nerve function including bowel and bladder continence – is a surgical emergency. Fractures can occur with high velocity impacts or in persons with osteoporosis. A high index of suspicion is needed to diagnose uncommon problems such as tumors (metastatic more often than primary) and infections such as epidural abscesses or disk space infections. Systemic disorders including polyarthritis, renal stones or infections, aortic aneurysms, nerve diseases, muscle diseases, and various metabolic disorders may present with back pain. Psychiatric diseases such as hysteria, malingering, or somatization disorders are the primary diagnosis in rare cases.

History. The history should answer the following questions:

- Is it likely that the patient has a serious illness or injury?
- Is the patient likely to become chronically disabled?
- Is there a disorder, which would benefit from specific treatments?
- Are there contraindications to certain treatments?
- Are there social factors such as work or avocation, which may require modification?

Most serious illnesses or injuries can be detected by asking appropriate questions during the history used to identify "red flags" in the AHCPR guidelines for acute low back pain. Table 1 lists many of these and the underlying conditions that they suggest. Clinical judgment is needed in interpreting whether a red flag requires further diagnostic testing.

The history should also assess risk for chronic disability. At initial presentation, trained physicians can predict with high sensitivity which persons will become chronically disabled by obtaining an adequate social history, as outlined in Table 2. Aggressive interventions to prevent chronic disability should be focused on this population.

Physical examination. The physical examination should answer these questions:

- Is the pain reproduced in a specific anatomic structure?
- Is there a neurologic deficit?
- Are there any clues to a dangerous systemic disorder?
- What is the extent and appropriateness of the patient's pain behavior?

General assessment should include areas of back tenderness and back mobility, including degree of flexion, extension, and lateral rotation (see Table 4). The focused examination includes the testing of muscle strength, reflexes, and range of motion. The strength examination should overcome the strength of each muscle in order to assess its full innervation. Especially in subtle cases, determination of a

true radiculopathy is more certain when two muscles from different nerves, but the same root, and the corresponding reflex are all abnormal. Neurologic deficits in multiple roots suggest more serious spinal or neurologic disorders.

The L-5 innervated medial hamstring reflex is not commonly taught. With the patient prone or sitting with knees bent to 90 degrees, one hand palpates to locate the medial hamstring tendon (posterior knee). A reflex hammer in the other hand briskly percusses the first hand. Hamstring contraction is palpated and knee flexion may be observed. The reflex is facilitated by having the patient activate the hamstring (flex the knee) slightly.

Reproduction of pain in a specific anatomical structure provides some assurance that the lesion is "mechanical" as opposed to a systemic disorder. It may hint at a specific spinal disorder. Palpation of the spine and flexion and extension of the spine are common maneuvers to differentiate between mechanical and systemic disorders.

A positive straight leg test requires pain radiation below the knee. The straight leg raise test detects over 90% of clinically significant radiculopathies due to disk herniation, and the femoral stretch test is about 50% sensitive for less common high lumbar disk herniations.

The examination also includes Gordon Waddell's five "non-organic pain" signs. If 3 or more of these 5 "Waddell" signs are present, then it is likely that there is a psychogenic component to the patient's pain behavior.

1. Overreaction during the exam
2. Simulated testing. Positive when pain is reported with axial loading (pressing on top of the head) or rotation with the pelvis and shoulders in the same plane.
3. Distracted testing. Test straight leg raise while distracted when sitting. (e.g. extend knee in sitting position while appearing to be performing a Babinski reflex)
4. Superficial, nonanatomical or variable tenderness. When skin rolling over the back markedly increases the pain. Mark areas of tenderness and examine later for reproducibility.
5. Nonanatomical motor or sensory disturbances. Positive when sensory loss does not follow a dermatome or entire leg is numb or without strength or when there is a "ratchety" giveway on strength testing.

Presence of two or more of these findings correlates with poor surgical outcome, but not rehabilitation outcome. It is incorrect to interpret them as specific for malingering, which is an uncommon disorder. In a primary care setting they are best viewed as a warning that the patient's report of pain will not be a reliable guide to treatment success, and that the patient is at risk for becoming chronically disabled.

