LOW BACK PAIN

CURRENT CONCEPTS IN ASSESSMENT, MANAGEMENT, AND PREVENTION

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In this book and test, the use of the words patient and client can be interchanged. In this book and test, the use of the words massage therapist, therapist, and practitioner can be interchanged.

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HOW TO BEST PROCEED WITH THIS COURSE
Each chapter should be approached systematically in a careful and objective manner. The pre-test questions at the end of each chapter will help you determine the mastery of the material. It is important to master each chapter before going on to the next. Relax, take your time, and go at your own pace. Only after you have successfully mastered all the material in the course and completed all the pre-test questions correctly in each chapter should you proceed to the post-test questions.

COMPLETING THE POST-TEST
Before beginning, please clearly write your name, address, zip code, and license number on your post-test answer card. Read each question carefully before answering. Please use a ballpoint pen to fill-in your answers on the answer card by completely shading your choice. Keep in mind that each question has only one correct answer. The post-test consists of 100 questions. For a passing grade, you must correctly answer 80 questions. We encourage your input and would welcome any suggestions to improve our course or test questions. Please feel free to note your suggestions or comments on the evaluation form found at the end of this course.

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Upon completion of this course, you will be able to:

1. Recognize red-flags which suggest malignancy in patients with back pain.

2. List common diagnostic tests to elucidate low back pain etiology and describe their indications and limitations.

3. Identify the signs and symptoms of acute lumbosacral sprain/strain and treatment contraindications.

4. Describe which activities that may predispose a person to lumbar intervertebral disc herniation.

5. Analyze the effectiveness of many common low back pain treatments being utilized by a variety of health care practitioners today.

6. Discuss measures to reduce the risk of low back injury by educating others in safe lifting techniques, proper posture, and physical fitness.
The incidence of low back pain has reached epidemic proportions in the United States. It has been reported that between 80 and 90 percent of the adult population will experience some form of low back pain at sometime in their lives. Low back pain ranks second, only to the common cold, as the reason for office visits to primary care physicians in the United States. The most frequent cause of limitation of activities in persons under 45 years of age is chronic back pain. Among the working population, it has been stated that between 50 to 80 percent will have an episode of low back pain sometime in their lives. Despite these grim statistics, the prognosis is excellent with 90 percent of patients returning to work within six weeks.

Low back pain can be classified in the following three stages:

1. **Acute** - pain persisting under three months.

2. **Subacute** - pain persisting three to six months.

3. **Chronic** - pain persisting for greater than six months.

It has been estimated that low back pain costs the health care system more than 20 billion dollars a year. Fortunately, most patients will improve rather quickly with either no treatment or minimal treatment. For others, low back pain can become chronic and disabling. Proper evaluation of low back pain sufferers requires a multi-disciplinary team approach. The team begins with a treating physician, and can also include a specially trained physical therapist, occupational therapist, psychologist, radiologist, neurologist, massage therapist, physiatrist, and possibly an endocrinologist, who specializes in metabolic bone disease. It is of utmost importance that patients with low back pain have an efficient, cost effective, and accurate evaluation, as the wrong diagnosis and/or treatment can make a simple case of low back pain a complex one.
STATISTICS OF IMPROVEMENT OF PAIN FOLLOWING ACUTE LOW BACK INJURY

Certain occupations are at high risk for low back pain. These include:

1. **Nurses.**
2. **Truck drivers.**
3. **Others that include heavy lifting on a frequent basis.**

There are many factors that predispose people to low back pain. Among them are:

1. **Heavy lifting.**
2. **Occupational lifting.**
3. **A history of previous back pain.**
4. **Morbid obesity.**
5. **Psychological stress.**
6. **Smoking.**
7. **Osteoporosis.**
8. **Prolonged driving.**

Smoking is known to increase the incidence of osteoporosis, which is most common in Caucasians. This may be why being Caucasian and smoking may lead to a greater incidence of low back pain.

The purpose of this course is to educate health care practitioners, who may be part of the multi-disciplinary team, in the complexities of low back pain including diagnosis and current treatment options available today. Specific attention will be given to the many etiologies of low back pain, diagnostic testing, and therapeutic options.
CHAPTER SUMMARY

Average American adults have an 80 to 90 percent chance of having an episode of low back pain sometime in their lives.

Low back pain treatment costs the health care system upwards of 20 billion dollars a year.

Certain occupations are predisposed to low back pain including nurses, truck drivers, and others that include heavy lifting on a frequent basis.

Smoking is known to increase the incidence of osteoporosis.

NOTES
The most important part of the initial evaluation is the history. The history and physical examination should be thorough and include a complete neurological screening. Unfortunately, 80 to 85 percent of low back pain syndromes do not carry an exact diagnosis.

Physicians often use the term "lumbar strain" as a default diagnosis. When patients complain of low back pain, some physicians may use the broad label of sprains, strains, or soft tissue injuries, even though there are no diagnostic tests currently available to verify these causes. According to the statistics following an acute back injury, 70 percent of patients are significantly improved after two weeks and 90 to 95 percent are recovered within two to three months. However, most low back pain sufferers who seek medical advice are among the five to ten percent who have not had symptomatic relief within three months.

With the understanding that a precise diagnosis cannot be made in most cases, attention should focus on ruling out serious causes of low back pain requiring immediate attention. Although over 90 percent of low back pain patients will have non-emergent conditions, it is of extreme importance to exclude the following:

1. Tumor.
2. Acute fracture.
3. Infection.
4. Serious neurological deficit.
<table>
<thead>
<tr>
<th>Symptom Description</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe night pain unrelieved by positional change</td>
<td>Tumor</td>
</tr>
<tr>
<td>Pain accompanied by fevers, sweats, or chills</td>
<td>Infection</td>
</tr>
<tr>
<td>Sharp radiating pain below the knee</td>
<td>Herniated disc</td>
</tr>
<tr>
<td>Morning stiffness that improves with daily activities</td>
<td>Degenerative arthritis</td>
</tr>
<tr>
<td>Pain increased while sitting</td>
<td>Discogenic pain</td>
</tr>
<tr>
<td>Pain related to specific injury</td>
<td>Strain/sprain</td>
</tr>
<tr>
<td>Chronic back pain exacerbated by activity</td>
<td>Deconditioning</td>
</tr>
</tbody>
</table>

5. Potentially life-threatening disease.

6. Degenerative or inflammatory arthritis.

7. Internal disease.

The patient should be asked a battery of questions on an initial evaluation to rule out potentially life-threatening causes of low back pain. (refer to table 2). It may be helpful to ask patients to circle the area or areas of pain using a written visual diagram. (see illustration 1). Pain analog scales may be used as well to illustrate the intensity of pain. (see illustration 1).

**TABLE 2 QUESTIONS TO ASK ON INITIAL EVALUATION**

<table>
<thead>
<tr>
<th>Question</th>
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<tbody>
<tr>
<td>1. Where is the location of the pain?</td>
</tr>
<tr>
<td>2. Does the pain radiate?</td>
</tr>
<tr>
<td>3. Is the pain constant or intermittent?</td>
</tr>
<tr>
<td>4. Is the pain relieved by changing position?</td>
</tr>
<tr>
<td>5. Is the pain better or worse with rest/with activity?</td>
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<tr>
<td>6. Is the pain worse at night?</td>
</tr>
<tr>
<td>7. Do you experience any numbness, weakness, or stiffness?</td>
</tr>
<tr>
<td>8. Have you experienced any low back problems in the past?</td>
</tr>
<tr>
<td>9. What other medical problems or surgeries have you had in the past?</td>
</tr>
</tbody>
</table>
ILLUSTRATION 1

Circle the area/areas where you are experiencing pain. Next to the area/areas circled, document the intensity of pain using the analog scale below.

<p>| | | | | | | | | | |</p>
<table>
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<tr>
<td>1</td>
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<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

LESS PAIN       MORE PAIN
10. Have you experienced weight loss or loss of appetite?

