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An Active and Cost-Conserving Approach to the Management of Low Back Pain

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DR. LIANG:

Low back pain in patients is a very common finding for many primary care physicians (PCPs) in the United States and around the world. Roughly 2 of every 3 patients have low back pain at some time in their lives; this complaint is second only to upper respiratory symptoms as a reason for visiting a physician.^{1,2} Indeed, between 40% and 80% of adults report experiencing low back pain.^{3,4} At any single time, approximately 10% of the adult population in the United States is experiencing acute low back pain, and a third of these patients are still experiencing low back pain symptoms after 6 months.⁵ Moreover, recurrence of low back is common; 60% to 85% of patients experiencing low back pain will have a recurrence of the pain within 2 years.⁶ Low back pain is among the top 10 reasons for primary care visits in the United States.⁷

Low back pain appears to affect men and women equally, with initial onset usually occurring from age 30 to 50 years.⁸ This symptom accounts for fully one third of all disability costs in the United States⁷ and is the leading cause of work-related disability in persons younger than 45 years. Moreover, low back pain is the most expensive cause of work-related disability as calculated using workers' compensation and direct medical expenses.⁹ Although identified risk factors for low back pain include heavy lifting, twisting, vibration, obesity, and poor physical condition, low back pain is also common in patients without these risk factors.¹⁰

As noted in this case study, treatments of low back pain vary considerably, with some having dubious benefit but others raising legitimate debate as to the most appropriate approach to treatment.¹¹⁻¹³ Specifically, excessive surgical intervention and radiologic diagnostic efforts may have been provided to patients with low back pain.¹⁴⁻¹⁷ Such clinical difficulties reflect the generally uncertain etiology of low back pain. Roughly 85% of patients with isolated low back pain cannot be

given a precise pathoanatomic diagnosis, and symptom association with radiologic findings is tenuous at best.¹⁸ Further reflecting the difficult nature of identifying an exact anatomic etiology for low back pain, nonspecific terms describing the etiology of the disease (eg, "strain," "sprain," "degenerative processes") are often used, despite the fact that such terms do not reflect specifically characterized medical entities either anatomically or histologically.¹⁹

Luckily, most low back pain, including that with a nonspecific etiology, is generally self-limited and leads to no permanent impairment of the patient,²⁰ with only 1% of patients requiring urgent care⁴ and the majority of patients becoming better within 4 weeks.^{21,22} These evidence-based findings²³ represent a step forward from times when physicians convinced patients of the ominous consequences of ignoring low back pain and its treatment.²⁴ Unfortunately, the legacy of the latter misinformation has thus far prevented broad clinical change, both because of continued inappropriate therapy and because of patient resistance to a "watch and wait" approach to treatment.²⁵

Overall, low back pain is a significant problem for many patients and thus is of great interest to PCPs. Given the already significant incidence of low back pain symptoms, PCPs are likely to see increasing numbers of patients with this finding, particularly as the population ages. It is of critical importance that physicians and other providers attend to evidence-based recommendations regarding the treatment of low back

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pain. Such an approach will limit health care costs, provide better care, and reduce the potential for patient injury that iatrogenic treatment causes.

DR. DUGAN ET AL:

Low back pain is a nearly ubiquitous symptom, with a reported lifetime prevalence of 60% to 90% and an annual incidence of 5% in the United States.²² Many people with low back pain do not seek medical care, suffer no significant functional impairment, and recover rapidly. However, low back pain does account for 14.3% of new patient visits to physicians each year. Back pain is the leading cause of lost work productivity and is second only to upper respiratory complaints as a cause of lost work time.²⁶ Nearly 2.5 million Americans are disabled by low back pain, 1.2 million chronically.²⁷ Estimates of the total cost of low back pain to society range from \$25 billion to \$85 billion.²⁸

Based on these estimates, it is essential that back disorders be treated efficiently and effectively in order to limit disability as well as to manage costs. However, medical management of low back pain continues to be fraught with overutilization of diagnostic testing, medications, immobilization and bed rest, and surgical procedures.²⁹ This article presents a practical and cost-efficient approach to the management of low back pain for PCPs, emphasizing an active approach to rehabilitation.²³ An active approach that focuses on restoring activity tolerance through exercise and minimal bed rest not only conserves resources but can prevent progression to chronic low back pain.³⁰

CASE STUDY

Initial Presentation

A 42-year-old woman presents to her PCP with the primary symptom of low back and right hip pain.

History

The patient reports that during the past few years, she has experienced intermittent bouts of low back pain that she attributed to household chores and lifting her children. Usually, the pain would subside in a few days. Six months ago, however, she had an unusually severe bout of low back pain for no apparent reason. The pain resolved after 2 weeks except for occasional right hip pain. Two days ago, she had the onset of severe low back pain with constant right hip pain after a busy weekend. The pain reduced minimally with ice to the low back. She has not used any medications.