Diagnostic tests. A complete blood count (CBC) and erythrocyte sedimentation rate (ESR) are sufficiently inexpensive and efficacious for use as initial tests when there is suspicion of cancer or infection as the cause of

acute LBP. In the absence of red flags and high index of suspicion, or of increasing pain and weakness, imaging studies are usually not helpful during the first 3-4 weeks of back symptoms. If low back symptoms persist for more than 4-6 weeks, further evaluation may be indicated. If radicular symptoms (leg pain and weakness) persist undiminished for more than 4 weeks, further evaluation is strongly indicated. Reevaluation begins with a review and update of the history and physical exam to assess again for red flags or evidence of nonspinal conditions causing back symptoms.

MRI, CT, CT-myelography. The use of these imaging tests for patients with acute low back problems is to define medically or surgically remediable pathological conditions. Imaging studies must be interpreted in conjunction with the clinical history and physical examination. In one study, MRI showed significant degenerative change and encroachment into the spinal canal in more than 50% of asymptomatic older persons; the incidence of asymptomatic herniated discs was approximately 20% in persons in their 30's. The imaging findings may not be significant unless they correlate with the findings on physical examination.

These tests should in general be used only for patients who present with one of these three clinical situations: (CT scans are to be avoided during pregnancy. Consultation with a radiologist is strongly advised when considering MRI scanning during pregnancy.)

- 1) History and clinical examination findings or other test results suggesting other serious conditions affecting the spine such as suggesting cauda equina syndrome, spinal fracture, infection, tumor, or other mass lesions or defects.
- 2) Patients limited by radiating low back pain for more than 4 weeks with physiologic evidence of nerve root compromise and symptoms/disability severe enough to consider injection or surgical intervention.
- 3) A history of neurogenic claudication and other findings in elderly patients suggesting spinal stenosis with symptoms severe enough to consider injection or surgical intervention.

For patients with acute low back problems who have had prior back surgery, MRI with contrast appears to be the imaging test of choice to distinguish disc herniation from scar tissue associated with prior surgery.

EMG. EMG testing is not recommended if the diagnosis of radiculopathy is obvious on the clinical exam. EMG results may be unreliable in detecting subtle nerve damage until a patient has had significant radiculopathy for over 3 weeks. EMG may be used to help delineate abnormal neurological exams in patients with risk factors for neuropathy (e.g. alcohol or diabetes).

Following imaging studies, EMG of the lower limb and paraspinal muscles may be helpful in the following circumstances:

- 1) in patients limited by radiating low back pain for more than 4 weeks without clear evidence on imaging studies of nerve root compromise.
- 2) for patients whose imaging study demonstrates lesions that do not correlate with the clinical picture (the false positive rate for EMG is quite low).
- 3) for persons with radiating pain or neurological deficits in the absence of imaging findings of disc herniation to assess for neuropathies, radiculitis, and focal nerve injuries which can mimic radiating low back pain.
- 4) for patients with abnormal MRI at multiple levels where clinical examination does not clarify the level of clinical significance.

Plain x-rays. Plain x-rays are not recommended for routine evaluation of patients with acute low back problems within the first 4-6 weeks of symptoms unless a red flag and high index of suspicion is noted on clinical evaluation. Plain x-rays are recommended for ruling out fractures in patients with acute low back problems when any of the following red flags are present: recent significant trauma (any age), recent mild trauma (patient over age 50), history of prolonged steroid use, osteoporosis, patient over age 70). Plain x-rays in combination with CBC and ESR may be useful for ruling out tumor or infection in patients with acute low back problems when any of the following red flags are present: prior prolonged steroid use, low back pain worse at night and with rest, unexplained weight loss. In the presence of red flags, especially for tumor or infection, the use of other imaging studies such as bone scan, CT or MRI may be clinically indicated even if plain x-ray is negative. The use of lumbar x-rays to screen for spinal degenerative changes, scoliosis, spondylolysis, spondylolisthesis, or congenital anomalies very rarely adds useful clinical information. X-rays are to be avoided in pregnancy.

Bone Scan. A bone scan is recommended to evaluate acute low back problems when spinal tumor, infection, or occult fracture is suspected from positive “red flags”. Bone scans are contraindicated in pregnancy.

