

Chronic Pain Rehabilitation: Principles and Practice

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ABSTRACT

Chronic pain affects more than 50 million Americans and costs the economy billions of dollars each year. Because chronic pain may involve physical, emotional and social-role dysfunction, treatments that only address the physical problems are often ineffective. In chronic pain rehabilitation, a team of skilled professionals employs multiple therapies and a structured treatment plan to address all the dimensions of chronic pain. Patients undergoing pain rehabilitation demonstrate lasting reductions in pain, improved coping skills, and improved physical and social function. This article reviews the basic principles and current practice of chronic pain rehabilitation, with a guide to the evaluation techniques and therapies employed to aid these most challenging patients.

INTRODUCTION

L.C. (not an actual patient, but a typical case) is a 47-year-old man who was working at a construction site and lifted a heavy beam when he felt a "pop" in his lower back, followed by excruciating pain in the low back and down the left lower limb. He was evaluated in the local emergency department and was found to have sustained a large leftward L5-S1 disc herniation impinging upon the left S1 nerve root. He did not improve with conservative therapy and underwent L5-S1 discectomy 2 months after injury. His symptoms initially improved, then returned starting 3 months after surgery. Now, 2 years after surgery, he presents to the pain rehabilitation center with complaints of severe, constant low back and left lower limb pain. He has not returned to work, citing back pain as the reason for his continued unemployment. He rates his pain today as 8 on a 0-to-10 analog scale.

Patients like L.C. are among the most difficult yet

common challenges faced by the medical profession. Chronic pain poses a tremendous burden to patients, their families, the economy, and society as a whole. More than 50 million Americans suffer from chronic pain.¹ Pain patients are heavy utilizers of health care services.² Chronic pain is associated with significant decrements in physical, emotional and social-role function. The incidence of anxiety and depression in chronic pain patients is 4 times greater than in the non-pain population.³ When pain lasts 6 months or more, becomes a major focus of the patient's life, is accompanied by depression or anxiety and is refractory to conservative treatment, the diagnosis of chronic pain syndrome may be made.⁴

The nature of their problem makes chronic pain patients notoriously difficult to evaluate and treat. Chronic pain can arise from a wide variety of physical causes including nerve injury, joint disruption, muscular overuse or injury, spinal disc pathology and others. This makes it difficult for a primary care physician to quickly identify the source of pain during a general physical examination. Coexisting psychological and behavioral issues further complicate the diagnostic picture.

To be truly effective, chronic pain treatment should address not only the physical cause of the pain but its emotional, behavioral and social implications. One particularly flexible and effective model of treatment, interdisciplinary pain rehabilitation, has been developed in response to this challenge. This article outlines the history and development of pain rehabilitation, guidelines for referring patients to a rehabilitation program, and current evaluation and treatment techniques.

THE PAIN REHABILITATION MODEL

During the 2 years since his surgery, L.C. has undergone multiple treatments. Lumbar epidural steroid injections were not helpful. Repeated applications of ultrasound, superficial heat and electrical stimulation produced a few minutes' relief at best. Opioid and nonsteroidal analgesics provided minimal relief. The

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patient's left lower limb pain has worsened over time and he describes frustration, anxiety and despondency regarding his ongoing pain and disability.

Despite the increasing variety of available pain treatment modalities, patients continue to suffer from chronic pain. Why does a patient continue to complain of pain after a well-performed block or operation targeting a well-defined anatomic lesion? Why does potent pharmacotherapy often fail to control the pain? The answers are complex. Single treatments may address a particular area of damage or disease but may not treat the deconditioning, muscular contracture and postural alterations that develop after months or years of chronic discomfort and which may become painful themselves. Psychosocial variables, including affective disorders, altered social roles, learned "sick-role" behavior and compensation issues may also complicate the resolution of chronic pain syndrome. Since chronic pain affects the entire person, treatment should logically employ a holistic approach. The pain rehabilitation model brings this whole-person perspective to chronic pain therapy.

HISTORY

The beginnings of pain rehabilitation date back to World War II and the Korean War, when Howard Rusk⁵ and other physicians treating injured veterans first observed that early mobilization and exercise resulted in better physical function and fewer pain complaints. The true pioneer of pain rehabilitation, however, was John J. Bonica, whose development of multidisciplinary pain centers in the late 1960s and 1970s revolutionized pain treatment.⁶ Bonica championed an intensive, behaviorally-based program carried out by a team of skilled personnel with the goals of restoring function, alleviating pain wherever possible and improving pain management skills. Bonica's original model has evolved over the years in response to refinements in pain treatment techniques and changes in reimbursement climate, but the basic principles remain the same.