The patient describes the pain in her back as a central constant low-grade ache, worse in the morning and with driving. Her hip pain is worse after driving and in the evening while watching television. She does not report any paresthesias or numbness, nor does she have pain on coughing or sneezing. She says she has no bladder or bowel problems or gait disturbances. She reports no history of fever, unexplained weight loss, neoplasm, or trauma. Her medical history is unremarkable, including a normal menstrual history.

The patient is a full-time homemaker and mother of 2 young children. She gave up working as a nurse 6 years ago after the birth of her first child. Her second child was born 3 years ago. She is not currently involved in regular strengthening or aerobic activity; however, she does report that as a teenager she was involved in contact sports. Since the birth of her children, she has found it difficult to find time to exercise.

Physical Examination

On examination the patient is 68 cm (5 ft 6 in) tall and weighs 61.2 kg (135 lb). She exhibits normal gait and full range of motion while in a squatting position. In standing, she does not have a lumbar shift and is nontender to palpation at the sacroiliac joints, greater trochanters and bursae, and pubic symphysis. She is found to have pain at the mid- to end-range of lumbar spine flexion and end-range extension. She is considerably limited in lumbar spine left side flexion. Reflexes, strength, and sensation of the lower extremities are all within normal limits on neurologic examination. Results of straight-leg raise and slump sit testing are within normal limits. Right hip range of motion is within normal limits. Patrick's test is negative. Her feet are pronated, the right foot more so than the left. On palpation, there is significant restriction of anterior/posterior movement of the right lumbar zygapophyseal joints (L1-L4). Costovertebral angle percussion is nontender.

Muscle length assessment reveals considerable tightness of the quadriceps muscle bilaterally. The iliopsoas is extremely shortened on the right, with passive hip extension limited to 5 degrees. The right piriformis limits external rotation of the right hip to 30 degrees compared with 45 degrees on the left. There is significant muscle weakness of the gluteal and abdominal muscles with obvious abnormal movement patterning of pelvic and lower limb movements. Muscular palpation reveals spasm of the erector spinae, greater on the right than on the left. There are very active trigger points in the right quadratus

lumborum and right gluteal musculature. The absence of a lower abdominal pulsatile mass is noted, and lower limb pulses are 2+ and symmetric.

- **What are possible causes of low back pain?**
- **What is the goal of the initial visit of a patient with low back pain?**

Low back pain is associated with a wide range of disorders (Table 1). Mechanical causes of low back pain include musculoligamentous injuries; disc and facet joint degeneration; herniation of nucleus pulposus, with nerve root irritation; spinal stenosis; and anatomic anomalies, such as scoliosis and spondylolisthesis. The majority of patients initially report mechanical axial low back pain with no referral pain patterns.³¹ In patients with mechanical low back pain, the neurologic examination typically reveals no abnormalities, and neural tension tests are negative for any findings; in some cases, results of neurologic examination can be abnormal because of comorbid conditions (eg, diabetic neuropathy). Underlying systemic diseases, such as primary or metastatic cancer, spinal infection, or ankylosing spondylitis, account for approximately 10% of cases. In as many as 85% of patients with low back pain, a definitive diagnosis cannot be given.¹⁹

Because a specific cause frequently cannot be identified and because the majority of patients presenting with low back pain will recover from the acute episode, the goal of the initial visit is to rule out any serious medical or neurologic illness and to identify the social or psychological issues that may lead to a prolonged course.¹⁹ Cancer, infection, and cauda equina syndrome are rare, but clues to these presentations should be sought in the history and physical examination.³² Historical “red flags” associated with cancer include weight loss and pain unrelieved by bed rest.

- **What diagnostic possibilities in this patient were ruled out by the physical examination?**

Right Hip Osteoarthritis

The pain of hip arthritis can present with more diffuse pain but usually includes the anterior aspect of the leg and groin. There may be stiffness in the morning with provocation of pain with weight-bearing activities. The physical examination reveals loss of hip range of motion, with a capsular pattern of restriction. The neurologic examination is normal. Associated low back pain caused by gait disturbance is not unusual and is mechanical in nature.