11. How long have you been experiencing this episode of low back pain?

12. Was there a precipitating cause to the low back pain episode?

13. Do you have a past medical history of cancer?

14. Do you have any loss of sensation or strength?

15. Do you have any impairment of bowel, bladder, or sexual function?

16. What is the character of the pain? (ex: burning, stabbing, aching, or throbbing?)

As early diagnosis and treatment has been shown to improve survival from metastatic cancer, the patient should be assessed for certain red flags pointing towards metastatic disease. Malignancy, as the etiology for low back pain, is rare and accounts for fewer than 1 percent of cases in an unselected population. Malignancy is more common in the lumbar spine than in the cervical spine. Two-thirds of spinal malignancies are metastatic, usually from tumors occurring in the breast, kidney, prostate, or lung.
The most common primary spinal malignancy is multiple myeloma. This often results in diffuse osteoporosis. Clues to look for include back pain in an elderly patient with osteopenia, especially if the pain is not relieved when the patient is lying down and vertebral compression fractures are not demonstrated. It is important to realize however, that almost 50 percent of patients who have low back pain with malignancy have a history of a preceding injury or trauma. It is of paramount importance to recognize certain red flags when taking a patient’s history. (refer to table 3)

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**TABLE 3**  
RED FLAGS FOR TUMOR IN PATIENTS WITH BACK PAIN

1. The patient being older than 50 years, or younger than 20.


3. Recent unexplained weight loss of more than 10 pounds within a three month period.

4. Pain unrelieved with rest, activity, or lying down.

5. Unexplained fever.

6. Severe pain present at night, which may be significantly worse than during the day.

---

About one-third of patients with malignant back pain have had a past medical history of cancer. It is important to screen all patients with a prior history of malignancy with appropriate laboratory tests and spinal x-rays. Even remote histories of cancer require these studies because of a risk of secondary malignancy. Some malignancies, such as breast cancer, are known to reoccur after long periods of disease-free intervals. If screening is not performed, it is important to monitor the results of therapy carefully, as unresponsiveness to therapy may suggest an underlying malignancy. Malignancy should be suspected in any patient exhibiting continued symptoms following a treatment course.

**WEIGHT LOSS**

Significant weight loss (more than ten pounds within three months), has been known to occur in 15 to 75 percent of patients suffering with malignant low back pain. Fever, chills, and lymphadenopathy are also clues to suspect malignancy. It also should be noted that benign low back pain commonly results in weight gain due to limited physical activity.

**PATIENT AGE**

Malignancy in patients with back pain is more commonly found in patients over the age of 50. It is important to look for early warning signs. Studies have shown that 77 to 100% of patients with malignant back pain from either primary or metastatic cancers were 50 years of age or older.

**PAIN PATTERNS**

Patients with benign (non-malignant) back pain due to myofascial or degenerative changes commonly experience an aggravation of pain with physical activity that is relieved by rest. Patients with malignancy may have difficulty sleeping due to pain present at night. Patients who complain of excruciating symptoms while lying down, persistent nocturnal pain, and/or pain lessened with forward flexion of the spine point towards malignant retroperitoneal lymphadenopathy.
In patients with neuro-tumors, pain is increased with lying down due to vascular filling of the tumors when the pressure of the spinal fluid column is lowered. This results in the patient having progressive difficulties with sleeping.

Neurological deficits are present in approximately 20 percent of patients with spinal malignancy. It is important to recognize malignancy early since many malignancies are potentially curable if treatment is commenced early on.

RISK FACTORS FOR INFECTION OF THE SPINE

1. A recent urinary tract infection or bacterial infection.
2. A history of IV drug use.
3. HIV infection or immunosuppression.
5. History of corticosteroid use.

Severe guarding of range of motion in the lumbar region in all planes may be suggestive of an infection as well as tumor, fracture, or inflammatory arthropathy. If a patient complains of a history of fever, chills, or sweats without a previous history of infection in the body, a bone scan should be performed to exclude the possibility of a low-grade infection.

COMPRESSION OF THE CAUDA EQUINA

Compression of the cauda equina caused by spinal stenosis, fracture, dislocation, or an enormously herniated disc is a serious medical condition in which prompt medical attention is required. Some warning signs to look for include:

1. Bladder dysfunction including urinary retention and increased frequency.
2. Perianal or perineal sensory loss and/or laxity of the anal sphincter.

3. Profound or progressive lower extremity neurological deficit.


5. Increasing numbness or weakness in the back.

Fracture should be suspected in patients with a history of a fall; either minor or major, patients involved in a motor vehicle accident, patients with a history of strenuous lifting, or older patients at risk for osteoporosis.

Once the serious causes of low back pain are ruled out, attention can be focussed on benign etiologies. It is important to recognize that many malignant conditions may exhibit physical findings consistent with benign etiologies.
CHAPTER SUMMARY

The history is the most important part of the initial evaluation. Although the majority of low back pain is benign in etiology, it is important to rule out the following serious conditions:

1. Tumor.
2. Acute fracture.
3. Infection.
4. Serious neurological deficit.
5. Potentially life-threatening disease.
6. Inflammatory arthritis.
7. Internal disease.

The patient should be asked a battery of questions upon initial evaluation to rule out potentially life-threatening causes of low back pain.

The use of visual diagrams and pain analog scales may be helpful in eliciting the source and intensity of the pain.

Malignancy as the etiology for low back pain accounts for less than 1 percent of cases in an unselected population.

A history of IV drug use or HIV infection are risk factors for infection of the spine.

Bladder dysfunction can be a warning sign of compression of the cauda equina.
CHAPTER TWO

THE PHYSICAL EXAMINATION

Assessment of muscle strength, reflexes, and sensation may be one of the most important aspects of the physical examination. The patient’s gait should be observed for any abnormalities such as limp or other efforts to compensate for pain or problems with coordination. The patient should also be instructed to perform certain functional tests, such as heel and toe walking and deep knee bending. Patients with difficulty walking on their heels may have weakness in the L5 innervated muscles. Patients having difficulty walking on their toes may have weakness in the S1 innervated muscles.

Manual muscle testing should also be performed. This is done by asking the patient to make one or more muscles do what they normally do, and then have the patient manually overcome the group of muscles by forcibly extending them.

It should be important to note that some patients may appear to have weakness when in actuality, it is pain that prevents them from adequately performing the strength testing. Further complicating matters may be substitution of different muscle groups when severe pain or weakness is present. Some patients may consciously attempt to appear weak. This may occur due to several factors such as insurance compensation cases or malingering. Radiculopathy (disease of the nerve roots) may cause weakness in patients with low back pain. Radiculopathy of L5, which is the most common type of radiculopathy, usually produces weakness in the anterior tibial muscles, peroneus longus and brevis muscles, posterior tibial muscles, extensor digitorum longus and brevis muscles, and extensor hallucis longus muscles. A footdrop is commonly found in patients with L5 radiculopathy and weakness. Some form of radiculopathy occurs in approximately 5 percent of patients presenting with acute low back symptoms. Over 90 percent of radiculopathy due to herniated discs involves the L5 or S1 nerve root.
S1 radiculopathy is the second most common form of radiculopathy. Weakness from S1 radiculopathy is somewhat difficult to detect, mainly due to the strength of the gluteus maximus and gastrocnemius-soleus complex. When the physical examination shows no weakness, an EMG (electromyogram) may delineate mild loss of strength.

Radiculopathy at the L4 level is the third most common form of radiculopathy, usually marked by weakness of the quadriceps and hip adductor groups.

In addition to the evaluation of strength, the physical examination should include evaluation of sensation. The patient should be tested for perception of hot and cold, light touch, vibration, and sharp and dull sensations. Dermatomal referral of pain can be seen in patients with nerve injury such as radiculopathy. Low back muscle strain or ligamentous strain can produce unusual sensations into the lower limbs or referral of pain.

Every patient with low back pain should have the deep tendon reflexes assessed. It is important to check asymmetry of reflexes, as radiculopathy is usually one-sided. It is equally important to note, however, that L5 radiculopathy does not have reliable deep tendon reflexes.

S1 radiculopathy can be tested with the ankle jerk reflex.

L4 radiculopathy can be tested using the patellar response.

Palpation over the bony structures of the low back is important, including the paravertebral musculature and vertebral spinous processes. This can indicate if the pain is localized or referred. Pain over the ischial tuberosity can indicate ischial bursitis. Pain palpated in the groin area can indicate a hernia, iliopsoas bursitis, inguinal adenopathy, or possible hip disease. The sudden onset of back pain accompanied by severe abdominal pain may indicate an abdominal aortic aneurysm.

There are several tests that can be performed to help elucidate the source of the low back pain.

**STRAIGHT LEG RAISING TEST (LASÉGUE’S):** Flexion of the hip when the knee is extended. If there is pain with flexion of the hip, this may indicate sciatica, especially if there is no pain when the knee is flexed.
BRAGARD’S TEST: With the knee stiff, the lower extremity is flexed at the hip until the patient experiences pain, then the foot is dorsiflexed. Increased pain may indicate disease of the nerve root.

