

## Chapter 2

# Multidisciplinary Pain Management in the Rehabilitation Patient

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### Introduction

One-third of Americans, or 100 million people, suffer from chronic pain [1]. Pain affects their ability to work, engage in daily activities, and to enjoy their lives. Many of these patients get relief from conservative treatment modalities including rest, physical therapy, chiropractic care, emotional therapy, or non-opioid medications (e.g., non-steroidal anti-inflammatory drugs [NSAIDs], membrane stabilizers). Some patients do not get adequate pain relief from conservative care and may require interventional procedures (e.g., epidural steroid injections, radiofrequency ablations), opioid medications, or even surgery. Patients who do not obtain relief from these treatments may benefit from implantable devices (e.g., spinal cord stimulators, intrathecal treatments) or regenerative treatments. A growing number of medical practices provide many or all of these modalities to patients. There is evidence that this comprehensive, multidisciplinary approach to treating chronic pain is advantageous in terms of patient outcomes and costs.

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**Table 2.1** Possible treatment modalities within a multidisciplinary approach to rehabilitating chronic pain

Type of treatment	Examples
Physical modalities	Physical therapy, chiropractic care, acupuncture, electroacupuncture
Emotional therapy	Biofeedback, group therapy, cognitive-behavioral therapy
Non-opioid medications	NSAIDs, membrane stabilizers, muscle relaxants
Opioid medications	Opioids, atypical opioids
Interventional procedures	Epidural steroid injections, nerve blocks, radiofrequency ablations
Implanted device therapies	Spinal cord stimulation, peripheral nerve stimulation, intrathecal pump
Regenerative therapies	Platelet-rich plasma therapy, stem cell therapies

## Multidisciplinary Approach Results

The multidisciplinary approach is intended to address the individual differences in patient responses to pain treatment modalities (see Table 2.1 for a list of multidisciplinary treatment modalities). Research investigating multidisciplinary approaches to pain management, such as the “bio-psycho-social” model, have shown significant results in improving pain symptoms and functionality in patients as compared to traditional models [2]. Comprehensive pain programs that include physicians, physical therapists, CAM providers, and psychologists have consistently been found to be both efficacious and cost-effective in treating chronic pain [3]. A study that evaluated patients who were randomized to receive either a standard exercise program (control group) or a comprehensive pain program found that the comprehensive care group demonstrated long-term efficacy in terms of pain reduction and decreased disability [4].

In addition to the efficacy of multidisciplinary treatment programs, there is evidence that these approaches may reduce health care costs. A study by Blue Cross Blue Shield of Tennessee followed 85,000 patients and found that patients entering healthcare through a doctor of chiropractic (DC) cost 20% less than patients entering care with a medical doctor (MD or DO), even after patient risk adjustments [5]. Early access to conservative care in chiropractic settings provides many patients with adequate relief, without the need to progress to potentially more expensive treatments.

Multidisciplinary practices can similarly offer conservative care for patients who can potentially benefit from these treatments. Another study compared patients receiving spine surgery and patients receiving care from a comprehensive model, which included treatment from physicians, physiotherapists, and clinical psychologists [6]. While there was no significant difference in treatment effectiveness between the two groups, there was a significant difference in cost-effectiveness. At 2-year follow-up, the average cost of a patient who saw a surgeon was \$14,400 compared to \$8323 for patients receiving comprehensive pain treatment. Most

studies of multidisciplinary treatment of chronic pain have examined back pain. A meta-analytic review of 65 studies found that multidisciplinary treatment of back pain is superior to single discipline treatments such as medical treatment or physical therapy [7]. Not only did multidisciplinary care provide greater pain relief, but also improved mood, decreased interference with activities of daily living, and greater likelihood of returning to work than single discipline treatments. The benefits of multidisciplinary care were also more stable over time.

Other studies have extended these findings to other pain indications. For example, a randomized controlled trial assigning patients with knee osteoarthritis to either standard care or multidisciplinary care found that multidisciplinary care resulted in better outcomes for pain and functioning [8]. A study of fibromyalgia patients found that multidisciplinary treatment based on a cognitive-behavioral model enabled patients to decrease their use of opioids, NSAIDs, benzodiazepines, and muscle relaxants [9]. A multidisciplinary treatment program including physical and occupational therapy, group psychotherapy, stellate ganglion blocks, and drug therapy has demonstrated efficacy in treating patients with complex regional pain syndrome [10].