Table 1. Disorders Associated with Low Back Pain

Mechanical	Rheumatologic
Muscle strain	Ankylosing spondylitis
Herniated intervertebral disc	Reiter's syndrome
Osteoarthritis	Psoriatic arthritis
Spinal stenosis	Enteropathic arthritis
Spondylolisthesis	Diffuse idiopathic skeletal hyperostosis
Adult scoliosis	Fibromyalgia
Infectious	Polymyalgia rheumatica
Osteomyelitis	Endocrinologic
Discitis	Osteomalacia
Pyogenic sacroiliitis	Osteoporosis
Herpes zoster	Parathyroid disease
Neoplastic/infiltrative	Microcrystalline disease
Osteoid osteoma	Referred pain
Osteoblastoma	Abdominal aorta
Osteochondroma	Pancreatitis
Giant cell tumor	Gall bladder disease
Gaucher's disease	Kidney
Skeletal metastases	Bladder
Multiple myeloma	Uterus
Chordoma	Prostate
Ovarian disorder	Miscellaneous
Neurologic/psychiatric	Paget's disease
Neuropathic arthropathy	Vertebral sarcoidosis
Neuropathies	Retroperitoneal fibrosis
Psychogenic rheumatism	Subacute bacterial endocarditis
Malingering	

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Right Sacroiliac Joint Pain with Referral

The sacroiliac joint as a pain generator is the subject of controversy in the musculoskeletal literature.³³ It may be associated with pain in the buttock and posterior or lower extremity. Pubic area pain may occur when alignment is altered. Neurologic examination is usually normal. Pelvic provocative maneuvers such as Patrick's test are positive.

Referred Pain from Visceral Structures

Visceral structures in the pelvic region can refer pain to the low back and right hip (eg, a cyst of the

right ovary). The quality of the pain is more vague and difficult to localize. The pain may be related to the menstrual cycle. The pain is not provoked with manipulation of the musculoskeletal system. Results of neurologic examination are generally normal.

Diagnosis

Based on her history and physical examination, the patient is presenting with an acute exacerbation of intermittent chronic low back pain with referral to the proximal lower extremity. The patient's initial reports of various acute low back strains that resolved spontaneously, progression to a more severe episode of back pain 6 months prior to her current episode, and residual hip pain implies a progressing pathology. The hip pain is presumably caused by symptoms arising from the deep structures of the spine, given the normal results of examination of her hip and sacroiliac joint. Her history and physical examination are not consistent with an emergency presentation. Her symptoms do not imply nerve root irritation or injury.

- **Is diagnostic testing indicated in this patient?**

Need for Further Evaluation

Radiologic testing is generally not required in patients presenting with mechanical low back pain. Abnormalities are common, even in asymptomatic patients; in fact, magnetic resonance imaging (MRI) findings of disc degeneration, end plate changes, and osteophytes are almost ubiquitous in persons age 60 years.³⁴ The Quebec Task Force recommends radiographic testing in the case of neurologic deficits, age greater than 50 or less than 20 years, fever, trauma, or history of neoplasm.³⁵ The Agency for Health Care Policy and Research (AHCPR) guideline on acute low back problems recommends the use of lumbar radiographs in the presence of certain red flags²³; of note, a retrospective chart review of Canadian family physicians³⁶ suggested that strict adherence to the AHCPR guideline would increase utilization of plain radiographs in patients with low back pain.

In the setting of an objective evaluation demonstrating neurologic compromise or disc disruption, MRI of the spine may be useful in detecting anatomic lesions. However, as Boden and colleagues noted, "a diagnosis based on magnetic resonance imaging in the absence of objective clinical findings may not be the cause of the patient's pain, and an attempt at operative correction could be the first step toward disaster."³⁴ One should be judicious in interpreting the findings of the examination, because studies have shown that nearly

one third of asymptomatic individuals will have abnormalities on lumbosacral MRIs.³⁷ An MRI should be obtained only if it will affect the plan of treatment.

Computed tomography is valuable for defining the bony architecture, such as with bony tumors or infection, and can be utilized if MRI is contraindicated. Bone scan also delineates bone inflammation in the spine. Electromyography (EMG) can be utilized to evaluate local neurologic function in ambiguous presentations. The AHCPR guideline states that needle EMG and H-reflex testing, a special study that provides information about the nerves including the root level, may be useful if the history and physical examination are not obvious and specific for radiculopathy.²³

Laboratory testing is typically unnecessary in patients with low back pain. In the event that the pain lasts longer than 1 month or is associated with systemic signs (eg, fever), the PCP may be prompted to test for evidence of a systemic cause of the pain, such as infection, ankylosing spondylitis, or a viscus.²³ For example, an erythrocyte sedimentation rate or C-reactive protein level may be useful in the setting of an infection. However, these recommendations are not uniformly followed in clinical practice. In a survey by Cherkin and colleagues¹² in which physicians were asked questions about hypothetical patients, the use of imaging, electrodiagnostic, and laboratory testing was dependent on the individual physician's training and was generally ordered earlier than recommended by the Quebec Task Force.