Treatment

Patient education. Exactly what to teach is not proven. In one study educating patients to resume usual activity was both safe and therapeutic and led to less work disability, less pain, and less health care utilization. One randomized controlled trial showed patients receiving educational booklets had significantly fewer subsequent follow-up visits over the next year than control populations. Substantial literature elsewhere in medicine indicates that physician education can have a positive effect on a disease process. Lack of clear physician communication regarding the cause of the patient’s LBP may prolong recovery and is a frequent source of patient dissatisfaction.

Several randomized controlled trials have shown contradictory results regarding “back schools” in acute

LBP. Back schools may be more effective in an industrial setting.

Ice and Heat. Self-applied ice (in a plastic bag wrapped in a moist towel, and applied for 20 minutes at a time) temporarily decreases pain and has an anti-inflammatory effect. Heat (in the form of a warm shower, bath, or hot pack) and counterirritants (such as “deep” heating compounds) distract the patient from the pain, and may have a muscle relaxing effect.

Spinal manipulation. Spinal manipulation (by chiropractors, osteopathic physicians, or specially-trained physical therapists) has been shown in randomized controlled trials to provide symptomatic relief for low back pain. Relief is rapid and patient satisfaction high, but multiple treatments are typically provided. However, in trials to date, manipulation does not improve function (e.g. return to work, decreased disabilities indexes).

Exercises. McKenzie exercises—a program of specific conditioning exercises, usually involving trunk extension, which strives to “centralize” pain—may be effective in relieving radiating LBP. A program of gradually increased aerobic and back-strengthening exercises may help prevent debilitation due to inactivity. Aerobic exercise programs, which minimally stress the back (walking, biking, or swimming), can be started during the first 2 weeks for most patients with acute LBP. Recommending exercise quotas that are gradually increased result in better outcomes than telling patients to stop exercising if pain occurs.

Other treatments. More complex physical modalities such as ultrasound, diathermy, phonophoresis or iontophoresis of medications, transcutaneous electrical nerve stimulators (TENS), and others have not been shown to be of benefit. When applied by a therapist, these increase cost substantially.

Shock absorbing shoe inserts may be of benefit to persons whose work involves long periods of standing on hard surfaces. Lumbar corsets or belts have no supportive effect, and most literature suggests that they are ineffective. Traction has no clear benefit.

Activity limitations. Strong evidence shows that bed rest is not an effective treatment option for acute LBP. Maintaining usual activities has been shown to improve recovery. It may be appropriate in some circumstances to limit physical activity, upon weighing the nature of a patient’s work and the severity of the pain. Since pain is not objectively quantified, and the physician is typically not expert in the patient’s work situation, the patient’s knowledge of these factors should be taken into account in making initial activity limitations.

Length of time off work is directly correlated with the risk of long-term disability. Thus a number of measures should be taken to minimize activity limitations. Activity limitations should be for a specific time period. Before

taking a patient off of work completely, the physician might consider communicating with the employer to see if light duty or limited hours are available. Workplace modification improves return to work rates and decreases disability time. Consultation with an occupational therapist or other allied health professional with expertise in job site evaluation should be considered. Patients should be followed frequently through any period of time off work.

Medications. Commonly used medications are listed in Table 7. Certain medications have been shown to decrease the discomfort of acute low back pain. None has been shown to decrease disability or change the natural history of the disorder.

Acetaminophen has not been studied in acute low back pain, but it should be considered based on its effectiveness in other disorders and its low side effect and cost profile

Nonsteroidal anti-inflammatory drugs (NSAIDs) are more effective than placebo in patients with uncomplicated acute LBP, but not in patients with acute sciatica. The choice of NSAID depends on cost and side effect profile.

Traditional NSAIDs should be recommended over COX-2 inhibitors in most patients. When patients taking a COX-2 inhibitor were compared to patients taking traditional NSAIDs, short-term (6 months) gastrointestinal side effects were less, but were no different at one year follow up. Differences in the rate of serious GI side effects are most pronounced in patients with a history of peptic ulcer and gastrointestinal bleeding. Conditions warranting the use of COX-2 inhibitors are summarized in Table 8. COX-2 inhibitors are significantly more expensive than acetaminophen or ibuprofen (see Table 7). Rofecoxib (Vioxx) was withdrawn from the market in 9/2004 and valdecoxib (Bextra) in 4/2005 by the manufacturers due to evidence that they increase risk of cardiovascular events.