## Physical Modality

The physical modality of pain treatments include a number of conservative care options, including a supervised targeted exercise plan, physical therapy, chiropractic care, acupuncture, massage, and others. Studies have shown that chiropractic manipulation, in conjunction with exercise, not only facilitates and improves recovery, but also minimize recurrence of symptomatic pain [11]. A 2004 study randomly assigned 1334 patients to receive spinal manipulation, exercise, both spinal manipulation and exercise, or best care from general practice [12]. Those assigned to complete spinal manipulation, exercise, or both experienced greater pain relief and reduced disability as compared to those who received only best care in a general practice setting at 3 and 12 months.

Physical therapy has been shown to improve function and to reduce pain for patients with chronic low back pain [13]. The most effective programs involve individualized regimens performed with supervision and include stretching and strengthening exercises. Given that benefits generally outweigh any risks, strong consideration should be given to physical therapy as an effective treatment modality for chronic pain.

Acupuncture involves the precise insertion of needles at specific points on the body with the intention to facilitate healing. Although this practice has its origins in traditional Eastern medicine, contemporary medical providers use this therapy with a sound physiological understanding. Research suggests that chemical changes in the brain occur as the result of acupuncture. These changes include increases of endomorphin-1, beta endorphin, enkephalin, serotonin, and dopamine, all of which

can act to induce analgesia. In addition, because of these effects, acupuncture can be used to treat gastrointestinal problems and psychological illnesses [14].

A large number of randomized controlled trials have provided evidence that acupuncture is a valuable option in the effective treatment of chronic pain [15]. Furthermore, trials have demonstrated significant differences between true and sham acupuncture procedures, which suggests that the efficacy of acupuncture is more than a placebo effect. One study evaluated several outcomes in treating chronic low back pain with acupuncture [16]. Several thousand patients underwent treatment and were evaluated after 6 months on measures of pain intensity, pain frequency, functional ability, depression, and quality of life. Results included a significant improvement of functional ability (45.5%), decreased days per month with pain, and a 30% decrease in work absences for employed patients.

Electroacupuncture (EA) is a form of acupuncture that involves using the needles as electrodes for passing electric current. Although less common than manual acupuncture, electroacupuncture has grown in popularity since its inception roughly 50 years ago [17]. One study investigating the differences in brain activity resulting from manual acupuncture and EA found that EA produced more widespread fMRI signal increase than manual acupuncture. Furthermore, all acupuncture treatments produced more widespread responses than the placebo-like tactile control [17].

It is important to note that patient expectations can have an impact on the results of acupuncture. One study evaluated patients' attitudes towards acupuncture and expectations regarding the outcomes prior to receiving treatment [18]. The results suggested that patients with high expectations about acupuncture were about twice as likely to have good treatment outcomes compared to those with lower expectations. Results like these underscore the importance of attitudes and psychological disposition in the treatment of pain.

## **Emotional Therapy**

The subjective experience of pain involves more than organic pathology. Psychological dispositions can influence the perception of pain, and the experience of pain itself can have a lasting effect on one's psychology. For example, patients suffering low back pain who also have major depression tend to exhibit lower success rates with many treatments, including spinal cord stimulator implantation and spinal surgery, than non-depressed patients [19]. Many pain treatments and procedures focus only on the organic factors of pain and do not address the cognitive and emotional elements. Therefore, a multidisciplinary model for the treatment of pain ought to include the option of treatments for the psychological components of pain.

Biofeedback provides one way of understanding and dealing with the physical effects of stress that result from chronic pain. This treatment strengthens the patient's ability to recognize the signs of stress arousal (e.g., shallow breath, muscle tension) and utilizes relaxation techniques to mitigate the effects of the stress [20]. Research indicates that biofeedback is effective in treating many different types of pain,

including chronic low back pain [21]. This treatment is most effective when used as one component of an interdisciplinary approach to pain management.

Group therapy is another important component in the treatment of chronic pain. By receiving therapy in a group setting, patients have support that can minimize the feelings of isolation that are commonly associated with sufferers of chronic pain. Research suggests that cognitive therapy that involves identifying and changing negative thoughts reduces self-reported pain in low back pain patients [22].

## **Medication Management**

Several classes of drugs can be appropriate for treating chronic pain conditions. Non-steroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen, can provide effective pain relief for several pain conditions including osteoarthritis and rheumatoid arthritis [23, 24]. Neuropathic pain can often be treated successfully with antidepressant and anticonvulsant medications [25, 26]. Opioids can be effective for treating chronic pain, with previous studies finding that opioids produce an average of 28% pain relief, compared to 7% pain relief for placebo [27]. Because opioid medications present substantial risks of addiction and overdose, careful consideration should be taken in their use [28]. This includes the selection of appropriate patients, ongoing monitoring through urine drug testing (UDT), pharmacy board report reviews, and the prescription of low to moderate doses. When used appropriately, opioids can be part of an effective treatment plan for chronic pain. Atypical opioids, such as tramadol, may provide effective pain relief with significantly less risk of abuse [29].