Initial Management

The physician tells the patient that her acute back pain is most likely the result of muscle strain and that her symptoms will likely go away in about a month. She is encouraged to continue with her activities of daily living but to avoid heavy lifting or prolonged activity. The patient is started on ibuprofen. She is also given cyclobenzaprine for use at bedtime. Because of the chronicity, irritability, and progressing pathology, a referral to rehabilitation is made. Interventional procedures, such as injections or referral for surgery, are not indicated, given her presentation.

- **What is the approach to medical management of low back pain?**

The algorithm in **Figure 1** presents 3 clinical pathways for patients with low back pain, depending on their presentation. The first pathway is for patients whose clinical presentation is consistent with acute mechanical low back pain; the second pathway is for patients with subacute/chronic low back pain or low back pain with somatic or neurogenic referral to the

lower limb; the third pathway is for patients with low back pain with evidence of nerve root irritation or frank radiculopathy. Compared with patients who have acute mechanical low back pain, patients with subacute or chronic low back pain or with referred pain may have a more advanced process along the degenerative cascade or a more complex biopsychosocial context for the pain and, as reflected in the algorithm, may require greater utilization of services to accomplish symptom control or resolution. Patients with evidence of nerve root irritation or frank radiculopathy are considered separately because of the potential for neurologic compromise.

For the case patient, management should follow the pathway for chronic low back pain with somatic referral.

- **What education should patients receive about their back pain?**
- **Should patients be advised to limit their activities?**

Patients should be advised about the self-limiting nature of low back pain as well as modalities that can be applied at home (eg, heat, ice). Patient education may limit the need for frequent follow-up visits and costly application of modalities within a rehabilitation clinic. Deyo and Diehl demonstrated that a thorough explanation of the natural history of the spinal degenerative cascade and recovery from back pain increases patient satisfaction.³⁸

Patients should be encouraged to continue with activities of daily living, as tolerated. Instructions should be given to avoid any heavy lifting or prolonged activity and to change positions frequently to avoid increasing intradiscal pressures.³⁹ Bed rest is not indicated in the setting of mechanical low back pain. In their 1986 study comparing 2 days to 7 days of bed rest, Deyo and colleagues concluded that 2 days of bed rest are more appropriate than is a prolonged period that may lead to more deconditioning in patients with low back pain.⁴⁰ Of note, there was poor compliance with bed rest in both groups. The International Paris Task Force supports maintaining or returning to recreational activities rather than any bed rest.³¹ Malmivaara and colleagues randomized patients with mechanical low back pain presenting to an occupational health clinic to either bed rest for 2 days, back exercises, or continued activity within the limits of their pain.⁴¹ Outcomes and costs were evaluated after 3 weeks and after 12 weeks. Whereas there was no difference in cost, the group participating in normal activity had the best recovery.

Had the case patient been working outside the home, the physician would encourage her to continue her occupational activity. The cost-effectiveness of

ergonomic standards in the work place is an area for future analysis. Valat and colleagues noted that prolonged cessation of work is associated with low back pain chronicity.⁴² There are obvious financial and psychosocial repercussions if an individual is unable to tolerate work duties. Nadler and colleagues recommend the assistance of a case manager when dealing with prolonged workman's compensation cases.⁴³

- **What medications are used for low back pain?**

In the case patient, the initial choice of medications was made to limit inflammation, control pain, and limit muscle spasm. A review of randomized controlled trials (RCTs) of common interventions concluded that analgesic agents, nonsteroidal anti-inflammatory drugs (NSAIDs), and muscle relaxants are effective in controlling acute and chronic low back pain.⁴⁴ Medication costs vary based on the specific medication prescribed and duration of use. Studies of efficacy demonstrate no significant differences comparing different types of NSAIDs or muscle relaxants. Reasonably well-designed studies show the efficacy of diflunisal, naproxen sodium, and piroxicam over placebo in patients with mechanical low back pain.⁴⁵ Newer NSAIDs, selective for the cyclooxygenase-2 receptor, have a limited adverse effect profile but are much costlier. They are appropriate for use in certain patients with specific comorbid conditions, such as ulcer disease or bleeding disorders. In patients in whom NSAID use is contraindicated, such as those with drug allergy or significant renal insufficiency, acetaminophen can be substituted and is economic.

Muscle relaxants may be helpful in patients with back pain. In one study, patients with low back pain receiving both muscle relaxants and NSAIDs had the best outcomes.⁴⁶ Oral corticosteroids, although theoretically useful in acute inflammatory conditions, have not been proved effective in acute low back pain. Because of their significant adverse effect profile, further studies must be done to justify their use in low back pain patients.⁴⁷

In some patients with low back pain and radiculopathy, further analgesic control may be required. Pure analgesic agents are used to decrease pain. Centrally acting agents in the opioid group are used for a short course in cases of severe pain.⁴⁸ Their use in patients with chronic pain has not been studied sufficiently. Combination products with both acetaminophen and a narcotic agent are available, but these products are more expensive. There are new sustained-release opioids with variable prices.