PATRICK’S TEST (FABERE - Flexion, Abduction, External Rotation, and Extension): With the patient supine, the thigh and knee are flexed and the external malleolus is placed over the patella of the opposite leg and the knee is depressed. If pain is produced, arthritis of the hip may be present.

FEMORAL STRETCH TEST: This test can be performed by having the patient in the prone position and flexing the knee and extending the hip. If this causes pain in the back or thighs, it may indicate a lesion of the third or fourth lumbar disc. Reproduction of pain along the distribution of the sciatic nerve may indicate sciatic nerve root irritation.

OBER’S TEST: With the patient lying on the side opposite to be tested with the underneath hip and knee flexed to a right angle, the upper hip is flexed to 90 degrees, fully abducted, brought into full hyperextension, and allowed to adduct; the angle that the thigh makes above the horizontal is the degree of abduction contracture. This test assesses the iliotibial band for tightness.

NOTES
CHAPTER SUMMARY

Pain may prevent some patients from adequately performing strength testing.

Radiculopathy occurs in approximately 5 percent of patients presenting with acute low back pain.

Severe abdominal pain when accompanied by back pain may indicate an abdominal aortic aneurysm.

The Ober’s test assesses for iliotibial band tightness.

NOTES
In patients not exhibiting any signs of tumor, infection, fracture, or other serious red flag conditions, the Agency for Health Care Policy and Research (AHCPR) guidelines advise delaying all imaging studies including x-rays for one month. Plain radiographs within this period in the absence of such findings will usually be of low yield. It is important to remember that plain radiographs as well as other studies such as MRI and CT scans may show abnormalities. However, these tests cannot prove the abnormalities are actually producing the patient’s low back symptoms. Research shows that 50 percent of patients will have degenerative changes on plain radiographs after the age of 40 and, by the age of 65, 90 percent of these patients will have degenerative changes. It is also important to note that it is difficult to rule out infection using plain radiographs.

If within the initial month of treatment the symptoms do not progress, then imaging is usually not suggested and conservative management is indicated.

The AHCPR recommends lumbar spine x-rays to rule out fractures under the following conditions:

1. A history of recent significant trauma. (any age)
2. A history of recent mild trauma. (over age 50)
3. A history of steroid use of prolonged duration.
4. A history of osteoporosis.

5. Patients 70 years of age or older.

It should also be mentioned that, due to increased radiation exposure, routine oblique x-rays in adults are not recommended.

In a patient presenting with red flag symptoms such as tumor or infection, plain x-rays are recommended. However, if these x-rays are negative, the patient should be referred for other imaging studies such as bone scan, CT scan, or MRI to rule out serious disease. Laboratory studies such as CBC and ESR in combination with plain x-rays may also be helpful in ruling out serious red flag conditions, especially if the patient presents with signs of recent infection.

A bone scan (a test using an intravenous injection and radiation) is a valuable screening tool in patients where suspicion of tumor or metastatic involvement is high. A bone scan may confirm early osseous lesions or inflammatory processes. The sensitivity of a bone scan for the presence of malignancy is approximately 99 percent. Bone scans are also useful in detecting stress fractures due to trauma, arthritis, discitis, metabolic bone disease, and osteomyelitis. A bone scan should be performed only in patients in which plain radiographs, lab tests, or physical findings indicate one of the above conditions. A bone scan is contraindicated in pregnancy.

It should be noted that a bone scan may not always distinguish between a fracture, osteoarthritis, or malignancy. A bone scan may even be normal in patients with diffuse bony involvement demonstrated on CT scan or MRI, as in osteoclastic disease such as multiple myeloma. A bone scan may detect abnormalities not seen on plain radiographs.
MAGNETIC RESONANCE IMAGING (MRI)

In patients with severe radiculopathy unresponsive to conservative measures, an MRI may be indicated. It is important to remember, however, that many asymptomatic people will have abnormalities found on MRI scans representing normal degenerative changes of the spine as well as asymptomatic herniated or bulging discs.

Approximately one-third of asymptomatic individuals will show abnormalities on MRI. Therefore, interpretation should be performed cautiously. An MRI should only be performed on patients in which surgery may be considered or postoperatively to differentiate between disc herniation and post surgical scar tissue.

MRI scanning is particularly useful in imaging paravertebral soft tissues and may be combined with water-based contrast media such as gadolinium for further enhancement.

MRI scanning is indicated in patients presenting with progressive weakness or patients suspected of having spinal stenosis. MRI reveals more of the spine than a CT scan and does so without exposing the patient to radiation as in CT scans. However, an MRI is more expensive to perform than a CT scan and can make a distinction between degenerative change and metastatic involvement. The study of choice for patients suspected of spinal malignancy is MRI.

COMPUTED TOMOGRAPHY (CT SCAN)

There are many situations in which MRI scanning is not indicated, such as in patients with cardiac pacemakers, metallic foreign bodies, or
ferromagnetic implants. Also, patients with severe pain who may not be able to lie completely still during MRI scanning may be better suited for a CT scan. The use of CT scan provides excellent evaluation of the osseous structures of the spine.

CT combined with myelography can provide superior bony detail of the spinal canal, spinal column, subarachnoid space, and extraspinal soft tissues. This procedure involves a spinal tap with an injection of water soluble contrast material followed by computed tomography. As this procedure is invasive and accompanied by a risk of complications, it is only recommended in certain situations requiring pre-operative planning.

The use of a non-contrast CT scan is discouraged, as results may not be as reliable and patients may frequently require an additional MRI or CT myelogram before surgical decisions are made.

In addition, a non-contrast CT scan may not be able to diagnose cauda equina tumors or other lesions that may mimic lumbar disc herniations.

Discography is an invasive procedure involving the injection of radiopaque dye into the nucleus of an intervertebral disc and subsequent exposure to radiation via radiograph. This procedure, because of the increased risk of complications, including exposure to radiation, is not recommended to assess patients with acute low back pain. These complications can be avoided with the use of non-invasive studies such as MRI or CT scan. After four months of unsuccessful treatment, a discogram may be appropriate. However, it is indicated in less than 5 percent of patients.
INDICATIONS FOR ELECTRODIAGNOSTIC STUDIES

Electromyography (EMG) and other electrodiagnostic studies may be indicated in patients exhibiting symptoms of leg pain where radiculopathy is suspected, peripheral neuropathy, entrapment neuropathy, or spinal stenosis.

EMG is contraindicated in patients not exhibiting lower extremity symptoms. These studies can often help to identify which level or levels are at the root of a radiculopathy.

EMG records the intrinsic electrical properties of skeletal muscle using surface or needle electrodes. This test should be performed by a physician. EMG in which needles are inserted into the muscles is performed primarily to assess nerve root dysfunction, myelopathy, and myopathy. EMG using surface electrodes is not recommended by the AHCPR (Agency for Health Care Policy and Research). Another test called H-reflex is commonly used to assess S1 radiculopathies by measuring sensory conduction through nerve roots. Both the needle EMG and H-reflex can be useful in determining nerve root dysfunction in patients exhibiting lower extremity symptomatology for longer than one month, even though the patients may not have low back pain.

LABORATORY ANALYSIS

Obtaining laboratory data on a patient can be very valuable in the face of red flag symptoms. An erythrocyte sedimentation rate (ESR), serum protein electrophoresis, serum calcium, alkaline phosphatase, and prostate specific antigen (PSA) should be ordered in a patient over
50 years of age if malignancy is suspected. An ESR elevated above 20 mm/h may indicate malignancy or an inflammatory process. Although an ESR may be elevated in patients with anemia or other red blood cell disorders, in 78 to 94 percent of patients suffering from low back pain and found to have cancer, the ESR was elevated more than 20 mm/h.

Serum protein electrophoresis (SPEP), a blood test, may indicate multiple myeloma in the presence of an M-spike or hypogammaglobulinemia (abnormally low levels of immunoglobulins in the blood). In most patients with low back pain in which the SPEP shows an M-spike or hypogammaglobulinemia, myeloma (a type of tumor) has been found to be the cause.

Elevated levels of prostate specific antigen (PSA) may indicate malignancy and/or clinical stage of cancer of the prostate. PSA levels are known to rise proportionately to the level and stage of cancer present. PSA screening is required in men over the age of 50 with a suspected malignant etiology to low back pain.