“Muscle relaxants” used for back pain appear to have no direct effect on skeletal muscle, yet a number of them have been shown to be more effective than placebo in relieving LBP. However, muscle relaxants have been proven not to be more effective than NSAIDs. Drowsiness is a common, sometimes dangerous side effect.

Opiate analgesics have not been shown to be more effective than NSAIDs in acute LBP. Side effects of drowsiness, addiction, and constipation need to be considered.

Other drugs. The literature does not support the use of oral steroids and tricyclic antidepressants in the treatment of acute LBP. Patients with psychological risk factors for subacute and chronic low back pain have decreased duration of disability with the use of SSRI antidepressants. Chronic pain is better managed with norepinephrigenic antidepressants when other health issues allow. Gabapentin has resulted in decreased pain intensity and duration in chronic low back pain.

Injections. Epidural steroid injections for the radiating pain of disk herniations or spinal stenosis may be of some benefit in decreasing radiating leg pain, however the effect on long-term outcome is not clear. Steroid injections into the facet joints and sacroiliac joints do not appear to have significant effect when completed outside the confines of a comprehensive rehabilitation program. Trigger point injections with local anesthetic, “dry needling”, and botulinum toxin injections have been shown to have short-term effectiveness in the management of low back pain.

Surgery. Since many patients with radiating pain get better within the first few weeks, surgery is usually not considered until a patient has failed at least 4 weeks of aggressive conservative treatment. Patients with progressive neurologic deficits require emergent surgical evaluation. Patients with pain radiating below the knee, positive neurologic findings, and disk herniation on imaging studies have faster relief of symptoms with surgery as opposed to conservative treatment. For disk herniation, long-term outcome is not statistically different between surgically and conservatively treated patients. The length of disability can be considerably shortened by surgical intervention. Patients with symptomatic spondylolisthesis, spinal stenosis, and segmental hypermobility may also respond to surgery.

Counseling. The effect of psychosocial counseling on most persons with acute back pain is not known. Reactive depression and anxiety may occur and are effectively treated with medication and counseling. Patients with premorbid personality, thought or mood disorders may have exacerbations. Counseling may be of benefit for these patients. Biofeedback and self-hypnosis, often taught by counselors, have not been shown to have an effect on acute LBP.

Multidisciplinary rehabilitation. Two randomized controlled trials have shown that complex rehabilitation programs are effective for persons that are disabled by subacute (6-12 week) or chronic (≥ 12 week) back pain. Psychosocial evaluation can identify patients likely to have chronic back pain. These individuals are candidates for multi-disciplinary rehabilitation programs. These programs typically involve a team of physical therapists, occupational therapists, psychologists, social workers or vocational counselors, and psychiatrists. These programs involve intensive exercise and counseling, which are probably not cost effective in the acute stage. Less intensive rehabilitation efforts including “work hardening” and “work conditioning” may be effective in the subacute 6-12 week period. Cognitive-behavioral therapy is also effective in patients with subacute low back pain, resulting in a significant reduction of the time of disability.

Special Circumstances

Primary Prevention

Screening. In a healthy population there is no utility for screening x-rays and little utility for screening physical examination. Since employees who are unable to perform the basic physical requirements of physically demanding jobs are more likely to be injured than others, it is thought that physical fitness for the job is an important, but reversible risk factor. Factors such as obesity, mild to moderate scoliosis, and a number of common congenital anomalies are not strongly predictive of back pain. A history of LBP is a predictor of future back ache, but since back ache is so common in the population, this is typically not a useful screen. Previous back surgery also predicts the possibility of future pain.

Preventive interventions. Prevention interventions that are probably effective include:

- Physical activity [D*]
- Back extensor muscle strength [C*]
- Smoking cessation affects outcome [C*]
- Psychosocial demands should be addressed [C*]
- Job satisfaction issues should be addressed [C*]
- General aerobic and strengthening exercises
- Lifting / standing affects outcome [C*]
- Modification of work design (job modification).
- Back supports are ineffective in preventing work injuries [A*]
- Back schools have not shown effectiveness in preventing injury [A*]

In older women or persons at risk for osteoporosis, trunk extension exercises are preventive, while trunk flexion exercises may increase the risk of osteoporotic fractures. Orthotic devices such as braces or back belts are probably not effective in preventing back pain.