Anticonvulsant medications have been used in the setting of chronic pain of neuropathic origin with success.

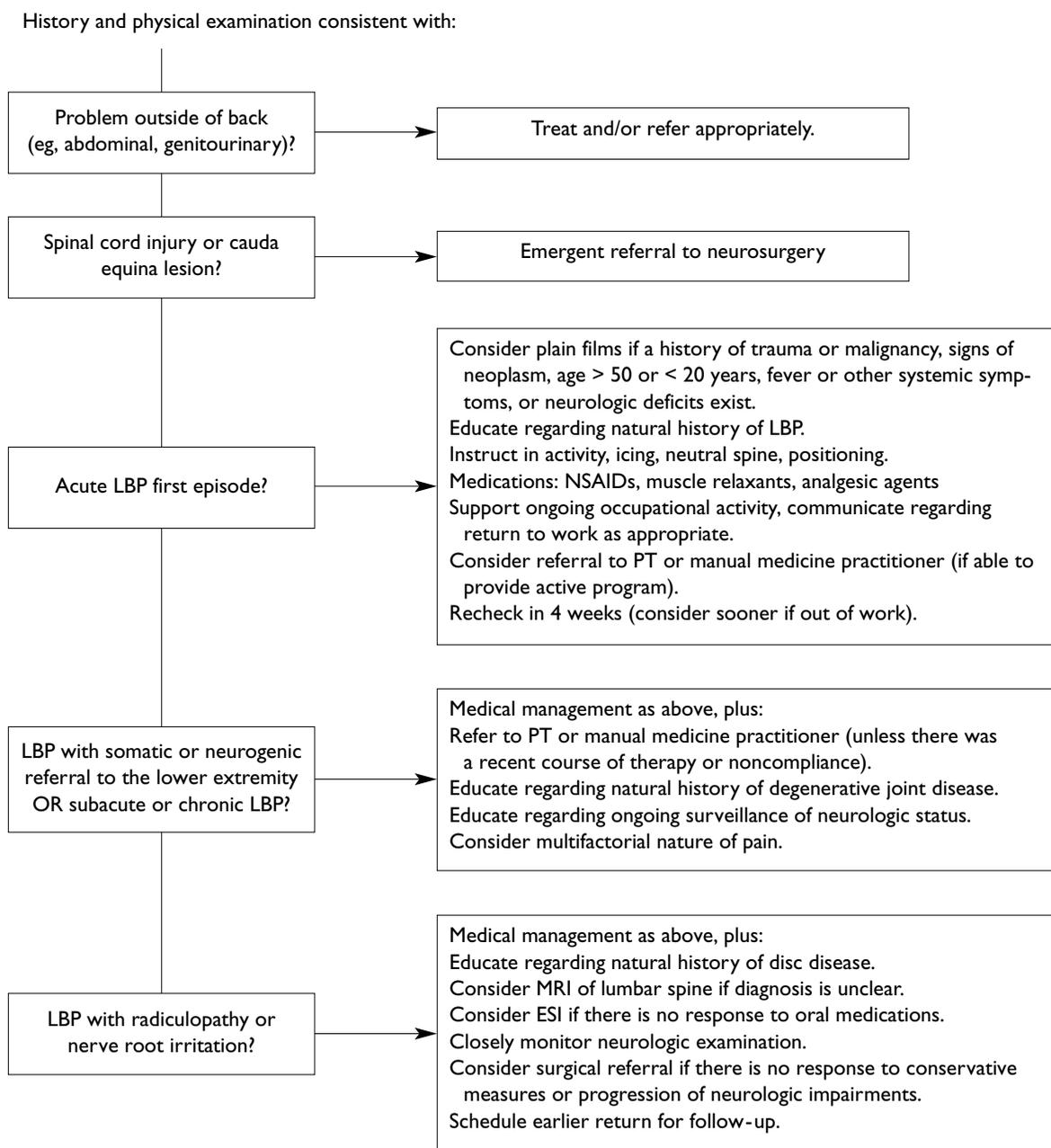
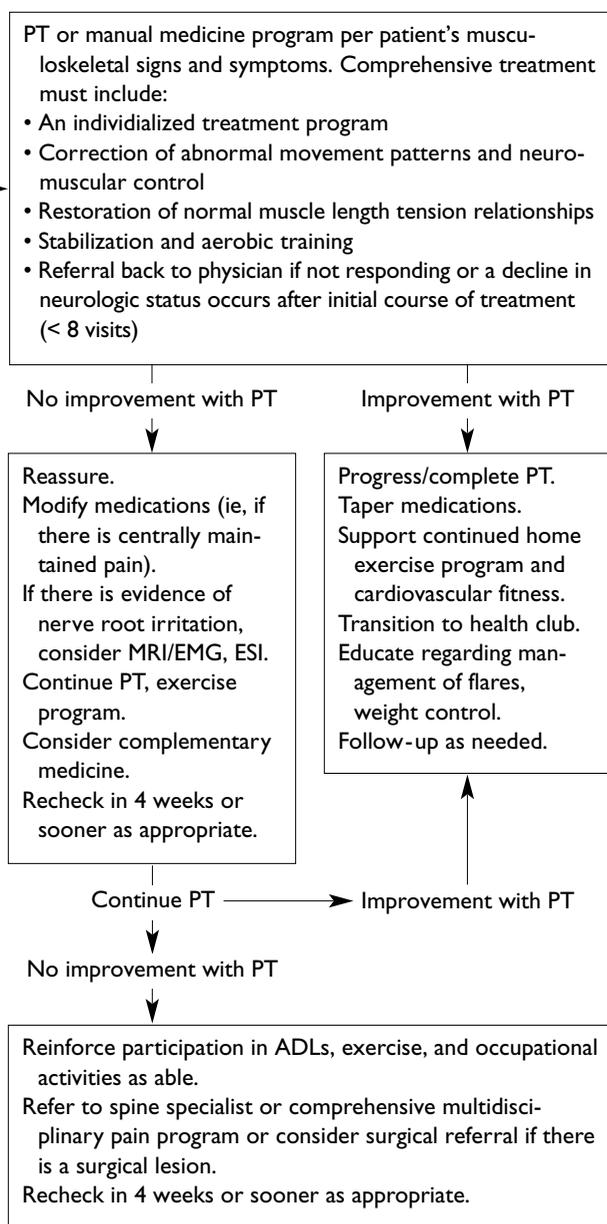