Elevated levels of serum calcium may indicate malignancy. 40 to 50 percent of patients with an abnormal elevation in serum calcium are found to have metastatic bone disease. 50 to 75 percent of patients with an abnormal elevation in alkaline phosphatase have been shown to have metastatic disease. They may also exhibit symptoms of low back pain due to the presence of metastatic prostate cancer.
CHAPTER SUMMARY

It is difficult to rule out infection using plain radiographs.

A bone scan may confirm early osseous lesions or inflammatory processes.

Approximately one-third of asymptomatic individuals will show abnormalities on MRI.

CT scan provides excellent visualization of the osseous structures of the spine.

Discography is indicated in less than 5 percent of patients.

EMG can help identify which level or levels are at the root of a radiculopathy.

An elevated ESR may indicate a malignancy or inflammatory process.

An elevated PSA may indicate malignancy.

NOTES
CHAPTER FOUR

SOME COMMON CAUSES OF LOW BACK PAIN

ACUTE LUMBOSACRAL STRAIN/SPRAIN

Acute lumbosacral strain refers to an injury to the muscles of the lumbosacral region. Acute lumbosacral sprain refers to an injury to the ligaments of the lumbosacral region. These two conditions can occur separately or in conjunction with each other. Acute lumbosacral strain/sprain is usually brought on by precipitating trauma, although the symptoms may occur sometime after the event. Patients usually hold the back in a stiff manner and the muscles affected can usually be palpated. If x-rays are taken, one may notice straightening of the normal lumbar lordosis or curve. Patients may exhibit the following:

1. Low back pain which may or may not refer into the buttock or lower extremity.
2. Decreased range of motion of the lumbar spine.
4. Point tenderness.

Treatment for acute lumbar strain/sprain is almost always conservative. In most cases, symptoms will resolve within four to six weeks. Treatment options may include:

1. Spinal manipulation in the absence of radiculopathy.
2. Muscle relaxants and/or analgesic ointments.
3. Self-administered treatment with hot and/or cold packs.

4. Opioid analgesics for severe pain.

5. Epidural injections using local anesthetics, steroids, and/or opioids for patients with pain radiating into the lower extremities after conservative measures fail to bring relief.

6. A low impact aerobic exercise program as instructed by the physician.

7. Special conditioning exercises for the back muscles if symptoms persist.

8. Physical or occupational therapy as prescribed by the physician.

Contrary to popular belief, bed rest is not a recommended option for the treatment of acute lumbosacral strain/strain. For patients with severe initial symptoms accompanied by leg pain, minimal bed rest can be prescribed, but no more than three days. Patients should be instructed to continue their normal daily routine as tolerated.
### TABLE 4
TREATMENTS NOT RECOMMENDED FOR ACUTE LUMBOSACRAL STRAIN/SPRAIN

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>REASON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral steroids</td>
<td>Possible severe side effects</td>
</tr>
<tr>
<td>Colchicine</td>
<td>Possible severe side effects</td>
</tr>
<tr>
<td>Transcutaneous nerve stimulation (TENS)</td>
<td>Not proven effective</td>
</tr>
<tr>
<td>Lumbar corsets</td>
<td>Not proven effective</td>
</tr>
<tr>
<td>Spinal traction</td>
<td>Not proven effective</td>
</tr>
<tr>
<td>Antidepressant medication</td>
<td>Not proven effective</td>
</tr>
<tr>
<td>Biofeedback therapy</td>
<td>Not proven effective</td>
</tr>
<tr>
<td>Trigger point injections effective</td>
<td>Invasive procedure not proven effective</td>
</tr>
<tr>
<td>Facet joint injections effective</td>
<td>Invasive procedure not proven effective</td>
</tr>
<tr>
<td>Acupuncture</td>
<td>Not proven effective</td>
</tr>
<tr>
<td>Ultrasound</td>
<td>Not proven effective</td>
</tr>
</tbody>
</table>

Table 4 discusses treatments not recommended for acute lumbosacral strain/sprain as per the AHCPR guidelines; however, many physicians currently find these treatments to be effective and continue to utilize them in their practice.
If low back symptoms persist longer than six months, it is termed chronic low back pain. This may be due to a posttraumatic myofascial pain syndrome. Although any musculoskeletal muscle can be affected, pain is mostly localized to the lumbosacral paraspinals or gluteal muscles. The patient’s symptoms may be intermittent with the patient experiencing both “good” and “bad” days. Patients may perceive referred pain, numbness, and dysesthesias, although no true neurologic weakness can be found.

The management of these cases can be difficult. While this syndrome may be chronic, the first line of defense in treating this condition may be to have the patient avoid some of the triggering factors. Factors that trigger symptoms may be as simple as certain exercises, lifting, bending, prolonged sitting, exposure to cold, or psychological stress. Excessive alcohol, caffeine, or nicotine may also trigger symptoms. Once these “triggers” are identified, steps can be taken to avoid them.

Antidepressants can be prescribed for patients with chronic low back pain, even though there may not be accompanying depression. Opiates are not recommended for chronic nonspecific low back pain as they have many side effects and can foster dependence. Caution must also be used when driving or operating machinery while using opiate analgesia as drowsiness may occur.

Treatment of chronic low back pain must focus on restoring function and reducing symptoms. An exercise program may help to improve function and relieve pain. If standard treatment fails, referral to a specialist in the management of chronic pain may be indicated.
Herniated and Bulging Discs

Although both herniated discs and bulging discs may be caused by either trauma or degenerative changes, true herniation is defined by a break in the anulus fibrosus. (refer to illustration 2). A bulging disc is usually treated with conservative measures, whereas a herniated disc may lead to surgery to repair the tear in the anulus fibrosus. A bulging disc may convert to a herniated disc. Symptoms of a ruptured anulus fibrosus may include intractable low back pain with radiculopathy, which may be accompanied by strongly positive neurological signs and reflexes.

The most common lumbar disc affected is L5-S1. The second most common disc is L4-5. A study by Jinkins et. al. revealed that 56.4 percent of disc extrusions were posterior, 14.4 percent were central, and 29.2 percent were anterior. Most disc herniations occur in a posterolateral direction.

The most common symptom associated with lumbar disc herniation is radiculopathy or radiation of pain into the extremities. Although both young and old patients may suffer from lumbar radiculopathy, disc herniation tends to occur in younger patients.

In a study by Kelsey, et. al., there are several activities that may predispose a person to lumbar intervertebral disc herniation. The study found that the following activities increase the risk of prolapsing a lumbar intervertebral disc.

1. Lifting heavy objects an average of over five times daily.
2. Twisting while lifting.
3. Lifting with the knees straight.
4. A sedentary lifestyle may also increase the risk of low back problems, which may be due to the increased pressure in the intradiscal cavity.

Many patients with herniated lumbar discs do not have any history of trauma. It is believed that repetitive trauma and degeneration can cause tears in the annulus fibrosus leading to herniation. A study by Gordon et. al. revealed that the most likely movements leading to annular tearing and prolapse (displacement) were flexion, rotation, and compression.

In a study by McCarron et. al., the inflammatory process that occurs as a result of the herniation is the cause of pain.

There are varying degrees of herniation.

1. **Bulging disc.**

2. **Protruding disc.**

3. **Extruded disc.**

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**TABLE 5  HERNIATED LUMBAR DISC CLINICAL FINDINGS**

1. POSITIVE FEMORAL STRETCH TEST

2. POSITIVE STRAIGHT LEG RAISING TEST IN BOTH SUPINE AND SEATED POSITIONS

3. DECREASED KNEE AND ANKLE REFLEXES

4. SENSORY LOSS IN A DERMATOMAL DISTRIBUTION

5. SEGMENTAL MOTOR LOSS

6. POSSIBLE CALF OR THIGH ATROPHY

ILLUSTRATION 2
THE THREE DEGREES OF DISC HERNIATION

Illustration by Joseph A. Wuest
Many studies have shown spinal manipulation to be very effective in the treatment of herniated discs. A conservative approach to lumbar disc herniation is believed to be extremely effective in most cases. The Agency for Health Care Policy and Research (AHCPR) believes spinal manipulation can be helpful in patients with acute low back pain without radicular symptoms, provided it is performed within the first month of symptoms.

A study by Weber compared surgical and conservative treatment of patients with herniated lumbar discs. The results showed that patients four years following surgery demonstrated no significant advantage in pain relief than the conservatively treated group.

Another study by Saal and Saal revealed that, in patients with herniated lumbar radiculopathy, the disc eventually spontaneously regresses, allowing the majority of patients to return to work. This is believed possible through a vigorous exercise program, limited use of bed rest, epidural corticosteroid injections, and appropriate pain medications. In some cases, surgical treatment is highly effective but also carries a risk of complications.