Recurrent Low Back Pain

Most persons who have an episode of back pain will have recurrences within the year. As long as they are similar in nature and not more severe, treatments previously used can be re-instituted. Patients who have recurrent, activity limiting acute episodes over a longer period of time may require further diagnostic and treatment efforts, and perhaps consultation with a specialist.

Pregnancy and Low Back Pain

About 50% of pregnant women will have a significant complaint of back ache. Pregnant women who have low back pain will likely have an increase in complaints through the pregnancy. Risk of back pain increases after delivery.

Possible causes for back pain including radiating low back pain complaints include:

- Loosening of the sacroiliac joint.
- Muscular fatigue.
- Disk herniation.
- Sciatic nerve or lumbar plexus pressure by the uterus.

Unproven, but possibly effective non-pharmacologic treatments include:

- Prophylactic initiation of low back stretching exercises
- Conditioning and exercise, especially exercise in the water
- Physical therapy
- Teaching about lifting mechanics
- Job and activity modification including bed rest
- Locally applied ice
- Judicious use of heat: heating pad, hot packs, shower, warm bath
- Manual (manipulative) therapy
- Lumbar traction
- Supportive devices such as “prenatal cradles” or sacroiliac joint belts

Medications are limited and should be appropriate for a pregnant woman. A consultation with a radiologist is strongly advised when considering an MRI scan during pregnancy.

- Avoid NSAIDs during first and third trimesters
- Acetaminophen
- Narcotic pain medication (acetaminophen/codeine)
- Epidural steroids can be considered before surgery.
- Surgery is rarely indicated.

Early delivery may be considered.

Pregnant women with back pain may want to discuss with their obstetrical care provider different positions, strategies, and methods of pain relief. This may include anesthesia consultation, or referral to hospital or community based prophylactic back classes specifically designed for pregnancy. For diagnostic testing, MRI and EMG may be performed if necessary. In general, x-rays and CT scans are contraindicated during pregnancy.

Controversial Areas

Alternative / Complimentary Medicine

(Note: manual or manipulative medicine is discussed under exercises.)

About 40% of Americans with a low back pain first seek help from an alternative health care provider. Because of the considerable variation of the techniques applied and the strong placebo effect, it is difficult to measure the effect of such interventions. Many alternative medicine treatments

are not thought to be clinically or cost effective following a brief trial. Ineffectiveness was noted for prolotherapy (injecting neutral substance, e.g. dextrose, into connective tissue structures to decrease pain and increase stability), magnet therapy, and acupuncture [A*].

Work Restrictions and Disability Ratings

Clinical judgment or the advice of an expert may be helpful when the physician is asked to provide permanent restrictions or disability ratings.

There is little or no correlation between legal disability rating systems (such as the AMA Guidelines to Physical Impairment or a number of other state compensation systems) and actual future risk of injury or disability.

There is little literature to support specific work restrictions for any specific spinal disorder. The literature supports better outcomes with early return to work. It is clear, however, that heavy lifting, twisting, and seated vibration (as in a car or truck) are risk factors for back pain. Clinical judgment is needed in determining work restrictions. Permanent work restrictions should be given based on objective findings on physical examination and diagnostic tests. Multidisciplinary evaluations may document physical abilities, but reversible causes for limited performance, including deconditioning or psychosocial factors must be considered.

What the Patient Should Know

The important educational points for patients with non-radiating and with radiating pain are listed in Tables 5 and 6 respectively.

Providing good educational handouts is also important. One study demonstrated that providing a more detailed booklet produced a better result than providing a simple information sheet.