Figure 1. Algorithm for cost-effective medical management of low back pain in the primary care setting. ADLs = activities of daily living; EMG = electromyography; ESI = epidural corticosteroid injection; LBP = low back pain; MRI = magnetic resonance imaging; NSAIDs = nonsteroidal anti-inflammatory drugs; PT = physical therapy.

Gabapentin, a newer anticonvulsant agent with a higher cost, is also being used for control of neuropathic pain.⁴⁹ Although the indication is not FDA approved, there is a growing clinical interest in use of gabapentin for the treatment of chronic musculoskeletal pain. Tricyclic antidepressant drugs were not effective in RCTs of

patients with chronic low back pain.⁴⁴ However, in the setting of neuropathic pain, tricyclic antidepressant medications have been shown to be clinically effective.⁵⁰ Newer antidepressant agents, such as serotonin-reuptake inhibitors, have fewer analgesic effects and are more costly than are tricyclic agents.



favors the use of epidural corticosteroid injections in patients with radicular pain rather than in those with low back or somatic referred pain.⁵¹

- **What supports the decision to refer this patient for rehabilitation?**
- **What should the rehabilitation program include?**

Referring the patient to a rehabilitation program that combines manual medicine skills with an active exercise program is recommended for this patient because of the chronic and progressive nature of the low back pain. In the setting of acute back pain without referral, one could forego referral to therapy if the pain resolved within 1 to 2 weeks.

Physical therapy must be individualized and should aim to promote patient independence through the emphasis of exercise and functional training. Manual medicine practitioners such as chiropractors can be utilized if they provide manipulation (defined as forceful passive movement of a vertebral motion segment beyond the current physiologic range but within the anatomic range) and exercise training. The therapist or practitioner should dynamically manage their patients based on the results of individual assessments, treatment response, and expected outcome. Van Tulder and colleagues found manipulation to be effective in patients with chronic low back pain.⁴⁴ However, there is no research support for ongoing “maintenance” manipulation treatment once pain is resolved and function is restored. Timm conducted an RCT of physical therapy interventions comparing physical agents, joint mobilization, and high-tech and low-tech exercises in patients with chronic low back pain; he found that low-tech approaches are the most cost-effective and provide the longest period of pain relief.⁵² The use of physical medicine modalities (eg, ultrasound therapy, electrical stimulation) was not shown to be clinically efficacious in a retrospective review by Jette and Jette.⁵³ Torstensen and colleagues in a RCT demonstrated a considerable cost savings when patients treated with a physical therapy-based exercise program were compared with a self-exercise group; the savings reflected fewer days lost from work.⁵⁴ Carpenter and Nelson showed the usefulness of spine strengthening with progressive resistance exercise training for prevention and treatment of chronic low back pain.⁵⁵

Had the case patient presented with acute mechanical low back pain only, utilization of manipulation and exercise would be controversial. The literature on the treatment of acute low back pain with manipulation is limited by poor measurement and study design. Van Tulder and colleagues reviewed RCTs of manipulation