Surgery is usually recommended only if there is progressive weakness, bowel or bladder incontinence, or severe pain and functional impairment. According to the AHCPR, surgery for a herniated lumbar disc should be considered only if the following conditions are met:

1. **The sciatica is severe and disabling.**

2. **There is persistence or progression of sciatica.**

3. **There is clinical evidence of nerve root compression.**

Another study by Bush and colleagues revealed that in 76 percent of patients with herniated lumbar discs, there was partial or complete resolution of the herniation one year later with a repeat MRI.

Non-surgical treatment options are the same for lumbar herniated disc as acute lumbosacral strain/sprain except for the addition of epidural steroid injections as a viable option.

Referral to a surgeon can be made provided the following three conditions are met:

1. **There is severe and debilitating sciatic pain.**
2. There is persistent sciatic pain with no sign of improvement or there is progression of symptoms.

3. The patient shows clinical signs of nerve root dysfunction.

   In patients with herniated discs and nerve root compromise, surgery can be efficacious. Standard diskectomy and microdiscectomy are considered two appropriate options. Percutaneous diskectomy is not recommended at the present time.

   Lumbar diskectomy is usually performed under general anesthesia through a small incision with a partial hemilaminectomy. Patients can often be released the same day or the day after the surgery. Lumbar diskectomy has been found to have a success rate of 80 to 90 percent. Serious complications are rare but include spinal infection and cauda equina injury. Failure, however, can usually be attributed to poor patient selection.

   Chymopapain injections into the herniated disc may be suggested as an alternative to standard or microdiscectomy, however less efficacious. Chymopapain is injected into the herniated disc to break down the herniated material and prevent it from putting pressure on the nerve root. These injections are likely to be successful in patients without sequestered disc material or spinal stenosis. Patients should first be checked for allergic reaction to chymopapain before the injection is considered.

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**SPINAL STENOSIS**

Spinal stenosis is characterized by compression of the cauda equina by the bone and ligaments of the spine. This condition can often be asymptomatic, however some patients report pain with standing or ambulation that is relieved with sitting. Spinal stenosis may frequently be accompanied by pain, weakness, or sensory loss in the lower extremities. Epidural steroid injections or corticosteroid injections may produce temporary relief but, in severe cases, surgery may be necessary. However, surgery should only be considered after conservative therapy has failed.
TABLE 6    CLUES FOR SPINAL STENOSIS

1. PAIN WHILE WALKING (PSEUDOCLAUDICATION).

2. THE PATIENT IS MORE COMFORTABLE SITTING, SQUATTING, OR RESTING WITH THE SPINE IN THE FLEXED POSITION.

3. THE PATIENT HAS NORMAL PERIPHERAL PULSES.

4. STRAIGHT LEG RAISING MAY BE NORMAL.

5. POSITIVE “STOOP TEST” (PAIN RELIEVED WITH FLEXION OF THE SPINE WHILE STANDING).

6. NON DERMATOMAL LEG PAIN.

Spinal stenosis is more common among the elderly, and is usually a combination of a narrowed spinal canal, superimposed osteoarthritis, and disc degeneration. It is produced when the bone and ligaments of the spine compress upon the cauda equina. Spinal stenosis may also be due to a central disc herniation. As narrowing of the canal occurs mostly when the spine is in extension, patients report relief when bending forward or flexing the spine. Severe cases of spinal stenosis can produce radiculopathy or even cauda equina syndrome accompanied by bowel or bladder incontinence.

Spinal stenosis can usually be diagnosed with CT scan or MRI. Most patients report relief with the use of nonsteroidal anti-inflammatory drugs or (NSAIDs). When NSAIDS are contraindicated, mild opiates may be used to relieve pain. Epidural steroid injections may be helpful in patients with radiculopathy before surgery is considered. With spinal stenosis, impotence, incontinence, or cauda equina syndrome may be present. Spinal stenosis may be accompanied by instability, spondylolisthesis, or scoliosis. Decompressive surgery is usually performed to relieve persistent neurogenic claudication symptoms and restore neurologic function when conservative measures fail. Surgery is not recommended in elderly patients that can function adequately in daily activities and can be treated with conservative measures.
OSTEOARTHRITIS

Osteoarthritis (degenerative joint disease or DJD) of the back is more commonly seen in patients over the age of 50. The disease begins insidiously as the patient ages and progresses. Osteoarthritis may be due to trauma from a past injury to the back. Some patients are asymptomatic yet others complain of morning stiffness lasting up to one hour, decreased range of motion of the spine, and pain with extreme motions of the spine. Patients usually report the stiffness returning later in the day. Patients may or may not report referral of pain to the buttock or thigh. Some patients report increased pain with activity.

X-rays can confirm the diagnosis of osteoarthritis, however the severity of the symptoms do not always correlate to the severity of the disease seen on x-ray. Severe cases of osteoarthritis can lead to spinal stenosis, especially if the patient has a congenitally narrow spinal canal.

Patients suffering with low back pain due to osteoarthritis can be treated with a combination of medications such as nonsteroidal antiinflammatory drugs (NSAIDS) or acetaminophen, exercise to strengthen the back and abdominal muscles, and orthotics. Patients should make every attempt to remain active, as inactivity can lead to decompensation syndrome.
CHAPTER SUMMARY

Acute lumbosacral sprain/strain is usually brought on by precipitating trauma.

A bulging disc may convert to a herniated disc.

There are three degrees of disc herniation.

Spinal stenosis may frequently be accompanied by pain, weakness, or sensory loss in the lower extremities.

Osteoarthritis is more commonly seen in patients over the age of 50.

NOTES
TREATMENT OF LOW BACK PAIN

Treatment measures vary greatly depending on the cause of low back pain. In patients with nonspecific low back pain, treatment is aimed towards preventing deconditioning and alleviating symptoms. Emphasis is placed on minimizing bed rest as this rapidly may progress to deconditioning, further worsening the back pain. Specific range of motion exercises often reduce pain.

Patients with low back pain lasting longer than six months are defined as chronic low back pain sufferers. Pain clinics that emphasize exercise, behavior modification, and work hardening can sometimes be beneficial in these cases. Education regarding proper lifting techniques and body mechanics may also be helpful.

Recent thinking has shifted away from bed rest as a viable treatment option for nonspecific low back pain and is now focused on exercise and activity as the treatment of choice. Many studies have concluded that bed rest longer than two to three days may actually be detrimental to recovery of acute episodes of low back pain. Bed rest promotes muscle atrophy, stiffness, and depression. Experts agree that, instead of bed rest, the patient should be encouraged to continue daily activities as tolerated.
**MEDICATION**

NSAIDS (nonsteroidal antiinflammatory drugs) may also be useful for acute episodes of low back pain. Tricyclic anti-depressants can be used in patients with or without depression and are often helpful in relieving symptoms. Opiates are more effective in relieving low back pain than acetaminophen or NSAIDS, however should be prescribed with caution due to potential complications such as dependence, drowsiness, and clouded judgment.

**SPINAL MANIPULATION**

Spinal manipulation is performed by a variety of health care practitioners including MDs, DOs, chiropractors, and physical therapists. An increasing amount of research has been done suggesting that spinal manipulation is the most effective form of therapy in the treatment of mechanical low back disorders in patients without radiculopathy. Studies have shown that spinal manipulation is more effective when performed in the initial stages of an acute attack of low back pain.

The AHCPR recommends appropriate diagnostic assessment to rule out serious neurological conditions in patients exhibiting signs of severe or progressive neurological deficits before commencing spinal manipulation.
A study done by Kinalsky revealed that patients receiving manual manipulative therapy responded positively in less than half the treatment time of patients treated by various forms of physiotherapy modalities.

Another study by Matthews et al. concluded that the most effective form of treatment for low back pain and sciatica was manipulation.

A third study done by Koes et al. showed that spinal manipulation was more effective than treatment consisting of massage, exercise, and/or physical therapy modalities. Furthermore, it revealed spinal manipulation to be more effective than treatment consisting of medication, home exercise, postural advice, and bed rest.

Spinal manipulation has also been found to be highly effective in the treatment of lumbar intervertebral disc herniation. One study found that 76 percent of patients were able to return to work following spinal manipulation for disc herniation. A study by Barker concluded that 44 percent of patients experienced immediate improvement following spinal manipulation during a ten minute appointment.