Strategy for Literature Search

The literature search for the 1997 guideline was based on major reviews and a supplemental search. Three prominent consensus panels funded by the Canadian Province of Quebec, The British Royal College of General Practitioners, and the United States Agency for Health Care Policy and Research (AHCPR) have performed exhaustive reviews of the back pain literature for their practice guidelines for acute back pain. A critique of the AHCPR guidelines (Gonzalez, I. The Nonsurgical Management of Acute Low Back Pain. Demos Vermande. New York, 1997) was also reviewed. To supplement these references a Medline literature search was performed for the five years 1992 through 1996, which including the terms: *low back pain, diagnosis, treatment, chronic low back pain, guidelines, and controlled trials.*

The literature search for the current update was based on a supplemental Medline search of literature from 1997 through the fall of 2002. The population was adults and the results were limited to English language. The major keywords were: *low back pain* and *back pain and low back*. Additional search terms were: *chronic disease, chronic back pain, risk, diagnosis, diagnostic use, therapy, therapeutic use, clinical trials, and guidelines.* The search was a single cycle. Also included were guidelines on low back pain listed at the National Guideline Clearinghouse and reviews on low back pain in the Cochrane Database of Systematic Reviews. When possible, conclusions were based on prospective randomized clinical trials. In the absence of randomized controlled trials, observational studies were considered. If none were available, expert opinion was used.

Disclosures

The University of Michigan Health System endorses the Guidelines of the Association of American Medical Colleges and the Standards of the Accreditation Council for Continuing Medical Education that the individuals who present educational activities disclose significant relationships with commercial companies whose products or services are discussed. Disclosure of a relationship is not intended to suggest bias in the information presented, but is made to provide readers with information that might be of potential importance to their evaluation of the information

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Annotated References

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Excellent evaluation of LBP treatment studies. The quality of the studies is rated and findings summarized in evidence tables.

Spitzer WO, LeBlanc FE, Dupuis M, et al. Scientific approach to the assessment and management of activity related spinal disorders: A monogram for clinicians.

Report of the Quebec task force on spinal disorders. *Spine* 12 (suppl.)s4-s55, 1987.

"The Quebec Study" is the first major governmental attempt to provide an evidence-based consensus on treatment of low back pain. It did not systematically review studies published before 1970.

AHCPR management guidelines for acute low back pain. 1994, The Agency for Health Care Policy and Research, U.S. Department of Health and Human Services.

The AHCPR guidelines used the Quebec study conclusions and added more recent data. [HTTP://www.AHCPR.gov](http://www.AHCPR.gov)

Waddell G, et al. *Clinical Guidelines for the Management of Acute Low Back Pain: Low Back Pain Evidence Review*. 1996 London Royal College of General Practitioners

The RCGP guidelines reviewed and sometimes disagreed with the AHCPR guidelines, updated the literature search, and performed separate analyses of some parts of the literature, added emphasis on detection and prevention of chronic disability. [HTTP://www.rcgp.org.uk/backpain/index.htm](http://www.rcgp.org.uk/backpain/index.htm)

Indahl A, Velund L, Reikeraas O. Good prognosis for low back pain when left untampered. A randomized clinical trial. *Spine* 1995;20:473-7.

This randomized controlled trial of Norwegians who were disabled due to subacute low back pain involved an individual discussion and educational visit in which an expert physician who showed the patient why the use of body mechanics and activity restrictions could be harmful, and how resuming usual activity was both safe and therapeutic. Controls and treated patients continued usual treatment aside from this visit. Three-year follow-up showed 50% less work disability, less pain, and less health care utilization in the treated group.

Hazzard RG, Haugh LD, Reid S, Preble JB, MacDonald L. Early prediction of chronic disability after occupational low back injury. *Spine* 1996, 21(8);945-951.

Hazard et al. showed that an 8-item questionnaire was 94% sensitive and 84% specific in predicting whether persons presenting for their first visit for backache would be working 3 months later. Others, listed in the RCGP review, have demonstrated other risk factors.

Haldorsen EM, Gradsal AL, Skouen JS, Risa Ae, Kronholm K, Ursin H. Is there a right treatment for a particular patient group: Comparison of ordinary treatment, light multidisciplinary treatment, and extensive multidisciplinary treatment for long-term sick-listed employees with musculoskeletal pain. *Pain* 2002; 95(1-2):49-63.

This randomized controlled trial in Norway demonstrated that patients with a poorer prognosis for return to work are more likely to benefit from intensive treatment.

Linton SJ and Andersson T. Can chronic disability be prevented: A randomized trial of a cognitive-behavior intervention and two forms of information for patients with spinal pain. *Spine* 2000; 25(21):2825-31.

This study demonstrated that early intervention that assesses and changes patients' behaviors and beliefs to improve coping can lower risk of long-term disability.