Injectable medications are also available for local control of pain and inflammation. The medications most commonly used in interventional spine procedures are local anesthetic agents, corticosteroids, and contrast agents. Their use is relatively costly. A recent review by Cannon and Aprill noted that consensus

in acute low back pain and found it no more effective than physical therapy or drug therapy.⁴⁴ They also concluded, based on a review of RCTs, that exercise therapy in acute low back pain is no more effective than other interventions, including no intervention. This conclusion was questioned by the International Paris Task Force, which recommends active exercise for all categories of low back pain.³¹ Because manual medicine techniques have been shown to decrease pain in the first 4 weeks, they are considered appropriate treatment for acute low back pain in the AHCPR guideline.²³ An RCT that compared various rehabilitation methods for low back pain patients without radicular symptoms concluded that chiropractic care and the McKenzie method of physical therapy had similar effectiveness and costs and resulted in only marginal improvements in outcome compared with provision of an educational booklet only.⁵⁶

- **Is there a role for complementary medicine in the treatment of low back pain?**

Complementary medicine approaches such as acupuncture may be appropriate, but this usefulness has not been proved in the literature; studies are ongoing. Van Tulder and colleagues found trials of acupuncture treatment for chronic low back pain to be of low quality in their 1997 review.⁴⁴ The range of expense for complementary approaches is broad and should be closely monitored.

Follow-up Visit with Primary Care Physician

Four weeks later, the patient returns for follow-up. She has been using an NSAID, resulting in decreased pain without significant adverse effects. She discontinued the NSAID in preparation for her appointment today and is experiencing a minimal pain flare. She has discontinued icing her back after exercise. She has attended 6 sessions of physical therapy and is tolerating a home exercise program of spine stabilization; the physical therapist recommends 2 additional visits to progress the exercise program to incorporate weight lifting and cardiovascular exercises at the community gym and to complete education regarding ergonomics. The physician recommends that the patient continue on the NSAID until she is on a stable exercise program at the gym; she can then use the NSAID on an as-needed basis.

- **What is the approach to follow-up evaluation of patients with back pain?**

Patients typically return for a follow-up visit after 4 weeks; if the patient is responding to the treatment program, telephone follow-up may suffice. In a patient

reporting decreased pain and tolerating normal occupational and recreational activities (like the case patient), it would be appropriate to discontinue or taper medications. Continued physical therapy interventions should be aimed at educating the patient in a prophylactic strengthening and conditioning program for life, including the use of icing and oral medications with resumption of activity as early as possible. Self-management techniques for future exacerbations should also be reviewed with the patient. Physical therapy is discontinued once goals are met. A specific plan for an ongoing community- or home-based exercise program is mandatory; this is done at an intensity and complexity commensurate with performance in the rehabilitation setting.

Should a patient vary from the expected progression of increasing exercise and functional training, the physician should be notified after the initial course of treatment (< 8 visits). The patient should schedule a follow-up visit for further medical management. Therapy can resume once the medical treatment has been modified, if necessary.

If the case patient had not appropriately progressed with her exercise program, her history would have justified further investigation for the presence of signs of disruptions of structural integrity (ie, annular tears or vertebral end plate fractures). If present, these findings would alter the expected rate of progression and perhaps, ultimately, level of long-term function. An MRI could delineate the pathology and might assist in planning for interventional procedures (eg, if it demonstrated nerve root involvement). If a patient will not consider surgery or interventional procedures, an MRI is not necessary. In a patient not progressing in rehabilitation, modifying the medication regimen based on ongoing symptoms may be appropriate. Medications to address any affective or central component of pain can also be utilized.

- **When should a patient with low back pain be referred to a spine specialist or a pain program?**

Patients with low back pain who do not progress with conservative management, despite adequate medication modification and compliance with the rehabilitation program detailed above, may require referral to a physician who specializes in spine care. This includes but is not limited to physiatrists, rheumatologists, neurologists, orthopedic surgeons, neurosurgeons, and internists who practice in occupational medicine settings. Spine specialists frequently work in an interdisciplinary spine center with radiologists, anesthesiologists, therapists, and psychologists who specialize in spine care and pain management.