## **Interventional Procedures**

Patients who have not responded to conservative pain management modalities, such as those described above, may be appropriate candidates for interventional procedures. For example, epidural steroid injections (ESIs) are a widely used procedure for the treatment of chronic radiating pain. Because epidural steroid injections are used at different regions and different injection routes, and for varying patient pathology, the efficacy can be difficult to determine. However, there is general consensus among specialists that in well-selected patients, ESIs provide at least short- to moderate-term relief [30]. Also, ESIs have been shown to have a better risk-benefit ratio and be more cost-effective than other treatments such as spine surgery.

Research suggests that radiofrequency ablation (RFA) of targeted nerves, either in the spine or peripherally, can produce significant pain relief. For example, RFA of the lumbar medial branch nerves has moderate to strong evidence for pain relief [28]. In one study, lumbar medial branch nerve RFA produced a 46% reduction in mean pain and a 47% reduction in greatest pain, compared to an 8% reduction in

mean pain and 13% reduction in greatest pain for sham RFA [31]. Two-thirds of those treated with RFA experienced at least 50% reductions in pain at 8 weeks after treatment (compared to 38% of patients experiencing such relief after sham RFA).

Some chronic pain patients may be appropriate candidates for implanted devices to manage their pain. In particular, spinal cord stimulators can provide safe, effective relief of chronic pain [32]. For example, in a study evaluating the efficacy of spinal cord stimulation for treating patients with failed back surgery syndrome, patients were randomly assigned to either receive SCS or re-operation [33]. After 3 years, 47% of SCS patients received at least 50% pain relief compared to 12% of re-operation patients.

## Regenerative Treatments

Many types of pain conditions, including osteoarthritis and degenerative disc disease, result from body tissues breaking down faster than the body can replace them. For these conditions, treatments with injection of biologics may have the potential to enhance the regenerative processes at the targeted area. These treatments can potentially alleviate pain, regrow damaged tissues, and/or inhibit further deterioration. For example, platelet-rich plasma (PRP) therapy is a technique to aid healing and regeneration. It begins with a small amount of blood being drawn from the patient receiving the treatment. The patient's blood is placed in a centrifuge that spins the blood, separating it into different layers. The top layer contains only plasma; red blood cells concentrate in the bottom layer. The middle layer contains a high concentration of platelets and growth factors. By concentrating these materials and injecting them at the injured site, the hope is that healing and regeneration will occur more effectively.

Early research supports this regenerative effect. A study of 91 patients receiving series of PRP injections in the knee for degenerative cartilage lesions and osteoarthritis found that PRP injections reduced pain, improved knee function, and quality of life for at least 12 months after injection [34].

Several types of tissues, found in the patient or a healthy donor, can potentially enhance regeneration through the presence of stem cells. Stem cells can be found in amniotic tissues, bone marrow, or adipose tissue. Amniotic tissues can be harvested from donors during a caesarian birth for use in the treatment of chronic pain. This tissue contains collagen, growth factors, and stem cells that are thought to induce healing. One study found injection of this fluid to accelerate healing of wounds in rats [35]. Other sources of stem cell therapies include bone marrow and adipose (fat) tissue. A study of culture expanded, bone marrow-derived stem cells found that injection of these stem cells into patients with osteoarthritic knee joints led to greater regrowth of cartilage compared to osteoarthritic joints not treated with stem cells [36]. Ongoing research is examining the potential for injections of bone marrow-derived mesenchymal stem cells (MSCs) to alleviate degenerative disc disease [37]. In an interim analyses of this randomized, placebo-controlled trial of 100

patients receiving MSC injections (high or low dose) or control injections (saline or hyaluronic acid) into degenerative discs in the lumbar spine found significantly reduced low back pain and improved function at 12-month follow-up among those treated with MSCs.

## Conclusion

It has been said that when the only tool you have is a hammer, every problem looks like a nail. Patients with chronic pain conditions vary in their responsiveness to different treatments. Some patients respond well to conservative treatments. Treating these patients with invasive procedures or high risk medication can create unnecessary costs for the patient and health care system as well as increased risk of adverse side effects. For patients who do not respond to conservative treatments, there are a variety of appropriate treatments that can provide pain relief. A multidisciplinary treatment paradigm involves a comprehensive approach that includes physical modalities, emotional therapies, medication management, interventional procedures, regenerative therapies, complementary and alternative options, and surgery only when needed. The availability of all of these treatment modalities gives patients the greatest chance of pain relief to improve their functioning and quality of life.

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