THE PAIN REHABILITATION TEAM

The rehabilitation team includes personnel from diverse backgrounds (Table 1) who combine their expertise to address the physical, psychological and social dimensions of pain. During the process of pain rehabilitation, the patient explores how pain has impacted his/her physical, social and emotional well-being. The rehabilitation team employs a structured combination of physical and cognitive-behavioral treatments to reduce pain, augment coping skills and bolster physical function. Exercise, relaxation skills

Table 1. The pain rehabilitation treatment team. Teams may include all or a subset of these individuals.

- Physician (physiatrist, anesthesiologist, neurologist or other trained pain professionals)
- Psychologist and psychiatrist
- Nurse practitioner
- Nurse liaison
- Physical therapist
- Occupational therapist
- Vocational rehabilitation specialist
- Recreation therapist
- Social worker
- Pharmacist
- Scheduler/referral coordinator

and other techniques are mainstays of treatment. Patients learn new ways to cope with physical and emotional problems and are expected to assume significant responsibility for their own care. This process is augmented by consistent communication from all members of the treatment team.

Some patients are unable to participate in pain rehabilitation without the use of palliative measures to reduce pain to tolerable levels. Medications, injection therapies and surgery may be used for this purpose. Once pain is reduced, rehabilitation begins in earnest. In pain rehabilitation, palliation is not an end goal in itself but a way to facilitate participation and functional restoration.

Pain rehabilitation has proven its effectiveness in clinical practice. In a meta-analysis, pain rehabilitation resulted in significantly reduced pain, improved mood, reduced health care utilization, and increased return to work for patients with low back pain.⁷ Improvements remained stable over time. Other studies support the efficacy of multidisciplinary pain management,^{8,9} though additional outcome studies, especially controlled trials, are still needed.

Besides being effective, pain rehabilitation reduces resource consumption. Multimodal treatment for back pain patients is more cost-effective than either spinal surgery or spinal cord stimulator implants.⁹ Health care utilization is further reduced when patients are empowered to manage their own pain as much as possible. Many patients return to work following pain rehabilitation, further reducing the socioeconomic cost of physical disability.

WHEN TO REFER

Patients with persistent pain should first undergo a thorough workup to rule out conditions requiring surgical or medical intervention such as tumors, infections, or lesions causing severe neurologic com-

promise. Once these conditions are ruled out, patients with any sort of persistent pain may be referred for pain rehabilitation. Some programs stipulate a threshold degree of chronicity, e.g. 3 or 6 months, before admission. In general, however, patients do better when they are referred relatively early in the course of the pain disorder. Patients referred to a chronic pain rehabilitation program must be willing and able to participate in the program. Psychological status must be compatible with participation; actively psychotic patients should not be referred until the psychosis is adequately treated. Patients should have a physician or other provider who is willing to provide primary care during the course of pain rehabilitation, and who will assume or resume responsibility for helping the patient carry out the pain management plan after the rehab program ends.

If surgery, e.g. spinal fusion, is contemplated but there is no neurological or life-threatening emergency, a preoperative referral to pain rehabilitation should be considered. Pain rehabilitation may forestall the need for surgery; where surgery is required, rehabilitation may improve its outcome. In disabled workers with chronic spine pain undergoing spinal fusion surgery, those who also underwent a formal rehabilitation program had "the best documented outcomes found in the literature for this population" with work retention, health care use and reoperation rates better even than those in rehabilitation without surgery.¹

TAKING THE HISTORY

Several members of the treatment team evaluate patients presenting for pain rehabilitation. The physician conducts a detailed medical history interview, paying careful attention to the presenting pain complaint, its characteristics, its time course, and aggravating and relieving factors. Prior treatments are explored in full, including medications, surgery, prior rehabilitation, and nontraditional medical treatments including supplements. The physician takes a full past medical history, review of systems and family medical history, and questions the patient about functional status (mobility, daily activities, limitations). Standardized instruments are used to obtain additional information regarding perceived pain and functional limitation. Patients are asked to report their own goals and expectations regarding evaluation and treatment.