If the patient exhibits significant signs of centrally maintained pain, a comprehensive multidisciplinary pain program may be required. The management of any patient should limit passive treatment and focus on functional restoration and pain control rather than pain resolution. Utilization of physical therapy, occupational therapy, psychology and psychiatry, and nursing in addition to the physician addresses the biopsychosocial dimensions of chronic pain. Van Tulder and colleagues noted that RCTs evaluating behavioral therapy in chronic low back pain were of low quality but demonstrated some good short-term results.⁴⁴

- **What is medical management in the setting of low back pain with nerve root irritation or radiculopathy?**

Patients with lumbosacral radiculopathy exhibit a particular pattern of reflex, sensory, and/or strength changes consistent with a specific root level, most commonly L5 or S1. In the setting of clear radicular signs and symptoms, conservative management without MRI corroboration is cost-effective and clinically acceptable. Saal and Saal showed that even in the setting of disc protrusion and documented neurologic impairment, most individuals are successfully managed nonsurgically.⁵⁷ An MRI would be more useful when one suspects nerve root irritation but does not have clear evidence of radicular changes on physical examination.

In the setting of nerve root compromise, interventional procedures such as epidural corticosteroid injections are frequently attempted prior to surgical consideration. The use of fluoroscopy-guided injections adds to the overall cost but improves localization⁵¹; it can also provide useful diagnostic information. Epidural corticosteroid injections in an RCT of patients with radicular symptoms provided short-term leg pain relief and sensory deficit improvement but offered no functional improvement or reduction in the need for surgery.⁵⁸ Theoretically, epidural corticosteroid injections are optimally performed in conjunction with a spine-specific physical therapy program to take advantage of the pain reduction. Another review maintained that epidural corticosteroid injections are beneficial in the treatment of lumbar radicular pain.⁵⁹ The authors of this review, as well as others who have reviewed the efficacy of epidural corticosteroid injections, focused on the few well-controlled studies that are available.

Radiofrequency neurotomy is also utilized as a means of extinguishing the pain signal, if not the pain generator itself; clinical research on its efficacy is ongoing. In carefully selected patients, lumbar medial branch neurotomy has been shown to provide significant pain relief at 1-year follow-up.⁶⁰ The cost-

effectiveness of these interventional procedures has not been studied.

In an attempt to localize pain generation more specifically to the disc and to improve surgical outcomes after discectomy, discography is utilized. Although its use remains somewhat controversial, a 1995 North American Spine Society position statement found that the majority of recent reports have been “supportive of discography for proper indications.”⁶¹ Discography is considered only after conservative treatments and other noninvasive diagnostic testing have proved inadequate. The preoperative workup cost increases when discography is utilized.

Patients who have failed both conservative and surgical treatment methods may be candidates for a trial of a spinal cord stimulator. This area of chronic pain management has undergone significant changes over the last decade and promises to continue to progress rapidly. Interested readers are referred to other sources for greater detail.^{62,63}

- **When should a patient be referred for a surgical consultation?**

Surgery for the patient with low back pain is an option in the setting of nerve root compromise and persistent sciatica. In other settings, surgical effectiveness is controversial. Malter and Weinstein concluded that elective discectomy is cost-effective when done in a select group of patients (with herniated discs, abnormal results on neurologic examination, and no improvement after 2 to 6 weeks of conservative therapy), taking short-term (2 to 4 years) outcomes into account.⁶⁴ Surgery is considered emergently in the setting of cauda equina syndrome and urgently in the setting of progressive neurologic decline. Surgical management of individuals who are receiving compensation for their injury is less successful in alleviating symptoms and disability.²⁸ Many centers require a formal or informal psychological evaluation of patients who have chronic low back pain prior to consideration for surgery, which can add to the expense. A complete review of surgical procedures is not within the scope of this article.

Clinical Course

Since the last visit with the physician, the patient has been discharged from physical therapy and is performing an exercise program at the gym 4 times per week that includes 30 minutes on the treadmill, focusing on walking while maintaining appropriate posture. She performs a lumbar spine, pelvic, and lower extremity stretching program for 10 minutes and performs an

alternating strengthening program with resistance equipment for the upper extremity, lower extremity, and spine. She is using correct lifting techniques for child care and housework. She has modified her sitting position in the car and is tolerating driving without pain. She has not required any regular use of medications or modalities, such as ice or heat, for pain control.

CONCLUSION

Overutilization of services to diagnose and intervene in patients with back pain consumes resources unnecessarily and can create greater disability. It is imperative that the physicians on the front line have access to the most current evidence-based guidelines for managing low back pain. The literature shows that many treatment approaches currently used have not been rigorously studied. The lack of information on cost-effectiveness reflects the literature and points the way for further research. Greater familiarity with cost-effectiveness data among clinicians will allow greater input in decisions related to the utilization of health care resources.⁶⁴

Research continues to focus on identifying individual risk factors as well as rehabilitation management strategies to avoid progression to chronic and debilitating low back pain. A growing body of research in the past decade highlights the importance of normalization of the neuromuscular system following low back injury; this approach to rehabilitation may prove to be an exciting alternative to our current tendency toward costly diagnostic testing and interventions.^{31,65-76} Primary prevention is likely a cost-effective approach and continues to be a focus of low back pain research. **HP**

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