**MASSAGE THERAPY**

Massage therapy is growing in popularity. Massage techniques can be performed by chiropractors, osteopathic physicians, physical therapists, physiatrists, nurses, and qualified massage therapists. Massage therapy can be used to relieve pain from chronic cancer, arthritis, and musculoskeletal complaints. Massage can be used to decrease muscle spasm and restore normal range of motion to the lumbar spine. Massage therapy has been found to be most effective in the treatment of acute lumbar pain. Massage may also be helpful in patients with fibromyalgia and myofascial pain. Massage may, in some cases, reduce the need for drug treatment.
LUMBAR TRACTION

Lumbar traction is a popular modality used to treat patients with back pain. There are at least ten different types of traction, with sustained and intermittent traction being the most widely used. Lumbar traction has been traditionally utilized to treat pain from herniated discs, degenerative disc disease, and foraminal stenosis.

Traction is based on the concept that separating the vertebrae will relieve pressure on the spinal nerve roots. This concept, however, is flawed since there is no evidence that nerve root compression is the basis for spinal pain. Secondly, once the patient is released from the traction table, gravity will reverse any beneficial effects the traction has achieved.

There are many contraindications for lumbar traction including the following:

1. Spinal malignancy.
2. Spinal cord compression.
3. Osteoporosis.
5. Aortic aneurysm.
6. Abdominal hernia.

Studies of lumbar traction offer conflicting results. This may suggest that further research is necessary in order to determine the optimal mode, duration, and frequency of lumbar traction treatments. The AHCPR does not recognize spinal traction as an effective treatment for acute low back pain and does not recommend it.

BIOFEEDBACK

Biofeedback is a tool that can be used to teach patients to relieve tension and anxiety whenever they feel pain. A series of electrodes are attached to the patient that measure one or more physiologic variables such as blood pressure, skin temperature, and heart rate. Patients are taught to control these variables while observing images or listening to prerecorded tapes. The AHCPR does not recommend the use of biofeedback for the treatment of low back pain.
**TRANSCUTANEOUS NERVE STIMULATION (TENS)**

A TENS unit is a small battery-operated device that involves the careful placement of electrodes over painful areas delivering a vibratory electrical current. The transcutaneous electrical stimulation is thought to relieve pain by working on the patient’s nerves and stimulating the body’s natural pain-killing endorphins. There is much conflicting data regarding the effectiveness of this device, thus the AHCPR does not recommend the use of TENS units for the treatment of patients with acute low back pain.

**THERAPEUTIC ULTRASOUND**

Therapeutic ultrasound employs high-energy sound waves to relieve painful muscle spasms and joint pain. It is believed that the ultrasonic waves increase blood flow by producing heat deep in the tissues such as joints, muscle, and bone. This is believed to hasten repair of the tissues and produce temporary relief of pain by increasing the threshold for pain perception.

A study by Gam and Johannsen has concluded that the use of therapeutic ultrasound for the treatment of low back disorders lacks firm evidence in controlled studies.

Due to conflicting studies on the efficacy of therapeutic ultrasound, the AHCPR has determined that the use of therapeutic ultrasound is of “insufficiently proven benefit” to justify its cost.
LUMBAR CORSETS

Lumbar corsets have long been used to prevent movement of the lumbar spine allegedly to protect the spine from injury. A study by Eisinger et al. demonstrated that the prolonged use of lumbar corsets contributed to trunk muscle weakness, even in the absence of back pain. The study recommended caution when prescribing lumbar corsets and suggested strengthening exercises to reverse the weakness.

The AHCPR approves of the use of lumbar corsets prophylactically in individuals required to do frequent heavy lifting at work, however states that lumbar corsets have not been proven beneficial in the treatment of acute low back pain.

EXERCISE

Exercise is of tremendous value in the management of back pain. Used primarily to increase strength in a specific muscle or groups of muscles, exercise can also be used to decrease pain by means of increasing range of movement or enhance motor skills. For example, patients may be taught abdominal strengthening exercises to help stabilize the lumbar spine. Low-impact aerobic exercise can be especially beneficial in the initial stages of low back injury by preventing debilitation due to inactivity. Exercises such as walking, swimming, or biking can help relieve pain and restore function in most patients with acute low back problems. Physicians may prescribe strengthening exercises for the trunk to help patients with persistent acute low back pain, but these exercises are more successful when preceded by aerobic fitness exercises. It is believed that, in the first two weeks following acute injury, strengthening exercises may aggravate back symptomatology.
Furthermore, it is recommended that patients be instructed to gradually decrease their exercise program if pain occurs rather than abruptly halt their exercise program. This has been shown to produce a better outcome.

The AHCPR guidelines conclude that, although machines aimed at targeting specific back muscles may be beneficial, they are not proven to be more beneficial than traditional exercise in the treatment of acute low back pain. These guidelines also conclude simple stretching exercises have not been proven effective in the treatment of acute low back pain.

Specific back strengthening and general endurance exercises may be instrumental in preventing recurrent back symptomatology in patients with a history of low back problems.

**INJECTION THERAPY**

The AHCPR guidelines approve of epidural corticosteroid injections in patients with radicular pain when conservative treatment has failed to provide relief and as a means of avoiding surgery. There are pitfalls, however, especially with placement of the needle. One study reported placement of the needle to be incorrect in 25 percent of cases.

Other types of injections such as trigger point, ligamentous, and facet joint injections were not recommended in the treatment of acute low back problems. Some physicians believe that these injections help relieve back pain, however research regarding the effectiveness of these injections is lacking.

The AHCPR guidelines have approved of the use of chymopapain (an enzyme used to dissolve herniated discs) injections as an acceptable treatment for patients with herniated discs and nerve root dysfunction. The AHCPR guidelines state that it is less effective than standard diskectomy or microdiscectomy.
Patients can benefit from a good structured exercise program supervised by a licensed professional physical therapist. Physical therapy is preferred over other modalities such as TENS, ultrasound, and heat and cold, which have yet to be proven efficacious in the treatment of acute low back pain. Exercises should be focused to meet specific goals such as to condition the back muscles or trunk. An adjunct home exercise program should be implemented as well for maximal benefit.

In recent years, functional restoration programs have been becoming popular by claiming to improve function using aggressive physical exercise and psychological support, despite pain. A study by Teasell and Harth assessed the effectiveness of these programs in returning patients to work. The study failed to demonstrate efficacy citing further clinical trials are needed.

According to the AHCPR guidelines, physical therapy sessions should be limited to a maximum of 12 sessions.

Acupuncture is the ancient Chinese practice of careful insertion of tiny needles into the skin for the following purposes:

1. To relieve pain.
2. To produce an anesthesia effect.
3. For therapeutic reasons.
As acupuncture is considered to be an invasive procedure, it is not recommended as a treatment option for acute low back problems, according to the AHCPR guidelines.

**HEAT AND COLD THERAPY**

Heat therapy can come in many forms including hot packs, diathermy, hydrotherapy, paraffin bath, or heat lamps. These modalities are meant to induce muscle relaxation, increase blood circulation, and decrease inflammation and spasm. Superficial heat is believed to produce an analgesic-type effect when applied, although the exact mechanism of this is unknown.

Cold therapy or cryotherapy is utilized to treat acute injuries to reduce swelling and minimize tissue damage by reducing blood flow and decreasing metabolic activity. Therapeutic cold in the form of ice packs, ice massage, or vapo-coolant sprays can also be used to produce a temporary analgesic effect, as long as the source of cold is applied. Once removed, however, the analgesic effect quickly wears off. Currently, there is no evidence to suggest that cold therapy has a lasting effect on low back pain. According to AHCPR guidelines, hot and cold therapy are not proven to be of benefit to justify their cost.

**SURGICAL OPTIONS**

Although only a small percentage of patients suffering from chronic low back pain will be referred for surgery, it is important to carefully select patients based on certain criteria in relation to their diagnosis. Inappropriate patient selection accounts for most cases of poor surgical outcomes.

Generally, patients can be considered for surgery if the following circumstances are met:

1. The patient has failed to achieve acceptable results from a variety of conservative therapy measures and has intractable pain that interferes with his/her ability to perform daily activities.