L.C. reports sharp pain in the central low back and up the left side of the lumbar spine, worse with bending backward, improved with sitting or lying down. He reports shooting and aching pain in the left buttock, posterior left thigh and posterior left leg, worse

with standing and walking. There is occasional numbness and tingling in the sole of the left foot. There are no bowel or bladder problems. The patient feels generally weak in the left lower limb but reports no specific muscle weakness. When asked his goals for the evaluation, the patient replies, "Get rid of my pain."

As always, a good history can provide significant information to aid in diagnosis. In the case of L.C., the patient reports symptoms that raise suspicion for lumbar radiculopathy (neuropathic pain) versus purely musculoskeletal lower limb pain. Increased back pain with spinal extension suggests problems with the posterior spinal elements, paraspinal muscles or nerve roots; lumbar spinal stenosis can also follow this pattern.

The physician and psychologist perform a detailed psychosocial evaluation. They explore the patient's home situation, prior psychological history, vocational history and substance use profile. They assess prior and present symptoms of depression, anxiety and other emotional difficulties. They often use standardized instruments to assess depression, personality disturbance and other psychosocial factors.

The patient reports emotional distress regarding his ongoing disability. He enjoyed his work greatly and is worried about his future. He feels his wife "doesn't understand" the degree of his pain and its impact on his life, and she continues to make demands of him, such as requests to assist with chores, that he does not feel able to meet. Their financial situation is tenuous because of his loss of income. He describes himself as "depressed." He denies active suicidal ideation or plan but does report some passive death wishes. His sleep is poor, with difficulty falling asleep and early morning awakening. He is often tearful. His score on the Beck Depression Inventory (BDI-II) is consistent with significant depression. He drinks several caffeinated beverages a day. He does not use alcohol. He smokes a pack of cigarettes a day and has done so for 15 years.

L.C. describes classic signs and symptoms of depression and of altered social, familial and vocational roles. His BDI-II score supports the diagnosis of depression. He regularly uses tobacco and caffeine, which as stimulants may heighten pain perception and worsen anxiety.

THE PHYSICAL EXAMINATION

Thorough examination of the pain patient requires a detailed understanding of the human neurological and musculoskeletal systems and the ways they interact to produce and maintain pain. Besides a general medical examination, patients undergo

detailed neurological, kinesiologic and functional evaluations. Components of the examination are summarized in Table 2. The physician, physical therapist, occupational therapist, nurse practitioner and other team members may all contribute to the examination.

General medical examination is unremarkable. The patient stands with most of his weight centered over the right foot, with the left hip and shoulder elevated, and with the left knee and hip slightly flexed. There is exaggerated lumbar lordosis. There is marked tenderness to palpation over the lumbar region and the left piriformis muscle, as well as the left lumbar paraspinal muscles, which are larger than the right. The L5-S1 facets are tender to palpation. Truncal forward flexion is limited to 50 degrees with mild pain; extension is to 10 degrees with severe pain. Extension with left side-bending is extremely painful in the left lumbar region and produces some left thigh pain. Lower limb strength, sensation and muscle stretch reflexes are normal bilaterally. Straight leg raise is negative. There is shortening of the left hamstrings, rectus femoris and iliotibial band compared to the right. There is left posterior thigh pain with hamstring stretch, reproducing a significant portion of the patient's lower limb pain complaints. The abdominal muscles are weak, as are the gluteals and hip flexors.

Here, the physical examination suggests a primarily musculoskeletal pain syndrome. The patient's radiating left lower limb pain is reproducible with muscle palpation and thus appears to be muscular rather than neuropathic. Significant postural abnormalities are identified, as is a pattern of chronic guarding to reduce left-sided weightbearing. Worsened pain on spinal extension with side-bending suggests posterior spinal dysfunction, possibly in the L5-S1 facet joints. Discogenic pain cannot be entirely ruled out.

DIAGNOSTIC TESTING

Imaging studies add valuable information to the history and physical exam. Plain x-rays are often the first choice for patients with suspected skeletal problems. For patients with spine pain, flexion, extension and oblique views may provide insight into spinal motion and allow inspection of the neural foramina and posterior articulating structures. MRI provides excellent visualization of discs and other soft tissue, while also providing reasonably good bone detail. CT is the study of choice when bony pathology is suspected, or when MRI cannot be performed. In patients with spine pain, IV contrast may be helpful with both CT and MRI. Numerous other studies are available but are outside the scope of this discussion.

Table 2. Physical examination of the pain patient

Neurological examination

- General mental status assessment
- Sensory examination
- Assess for altered, lost, increased sensation or after-sensation
- Modalities: touch, sharp, vibration, temperature, proprioception
- Strength examination – manual muscle testing
- Muscle stretch reflex examination
- Balance / coordination testing
- Cranial nerve examination (where appropriate)

Kinesiologic examination

- Observation
 - Postural assessment: symmetry, spinal curvature, weightbearing, alignment
 - Check for deformity, edema, erythema
- Range of motion/flexibility
 - Limb motion
 - Segmental motion
- Palpation

Functional examination

- Posture and comfort during exam and interview
- Time on and off exam table
- Time in and out of chair
- Sitting and standing tolerance
- Pain response: appropriate, lacking, magnified?

Electrodiagnostic studies (electromyography, nerve conduction studies) are valuable diagnostic tools where neural or muscular pathology is suspected. They have excellent sensitivity and specificity for diagnosing nerve entrapments, including radiculopathy, peripheral neuropathy, myopathies of various types and neuromuscular junction disorders. Some centers perform small-fiber quantitative sensory testing (QST), a new technique which is proving useful in the assessment of sensory nervous function¹¹.

Plain radiographs of the lumbar spine revealed Grade I degenerative anterolisthesis of L5 on S1 with associated facet sclerosis at that level. No spondylolysis was appreciated on oblique views. MRI of the lumbar spine also demonstrated L5-S1 spondylolisthesis, no spondylolysis, and L5-S1 facet arthropathy, left greater than right. There were mild degenerative changes of the L5S1 disc, including some height loss and desiccation. The remainder of the study was unremarkable.

These studies increase the suspicion that mechanical dysfunction at the L5-S1 facets may be contributing to L.C.'s lumbar pain syndrome, while also confirming the absence of nerve root compromise.

TREATMENT PLANNING

Clear communication between team members is one of the greatest strengths of pain rehabilitation and is

Table 3. Sample treatment plan for pain rehabilitation

Treatment Plan
Patient: L.C. MR Number: 1234567 Date: 05/01/2001 Referred by: Primary Doc, MD
Diagnostic Impression: 1. Chronic pain syndrome 2. Grade II spondylolisthesis L5-S1 with facet disease and mechanical low back pain 3. Myofascial low back pain 4. Postural abnormalities with painful left lower limb contractures 5. Major depression, single episode, moderate 6. Tobacco abuse 7. Regular caffeine use
Goal: Increase Functional Activity 1. Supervised physical therapy, including stretching, strengthening and endurance exercises, 3x/week for 4-6 weeks, then 1x/week for remainder of program 2. Meet with psychologist for development of pain coping strategies/skills, 2x/week for 4 weeks, then 1x/week for remainder of program
Goal: Reduce Pain by 25% or more 1. Medication trial with NSAIDs. Muscle relaxants or opioids as "rescue" medication. 2. Consider bilateral L5-S1 medial branch blocks/RF denervations for further pain reduction if necessary.
Goal: Diminish Psychological/Social Disruption 1. Meet with psychologist for cognitive therapy of depression, as above 2. Trial of tricyclic antidepressant to reduce depression, reduce pain, facilitate sleep 3. Family therapy every 2 weeks 4. Smoking cessation counseling
Goal: Return to Work 1. Consultation with Vocational Rehabilitation specialist
Planned Treatment Duration: 3 months
Case Conferences: monthly

critical to its success. After the interview and examination are complete, most programs hold a team conference where the various team members report, compare their impressions of the patient, and formulate a treatment plan. This may include a detailed diagnostic impression, specific treatment goals, and details of the treatment schedule. A sample treatment plan is presented in Table 3. When the team presents the treatment plan, the patient should have the opportunity to comment and ask questions. If both parties agree to treatment as planned, the patient enters the rehabilitation program.

TREATMENT

Functional restoration, pain reduction and enhancement of coping skills are accomplished through a

combination of physical, pharmacological and psychological methods. This multimodal approach ensures effective treatment of all aspects of the chronic pain syndrome. Regular case conferences are recommended to discuss each patient and assess progress toward the goals outlined in the treatment plan.