2. The patient does not display signs of exaggeration and has demonstrated a good faith effort towards rehabilitation.

3. A distinct surgical lesion has been identified and believed to be the cause of the patient’s pain symptomatology.
The decision to operate ultimately lies in the hands of the physician, however some basic guidelines apply and are as follows:

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**TABLE 7**

**SURGICAL GUIDELINES FOR LUMBAR SPINAL NERVE ROOT ENTRAPMENT**

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**TYPES OF LUMBAR SURGERY:**

1. Laminectomy.
2. Laminotomy.
3. Foraminotomy.
4. Foraminal decompression.
5. Microdiscectomy.
7. Spinal fusion.

**PATIENT SYMPTOMS:**

1. Radicular pain indicating nerve root compromise.
2. Bowel or bladder incontinence and/or sexual dysfunction.
3. Weakness or sensory loss in an extremity.
4. Uncontrolled severe pain.

**FINDINGS ON CLINICAL EXAMINATION:**

1. Pain radiating into an extremity with or without accompanying back pain.
2. Evidence of nerve root compromise in the distribution of a particular spinal nerve causing the following:
   a. Motor or sensory deficit.
   b. Changes on reflex testing.
   c. Positive findings on EMG testing.
   d. Intractable pain in a pattern consistent with a nerve root distribution.

**DIAGNOSTIC EVIDENCE:**

For surgery to be considered, one of the following diagnostic tests must show evidence of nerve root compromise:

1. MRI.
2. CT scan.
3. Myelogram with CT scan.

---

**TABLE 8**
POST SURGICAL TREATMENT OPTIONS FOR NERVE ROOT ENTRAPMENT

1. The patient should be instructed to apply ice or heat to the back to relieve discomfort.

2. Medication:
   a. Non-narcotic analgesics.
   b. Muscle relaxants but not longer than one week.
   c. NSAIDS if not contraindicated.
   d. Opioid analgesics prescribed for a limited period of time.
   e. Antidepressants prescribed for cases of chronic low back pain.

3. The patient should be instructed in a structured home exercise program.

4. A patient exhibiting loss of functional ability may be prescribed physical therapy with a licensed professional physical or occupational therapist.


Nerve root entrapment can be caused by herniated lumbar disc, spinal stenosis, or a combination of the two. Sometimes nerve root entrapment can be due to a tumor on the spine, although rare. Patients experiencing moderate to severe pain with this condition will opt for surgery early on. Others with milder pain will choose surgery only if exhaustive conservative measures have failed to bring relief.

Surgical success can be measured by assessing the following in relation to pre-surgical status:

1. Pain.

2. Range of motion.

3. Functional ability.

4. Psychological well-being.

5. Structural and neurologic status.
### TABLE 9
**SURGICAL GUIDELINES FOR CAUDA EQUINA SYNDROME**

#### TYPES OF LUMBAR SURGERY:
1. Laminectomy.
2. Microdiscectomy.

#### FINDINGS ON CLINICAL EXAMINATION:
1. Sudden or progressive sensory symptomatology.
2. Severe and acute neurological deficit that is progressive, bilateral, or multi-level.
3. Bowel or bladder dysfunction.

#### DIAGNOSTIC TESTS:
1. MRI scan.
2. CT scan.
3. Myelogram with CT scan.

#### SURGICAL CRITERIA:
For surgery to be considered, both of the following conditions must be met:

1. Evidence of a large lesion causing central spinal stenosis with tight obstruction on one of the above diagnostic tests.
2. Severe and acute neurological deficit that is progressive, bilateral, or multi-level.

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**Source:** Surgical Guidelines for Cauda Equina Syndrome published by the federal Agency for Health Care Policy and Research. February 1996.
TABLE 10
POST SURGICAL TREATMENT OPTIONS FOR CAUDA EQUINA SYNDROME

1. The patient should be instructed to apply ice or heat to the back to relieve discomfort.

2. Medication:
   a. Non-narcotic analgesics.
   b. Muscle relaxants but not longer than one week.
   c. NSAIDS if not contraindicated.
   d. Opioid analgesics prescribed for a limited period of time.
   e. Antidepressants prescribed for cases of chronic low back pain.

3. The patient should be instructed in a structured home exercise program.

4. A patient exhibiting loss of functional ability may be prescribed physical therapy with a licensed professional physical or occupational therapist.


Compression of the cauda equina can be due to the following conditions:

1. Spinal stenosis.
2. Fracture.
3. Dislocation.
4. Massively herniated disc.

Patients with compression of the cauda equina should immediately be referred for surgery, as this is a medical emergency.

Patients with compression of the cauda equina may exhibit the following symptomatology:

1. Sudden onset of urinary frequency, retention, or incontinence.
2. Sensory loss in the perianal or perineal area.
3. Sudden anal sphincter dysfunction.
4. Major motor weakness in the lower extremities.

It should be noted that the prognosis of patients suffering with severe cauda equina syndrome due to a large central disc herniation is guarded, even with prompt surgery for disc removal and decompression.
CHAPTER SUMMARY

NSAIDS may be useful for acute episodes of low back pain.

Massage can be used to decrease muscle spasm and restore normal range of motion to the lumbar spine.

Lumbar traction is contraindicated in patients with osteoporosis.

Therapeutic ultrasound employs high-energy sound waves to relieve painful muscle spasms and joint pain.

Exercise can be used to increase range of movement or enhance motor skills.

Acupuncture is considered to be an invasive procedure.

Inappropriate patient selection accounts for most cases of poor surgical outcomes.

NOTES
CHAPTER SIX

PREVENTION OF LOW BACK PAIN FOR HEALTHCARE PROFESSIONALS

Programs designed to educate and prevent low back problems should be instituted in every workplace. With the incidence of low back injury among workers reaching epidemic proportions, preventative measures should be exhaustively taken.

Suggested measures to reduce the risk of injury include following basic ergonomic strategy in the workplace and education of management and employees.

LIFTING SAFETY

Nurses, physical therapists, radiologic technicians, and other health care professionals who tend to lift patients on a frequent basis are at most risk for developing low back problems. Compliance of some basic safe lifting techniques can help prevent most injuries.

Some facilities institute a “no lifting policy.” This means that the manual lifting of patients is prohibited, except in cases of emergency. Patients are encouraged to become more independent by helping to transfer themselves whenever possible. The rolling of patients can also be an alternative to lifting when possible and patients can be moved from bed to bed or bed to gurney using sliding aids.

Sometimes, special equipment such as hoists or sliding devices are needed. These machines can be very costly but the risk of manual lifting may outweigh the cost in some cases.
There are four aspects of lifting that play a role in spinal stress. They include:

1. **The amount and shape of the weight lifted.**
2. **The distance of the load from the torso.**
3. **Lifting of the load from ground level.**
4. **The speed in which a load is lifted.**

The increased risk of spinal stress can be lessened with these simple lifting techniques.

1. **When picking up an object from the ground level,** the knees should be bent and the back should be kept as straight as possible.

2. **Keep the object close to the body** to prevent undue strain on the discs.

3. **Lift the object as quickly as possible** to reduce the strain on the anulus and ligaments.

4. **Use common sense** when deciding whether or not an object is safe weight-wise to lift.

5. **When lifting,** do not twist the spine.
PHYSICAL FITNESS AND TRAINING

Another way to protect the back against injury is fitness and strength training. Employees may volunteer to attend exercise sessions to increase endurance, flexibility, and strength. This type of training is believed to lower the risk of back injury by strengthening the muscles of the spinal column.

POSTURE

Good posture plays an significant role in the prevention of low back problems. Poor posture leads to stress and musculoskeletal disorders. The lumbar spine should be keep as straight as possible. Employee workstations should be made adjustable to adapt to individual body sizes.

Ergonomic chairs can help alleviate stress on the lumbar spine caused by incorrect body mechanics.
ILLUSTRATION 3
EXAMPLE OF GOOD POSTURE

ILLUSTRATION 4
EXAMPLE OF BAD POSTURE
CHAPTER SUMMARY

1. Nurses, physical therapists, radiologic technicians, and other health care professionals who lift frequently are at increased risk for developing low back problems.

2. Rolling patients may be an alternative to lifting in certain cases.

3. Keeping objects close to the torso when lifting reduces strain on the back.

4. Good posture can help prevent low back problems.

NOTES
GLOSSARY OF TERMS

ABDOMINAL AORTIC ANEURYSM - A fluid-filled sac or sac of clotted blood formed in the abdominal artery by dilation of the artery wall.

ACUPUNCTURE - The ancient Chinese practice of inserting needles into specific body regions in an effort to relieve pain.

ADENOPATHY – Enlargement of the glands, especially the lymph glands.

AHCPR - Agency for Health Care Policy and Research.

ALKALINE PHOSPHATASE TEST - A blood test that may indicate liver or bone disease.

ANEMIA - A below normal reduction in erythrocytes (red blood cells) on hemoglobin (the oxygen carrier) in the blood.