In physical and occupational therapy, skilled therapists approach the patient from a kinesiological and functional perspective. Exercise is the most common treatment method and is thought to be the most important for long-term maintenance of function. Patients with longstanding pain learn exercises to restore flexibility to contracted muscles and joints, to strengthen key support muscles, and to improve posture and postural awareness. Patients learn safe techniques for working, lifting and bending to reduce the risk of additional injury. Patients with particular functional deficits (e.g. gait problems) receive specific training and, if necessary, assistive devices to augment function. Ergonomics in home and workplace are reviewed and corrective suggestions are made. A home exercise program is carefully designed and the patient is encouraged to continue it independently.

Different exercise programs are indicated for patients with different pain conditions. Dynamic lumbar stabilization exercises, which strengthen the supporting musculature of the lumbar spine and improve limb flexibility, are helpful for a large number of patients with low back pain, including those with herniated discs and/or radiculopathies.¹² Warm-water aquatic exercise is helpful for arthritic patients and those with other chronic musculoskeletal conditions including back pain.¹³ Many pain patients benefit from regular light-level aerobic exercise; in patients with fibromyalgia syndrome, this is the mainstay of treatment.¹⁴

Thermal treatment modalities can be beneficial in a number of musculoskeletal disorders. Superficial heat improves local circulation to the warmed area and may promote mobilization and elimination of accumulated metabolic byproducts. Deep heat modalities, such as ultrasound, will warm deeper tissues and can be used in combination with stretching to improve tissue elasticity in conditions such as frozen shoulder.¹⁵ Deep heat cannot be safely applied over certain types of implants, such as pacemakers and some synthetic joints, because of the risk of hardware heating. Heat modalities should not be employed in patients with active inflammatory conditions because they can worsen edema and facilitate the inflammatory response. Cooling modalities, such as ice, retard local blood flow, alter nerve conduction and can induce brief local analgesia. They can be

safely used in inflammatory conditions and also are helpful for chronic muscle pain. No thermal modalities of any type should be used over insensate or hyposensate skin.¹⁵

While thermal modalities are valuable adjuncts to treatment, their effects are usually transient. They are best used to facilitate the patient's participation in exercise and other aspects of treatment. Lengthy courses of repeated thermal modalities without associated exercise are expensive and rarely produce any sustained improvement in patients with chronic pain.

With electrical stimulation, different stimulus waveforms, frequencies and intensities are used for varying effect. Transcutaneous electrical nerve stimulation (TENS) transmits a safe, low-level current which attenuates pain, apparently by producing sensations that interfere with pain perception.¹⁶ TENS units are portable and can provide useful local relief for both neuropathic and musculoskeletal pain conditions. For patients with weakness due to severe deconditioning or neural injury, functional electrical stimulation (FES) can be used to assist with muscle retraining by facilitating the patient's ability to activate weakened muscles.¹⁶ Like thermal modalities, electrical stimulation should be used as part of an overall treatment plan. Its use without a clear indication is discouraged.

Manual therapy techniques focus on the correction of biomechanical deficits using a combination of manipulation and exercise. Myotherapy and myofascial release are massage techniques focusing on myofascial "trigger points" and muscle spasm. These techniques have not been well studied scientifically but are of real benefit to some patients, though they do not replace an effective exercise program.

Behavioral/psychological therapy helps patients learn new methods to cope with pain and to manage the emotional issues that accompany it. Patients may require individual psychotherapy to treat depression, anxiety or other affective problems. Stress management and relaxation training, biofeedback and meditation training can reduce pain and augment coping skills. Brief marital and/or family therapy are often employed to help patients and their loved ones deal with the emotional consequences of persistent pain. While some pain centers are equipped to treat patients with active substance-abuse disorders, the physical and emotional issues surrounding substance abuse often interfere with the course of pain rehabilitation. Patients should undergo specific treatment for these problems before entering a pain rehabilitation program.

Vocational rehabilitation specialists facilitate the

patient's return to work. They assess the patient's aptitudes and skills, analyze job requirements, and help the patient and employer to identify workable solutions. Job-site modification or training for new job skills may be required.

ADJUNCTS TO REHABILITATION

Medications are judiciously used to relieve pain and reduce comorbid problems such as depression and sleep dysfunction. Effective palliation of pain makes patients more able to participate in physical exercise and other aspects of the rehabilitation program. Choice of medications is carefully tailored to the situation and needs of the individual patient.

Nonsteroidal anti-inflammatory agents remain a mainstay of chronic pain treatment. Tricyclic antidepressants are effective modulators of pain while simultaneously improving sleep hygiene and treating depression.¹⁷ Another class of antidepressants, selective serotonin reuptake inhibitors (SSRIs), have been disappointing thus far as analgesic agents but are valuable for their combined antidepressant and anxiolytic effects. "Muscle relaxers," a heterogeneous class of agents which may reduce muscle pain and tension, are useful as short-term or "rescue" agents but generally are not recommended for chronic use. Examples include carisoprodol, metaxalone and cyclobenzaprine.

Antiepileptic drugs are increasingly used as effective therapy for neuropathic pain, with gabapentin one of the better-studied and better-tolerated agents.¹⁸ Antispasmodic agents, such as baclofen¹⁹ and tizanidine,²⁰ may have some therapeutic activity in neuropathic pain and are being studied in clinical trials. Topical lidocaine is a new preparation which is well-studied in postherpetic neuralgia²¹ but can also be helpful in other types of neuropathic pain.

Opioid (narcotic) agents are among the most potent analgesics known. Because of their well-known addictive properties, the use of opioids in chronic pain treatment remains controversial.²² In pain rehabilitation settings, these drugs are most appropriately used as "rescue agents" for severe pain flares. Longer-term use is often avoided during the rehabilitation program, but may be undertaken in select cases if the drugs clearly relieve pain, improve function and do not cause cognitive or emotional impairment.²³ For patients receiving opioids or other controlled substances, clear behavioral guidelines governing medication use should be defined. Many practices use formal written guidelines signed by the physician and patient.²⁴

Injection procedures are being increasingly uti-

lized for patients with focal neuropathic, articular or musculotendinous pain. When carefully performed, therapeutic injections may help to facilitate participation in the rehab program. Lumbar epidural steroid injections are effective for low back and lower limb pain in selected patients.²⁵ Percutaneous radiofrequency neurotomy can be helpful for cervical²⁶ and lumbar facet joint pain, though results are generally temporary. Myofascial trigger-point injections can reduce both local and referred pain in patients with clearly defined myofascial pain syndrome.²⁷ A wide variety of other procedures is available.

Where no surgical emergency exists, surgical procedures such as spinal fusions, dorsal-column stimulators and intrathecal infusion should be entertained only in carefully selected patients who have not achieved benefit from a comprehensive rehabilitation program, appropriately prescribed medications, injections or other treatment modalities.

Alternative medical treatments are heavily used in this country but are not well studied or regulated. The NIH consensus statement on acupuncture suggests that it may be of value in some chronic pain syndromes, but the published evidence for its efficacy remains weak. In our experience, acupuncture alone is rarely effective in patients with chronic pain syndrome, though it may have somewhat greater efficacy as a component of a broader treatment program. Herbal supplements can have significant, and often poorly characterized, pharmacologic activity. All patients should be carefully interviewed regarding supplement use before enrollment in a pain rehabilitation program. At present, no herbal supplement is specifically recommended for use in patients with chronic pain.

L.C. was enrolled in the pain rehabilitation program. He was started on regular doses of a nonsteroidal and a tricyclic antidepressant. He began a regular exercise training program supervised by the physical therapist, starting with a lumbar stabilization program. Once able to maintain proper spinal mechanics, he embarked upon a stretching program for the hamstrings, hip flexors, lumbar paraspinals and piriformis muscles. He worked with the occupational therapist on improving his biomechanics during home activities, and he entered psychotherapy and relaxation training.

L.C.'s low back pain proved too severe for him to reach the desired levels of exercise intensity. He was evaluated by the program's interventional specialist and underwent bilateral L5-S1 facet blocks with partial relief of back pain. Shortly thereafter he underwent radiofrequency facet denervation at L5-S1

bilaterally with good relief. He then re-entered the full rehabilitation program. Exercise was ramped up to include a light aerobic program. With the psychologist, he worked on advance stress-management techniques. He worked with the occupational and vocational therapists on modifying his work habits and posture during simulated work activities and was referred for job placement.

MONITORING TREATMENT

Patients should visit regularly with the physician, nurses and other providers during the treatment period. Pain scales and standardized questionnaires may be periodically readministered to assess changes in pain, function and emotional status. Regular case conferences are helpful to monitor progress through the treatment plan and adjust treatment as necessary.