ANULUS FIBROSUS - A ring of the intervertebral disc composed of fibrous tissue and fibrocartilage.

ARTHROPATHY - Disease of the joints.

BIOFEEDBACK – Training technique which enables an individual to gain voluntary control over automatic body functions.

BONE SCAN - A test utilizing an intravenous injection and radiation helpful in detecting malignancy or infection involving any part of the skeleton.

BULGING DISC – When the nucleus pulposus presses against the anulus fibrosus producing an indentation as noted on spinal imaging.

BURSITIS - Inflammation of a bursa, sometimes accompanied by a calcific deposit in the supraspinatus tendon.

CAUDA EQUINA - A group of spinal roots descending from the lower part of the spinal cord.

CBC - (Complete Blood Count) A blood test including a platelet count, hemoglobin, hematocrit, white blood count, and red blood count.

CHYMOPAPAIN – A papaya fruit-derived enzyme used as an injectable to dissolve herniated discs by chemonucleolysis.

COLCHICINE - An alkaloid commonly used to treat gouty arthritis.

COMPRESSION FRACTURES – Wedge-shaped broken bones caused by compression such as seen in the lumbar spine.

CONTRAST MEDIA - A substance commonly used to emphasize the difference between light and dark on x-rays or scans to better visualize the organs and tissue.

CORTICOSTEROID - A steroid used clinically in many settings including hormone replacement therapy, antineoplastic, antiallergic, antiinflammatory, and to suppress the immune system.

CHEMONUCLEOLYSIS - Dissolution of the nucleus pulposus of an intervertebral disc by injection of an agent such as chymopapain.

CRYOTHERAPY - Cold used for relief in treatment.

CT SCAN - Three-dimensional diagnostic test providing accurate density detail of internal organs.
DECOMPRESSIVE SURGERY - Excision of disc and bone to decrease anatomical irritation on the spinal cord or nerve roots.

DEEP TENDON REFLEXES - Involuntary muscle contraction following brief stretching caused by percussion of its tendon.

DEGENERATIVE ARTHRITIS - (Osteoarthritis) A noninflammatory degenerative joint disease most commonly found in the elderly causing pain and stiffness.

DERMATOMAL DISTRIBUTION - The extent of a nerve and its branches.

DIATHERMY - Warming of different parts of the body using high frequency electromagnetic radiation.

DISKOGRAPHY – Post intradiscal injection, an image of the intravertebral disc using a radiograph.

DYSESTHESIA - A distortion of one's senses from normal.

ELECTRODES - An object used between an electric source and the position to which the electric stimulus will be applied.

ELECTROMYOGRAM (EMG) - An electrodiagnostic test to detect neuromuscular disorders.

ENDORPHINS - Chemicals located in the brain and, when present, produce analgesic effects.

EPIDURAL INJECTION - Injection into or around the dura mater used for diagnostic or anesthetic purposes.

ERYTHROCYTE SEDIMENTATION RATE (ESR) - Test using whole blood for detection of infection.

FIBROMYALGIA - Pain in fibrous tissue around a muscle.

FOOTDROP - Paralysis of the anterior muscles of the leg due to a peroneal or tibial nerve lesion causing dropping of the foot.

FORAMINAL DECOMPRESSION - The reduction of pressure on a nerve root by excising bone at the intervertebral foramina.

FORAMINAL STENOSIS - The narrowing of an intervertebral foramen – the opening where the spinal nerve root exits the bony spinal protection to become a peripheral nerve.

FORAMINOTOMY - An operation performed to relieve nerve root compression by removing the roof of the intervertebral foramina.

FUNCTIONAL RESTORATION – Therapy to restore a person back to their ability to carry out daily activity.

GADOLINIUM - A rare element used as a contrast agent in magnetic resonance imaging.

HERNIA - A loop-like protrusion of an internal organ or tissue through the abdomen.

HERNIATED DISC - A protrusion of the nucleus pulposus extending into or tearing part of the annulus fibrosus.

HOIST – A device used to aid in lifting.

H-REFLEX - A type of nerve conduction study to detect disease involving the proximal segments of a peripheral nerve.

HYDROTHERAPY - The use of water therapeutically.
HYPOGAMMAGLOBULINEMIA - Abnormally low levels of immunoglobulins in the blood.

ILIOTIBIAL BAND - Also called tractus iliotibialis; a muscle located in the leg.
INFLAMMATORY ARTHRITIS - Also known as degenerative arthritis.

IMMUNOSUPPRESSION - Suppression of the immune system.

INSTABILITY - An unstable or excessively mobile section of the spine due to damaged ligaments.

LAMINECTOMY - Surgical removal of the posterior arch of a vertebra.
LAMINOTOMY - Splitting of the lamina of a vertebra.
LIGAMENT - A band of tissue that connects bones to joints.
LUMBAR CORSET - A supportive device worn encircling the back region used to prevent and treat spinal injuries or deformities.
LUMBAR STRAIN - Overstretching or overexertion of the back region.
LYMPHADENOPATHY - Pathology of the lymph nodes.
METASTATIC DISEASE - Disease that is transferred from one part of the body to another not connected to the original part of the body.
MICRODISKECTOMY - Debulking of a herniated disc using a microscope or other form of magnification.
MRI SCAN - (Magnetic resonance imaging) - A diagnostic test, when directed at the lumbar spine, can detect herniation, lumbar canal stenosis, infection, tumor, or other pathology affecting the lumbar spine.
M-SPike – Excessive gamma globulin noted on serum electrophoresis.
MUSCLE ATROPHY - Wasting away of a muscle.
MULTIPLE MYELOMA - A plasma cell cancer characterized by multiple bone marrow tumors, fractures, hypercalcemia, and anemia.
MYELOGRAPHY - Testing used to visualize the spinal cord by injecting contrast media into the subarachnoid space via spinal needle.
MYELOPATHY - A general term denoting pathology in the spinal cord or bone marrow.
MYOFASCIAL PAIN SYNDROME - Pain syndrome due to muscle and surrounding connective tissue irritation.
MYOPATHY - A general term denoting disease of a muscle.
NERVE ROOT ENTRAPMENT - Pinched nerve either by bony encroachment, muscle impingement, or disc protrusion.
NONSTEROIDAL ANTIINFLAMMATORY DRUG (NSAID) - Medication that counteracts inflammation.
OPIOID ANALGESIC - A synthetic narcotic used for pain.
OSSEOUS - Relating to bone.
OSTEOCLASTIC - Destructive to bone.
OSTEOPENIA - A reduced amount of bone due to a decrease in bone manufacturing.
OSTEOPOROSIS - A significant reduction in bone mass which can result in fractures.

PARTIAL HEMILAMINECTOMY - Removal of one side of a vertebral lamina.

PERCUTANEOUS DISKECTOMY – Through the skin microsurgery to remove part or all of a herniated disc.

PROSTATE SPECIFIC ANTIGEN (PSA) - The most accurate and useful blood test to detect carcinoma of the prostate.

PSEUDOCLAUDICATION - A condition caused by compression of the cauda equina or nerve roots often resulting in difficulty with walking.

RADICULOPATHY - An abnormality with the base of a nerve.

SCIATICA - Pain associated with the sciatic nerve usually in the back radiating into the buttock region.

SCOLIOSIS - A change in the shape of the spine.

SERUM CALCIUM - A blood test used to detect conditions such as hyperparathyroidism and malignancy.

SERUM PROTEIN ELECTROPHORESIS (SPEP) - A blood test used to detect monoclonal gammopathies which are usually found in association with hematopoietic neoplasms.

SPINAL FUSION - Ankylosis of two or more vertebrae.

SPINAL MANIPULATION - Passive movement of the bones of the vertebrae by hand used to increase flexibility and decrease pain.

SPINAL STENOSIS - Narrowing of the vertebral openings.

SPINAL TRACTION - The pulling by force of the vertebrae.

SPONDYLOLISTHESIS - Anterior displacement of one vertebra over another.

TRIGGER POINT INJECTION – Injection of local anesthetic with or without corticosteroid to digitally palpable tissue texture abnormality.

ULTRASOUND – High frequency crystal induced sound waves to induce heat below the skin surface.

VAPOCOOLANT SPRAY – Aerosol spray used for manual spray and stretch techniques for muscle spasm and myofascial pain (ethyl chloride/fluormethane).


32. Surgical Guidelines for Low Back Pain published by the federal *Agency for Health Care Policy and Research.* February 1996.
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