In some programs, the patient is invited to the conference to learn the team's impressions and ask questions. Pain rehabilitation asks a great deal of the patient, and clear communication between team members and the patient is crucial.

Patients are discharged when treatment goals are met. Earlier discharge from the program may occur in cases where prescribed treatment is ineffective or poorly tolerated, or where adherence to the treatment program is poor despite reasonable efforts to encourage participation.

L.C. reported reduced pain, improved mobility, improved affect, and better quality of life as he proceeded through the program. Objective findings revealed decreased muscle tenderness, improved posture and improved spinal and limb flexibility. Psychometric indices suggested improved mood and problem-solving skills. L.C. was discharged from the program 6 weeks after entry, with follow-up visits arranged, after communication between the rehabilitation team, the patient and his family, and the primary physician.

FOLLOW-UP

Patients are followed-up at set intervals after discharge from the program. A typical schedule might be at 3, 6 and 12 months after discharge. These visits encourage continued adherence to the program's principles and allow longer-term assessment of the magnitude and stability of treatment outcomes.

At 6 months after discharge, L.C. had returned to work, with modifications to his schedule to allow rest breaks when needed and frequent position changes. His pain remained but was significantly less than at admission. Improvements in mood and physical function were unchanged from the time of discharge.

CONCLUSION

Chronic pain rehabilitation unites varied treatment modalities into a coherent whole to reduce pain, restore function and improve quality of life. The exact combination of treatments may differ among pain centers, but the emphasis remains the same: patients are enlisted as active participants in their care and are empowered to increase physical activity, cope better with pain and stress, and resume productive social roles.

The existing literature supports the pain rehabilitation model, but further studies are sorely needed. Most studies of interdisciplinary pain treatment focus on low back pain, which is only a portion of the overall chronic-pain population. Recently published clinical guidelines for chronic pain management^{28,29} herald an encouraging trend; evidence-based standardization of pain treatment practice should foster multicenter collaboration and yield further research.

Pain rehabilitation is resource-intensive and expensive. Third-party payors are not always willing to pay for full-spectrum rehabilitative programs.³⁰ Studies suggest that pain rehabilitation is less expensive to insurers and to society than surgery or long-term disability compensation,⁹ but definitive research is still required. Necessary studies include rigorous comparisons of full pain rehabilitation with single-discipline treatment, outcome studies following patients over a number of years, and comparisons of rehabilitation and surgical treatments.

Pain rehabilitation successfully treats patients with complex chronic pain conditions by improving physical function and fostering positive behavioral change. For pain patients who do not require urgent surgical or medical treatment, pain rehabilitation can make a world of difference. Its use should increase as patients, providers and payors demand more and higher quality pain treatment services.

REFERENCES

- American Academy of Pain Medicine. *FAQs about pain.*: American Academy of Pain Medicine; 2000.
- Marcus DA. Treatment of nonmalignant chronic pain. *Am Fam Physician* 2000;61(5):1331-8, 45-6.
- Gureje O, Von Korff M, Simon GE, Gater R. Persistent pain and well-being: a World Health Organization Study in Primary Care. *Jama* 1998;280(2):147-51.
- Addison RG. Chronic pain syndrome. *American Journal of Medicine* 1984;77(3A):54-8.
- Rusk HA. The growth and development of rehabilitation medicine. *Arch Phys Med Rehabil* 1969;50(8):463-6.
- Loeser JD, John J, Bonica 1917-1994. Emma B. Bonica 1915-1994. *Pain* 1994;59(1):1-3.
- Flor H, Fydrich T, Turk DC. Efficacy of multidisciplinary pain treatment centers; a meta-analytic review. *Pain* 1992;49(2):221-30.
- Aronoff GM, Evans WO, Evers PL. A review of follow-up studies of multidisciplinary pain units. *Pain* 1983;16(1):1-11.
- Turk DC. Efficacy of multidisciplinary pain centers in the treatment of chronic pain. In: Cohen NM, Campbell, J., editor. *Pain treatment centers at a crossroads: practical and conceptual reappraisal.* Seattle, WA: IASP Press; 1996. p. 257-73.
- Mayer T, McMahon MJ, Gatchel RJ, Sparks B, Wright A, Pegues P. Socioeconomic outcomes of combined spine surgery and functional restoration in workers' compensation spinal disorders with matched controls. *Spine* 1998;23(5):598-605.
- Nygaard OP, Kloster R, Mellgren SI. Recovery of sensory nerve fibers after surgical decompression in lumbar radiculopathy: use of Quantitative Sensory Testing (QST) in the exploration of different populations of nerve fibers. *J Neurol Neurosurg Psychiatry* 1998;64(1):120-3.
- Saal J. Dynamic muscular stabilization in the nonoperative treatment of lumbar pain syndromes. *Orthopaedic Review* 1990;19(8):691-700.
- Cole AJ, Eagleston RE, Moschetti M, Sinnett E. Aquatic rehabilitation of the spine. *Rehab Manag* 1996;9(3):55-60, 62.
- Bailey A, Starr L, Alderson M, Moreland J. A comparative evaluation of a fibromyalgia rehabilitation program. *Arthritis Care Res* 1999;12(5):336-40.
- Lehmann JF, de Lateur BJ. Diathermy and superficial heat, laser, and cold therapy. In: Kottke FJ, Lehmann JF, editors. *Krusen's Handbook Of Physical Medicine And Rehabilitation.* 4th ed. Philadelphia, PA: W.B. Saunders; 1990. p. 283-367.
- Basford JR. Physical Agents. In: Delisa JA, editor. *Rehabilitation Medicine: Principles and Practice.* 2nd ed. Philadelphia, PA: J. B. Lippincott; 1993. p. 404-24.
- Goldenberg D, Felson D, Dinerman H. A randomized controlled trial of amitriptyline and naproxen in the treatment of patients with fibromyalgia. *Arth Rheum* 1986;29:1371-7.
- Backonja M, Beydoun A, Edwards KR, Schwartz SL, Fonseca V, Hes M, LaMoreaux L, Garofalo E. Gabapentin for the symptomatic treatment of painful neuropathy in patients with diabetes mellitus: a randomized controlled trial. *JAMA* 1998;280(21):1831-6.
- Fromm GH. Baclofen as an adjuvant analgesic. *J Pain Symptom Manage* 1994;9(8):500-9.
- Murros K, Kataja M, Hedman C, Havanka H, Sako E, Farkkila M, Peltola J, Keranen T. Modified-release formulation of tizanidine in chronic tension-type headache. *Headache* 2000;40(8):633-7.
- Galer BS, Rowbotham MC, Perander J, Friedman E. Topical lidocaine patch relieves postherpetic neuralgia more effectively than a vehicle topical patch: results of an enriched enrollment study. *Pain* 1999;80(3):533-8.
- Harden RN, Bruehl S., Backonja M. Point/Counterpoint: The use of opioids in treatment of chronic pain: an examination of the ongoing controversy. *J Back Musculoskel Rehab* 1997;9:155-80.
- Sanders SH, Rucker KS, Anderson KO, Harden RN, Jackson KW, Vicente PJ, Gallagher RM. Clinical practice guidelines for chronic non-malignant pain syndrome patients. *J Back Musculoskel Rehab* 1995;5:115-20.
- University of Wisconsin Pain Treatment and Research Center. *Agreement for treatment with controlled substance medications.* Madison, WI USA: University of Wisconsin; 2001.
- Cannon DT, Aprill CN. Lumbosacral epidural steroid injections. *Arch Phys Med Rehabil* 2000;81(Suppl):S87-S98.

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26. Lord SM, Barnsley L, Wallis BJ, McDonald GJ, Bogduk N. Percutaneous radio-frequency neurotomy for chronic cervical zygapophyseal joint pain. *NEJM* 1996;335(23):1721-6.
27. Simons DG. Myofascial pain syndromes: where are we? Where are we going? *Arch Phys Med Rehabil* 1988;69(3 Pt 1):207-12.
28. Sanders SH, Harden RN, Benson SE, Vicente PJ. Clinical practice guidelines for chronic non-malignant pain syndrome patients II: an evidence-based approach. *J Back Musculoskel Rehab* 1999;13:47-58.
29. ASA (Task Force on Pain Management). Practice guidelines for chronic pain management. *Anesthesiology* 1997;86:995-1004.
30. Sanders SH. Chronic pain rehabilitation: should and can it be saved? *APS Bulletin* 2001;11(2):5,9,14,17.



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