

- CHAPTER ONE –

You're In Pain

So you're in pain. Why else would you read this book? Yes, maybe it's to educate yourself about a friend's or family member's pain. But even so, you have experienced pain. We all have. What was the last time? Maybe you stubbed your toe on the kitchen table. Maybe you strained your back trying to lift a heavy object. Maybe you burned your hand spilling hot coffee. While pain often resolves itself, sometimes it doesn't. Sometimes it's stubborn. Sometime it appears there will never be relief.

When pain cannot be relieved, it changes your life. We hear it from patients all the time: *"I can no longer do the activities I enjoy"*, *"I'm constantly in fear of triggering my pain"*, *"I no longer feel like the person I was before my pain"*. Right now, its possible your pain is so severe that sitting and reading this book is difficult. If so, you probably don't care about where your pain derives from, what type of pain you're experiencing or why it's there. Maybe you don't even care about the treatment methods. Don't worry, we understand.

Physical pain is more than just an uncomfortable sensation. It can affect you mentally and socially. It can disrupt your relationships, sleep, mood and productivity. It can even change your character. A former "go-getter" at the office may experience a decrease in drive because she's experiencing pain-related sleep disturbance. Consequently, her ability to fulfill her role in the workplace as an employee or team member is diminished. Or, a parent may no longer be able to play with their children because of the pain limiting their movement. Failure to fulfill this aspect of parenting then leads to frustration and sadness.

If you can relate to these examples, don't worry you're not alone. Everyone is at risk to develop persisting pain. In fact, approximately 100 million US adults live in pain.ⁱ Of those suffering in pain, it is estimated that 25% suffer from severe or chronic pain while 10% suffer from severe disabling pain.ⁱⁱ Because pain is so common and relief is of utmost importance for those suffering, pain relief has grown into a major industry. Think about the last time you watched television or flipped through a magazine. Consider how frequently you found yourself looking at an advertisement for some pain "solution". It may have been a commercial for a topical cream or lotion, a heating/cooling patch or an over-the-counter medication (ibuprofen, acetaminophen, etc.). There are an abundance of pain remedies on the market but millions of patients still find themselves helpless and without relief.

In an attempt to successfully serve an undertreated population, pain medicine has grown to become an important medical specialty. Pain medicine views pain in a unique manner compared to other medical fields. We believe pain is a chronic disease unto itself – not always a symptom of some other problem. Instead of solely focusing on uncovering and targeting the underlying cause of your pain, such as an orthopedic surgeon correcting a broken bone, we target pain using multimodal therapy. We create a treatment plan that uses one or more treatment modalities to help you regain your physical, psychological and social wellness and function.

Our goal in writing this book is to provide you with the information required for taking the first step towards becoming pain-free or at least learning to live better with the pain you have. We acknowledge that your decision to read a book on pain management is less of a choice and more of a necessity. There is a strong chance you have exhausted other treatment options. This is common. We are here to help you through the process of treating and managing your pain. The content of this book is not full of medical jargon and it does not require an understanding of science. Instead, it presents medically based information in an easily comprehensible format. It will arm you with the tools for making the appropriate decision for conquering your pain. The quicker and more efficiently this is achieved, the sooner (and cheaper) your pain will be relieved.

Lastly, pain treatment is most effective when a patient and their physician work together. This is because your pain is *your* pain. Pain is a subjective sensation that no one else can feel. There are no true objective tests to diagnose pain, as there are X-rays, CAT scans, and MRIs for diagnosing other conditions. In many cases, your doctor may order these studies or even perform diagnostic injections to try to identify the pain generator. There can be any number of causes for different types of pain. Your pain can present itself in a variety of ways- each requiring a different combination of treatments with varying outcomes. With this in mind, it makes sense that every patient should be treated as unique. The patient and physician must communicate effectively and work together to determine a treatment that works best. So without further ado, let's begin.

- CHAPTER TWO –

What is Pain?

Bad vs. Good Pain, Acute vs. Chronic Pain

Pain is an unpleasant sensory and/or emotional experience associated with actual or potential tissue damage. It's always unpleasant, subjective and sensed within the body.ⁱⁱⁱ No one can feel or see *your* pain.

But believe it or not, pain is actually good. Good pain is an adaptive trait that acts as a warning. If you place your hand on a hot stovetop, pain becomes the motivating force for removing your hand. A message is sent from pain receptors in your hand to your spinal cord and brain via the nervous system where it is interpreted. Once your body recognizes actual or potential injury, your reaction is to remove your hand, preventing further damage. When abnormalities occur during this process and pain cannot be relieved, it becomes bad or pathologic pain.

Bad pain is often characterized by hypersensitivity or an over responsiveness to something that shouldn't be painful. For example, lightly bumping into someone in the hallway at work should not result in an intense, unpleasant sensation. This would be an indication that there is a problem in the sensation, transmission or interpretation of pain (the process of pain traveling from the afflicted body part to being understood by the mind). In order to prevent bad pain from worsening, medical intervention is most likely necessary.

In addition to being described as good or bad, pain is categorized as acute or chronic. Acute pain is a sudden onset of pain that lasts for a short period of time. Typically, acute pain can be linked to specific causes or events (such as the burn from the stovetop). It can also be linked to illness, injury and disease. In some cases, acute pain can come and go in waves such as the pain associated with contractions for a woman in labor. Often, when a patient receives proper counseling and treatment, acute pain can be managed. It is commonly managed with rest, over the counter medication, short course analgesics or a medical procedure.

Without treatment, acute pain can progress to chronic pain. Chronic pain is pain that lasts for more than 3 months. If the resulting burn from the stovetop is left unattended, lasting tissue damage can develop. Pain from the damaged tissue can progress in severity and will become

more difficult to manage than it would have been if it had been treated right away, when it was acute pain. Other causes of chronic pain include inflammation that increase the sensitivity of pain receptors, diseases that affect the nervous system, and lasting tissue damage from surgery. For some conditions, such as migraine headaches, fibromyalgia and irritable bowel syndrome the causes may be less discrete, but the resulting chronic pain is persistent and real.

The Three Components of Pain: Physical, Psychological and Social

Chronic pain may be viewed as its own disease. Pain specialists understand that chronic pain is more than just a physical sensation- and you should too. It has the potential to affect physical, mental and social health. Understanding pain through the scope of these three components is known as the **biopsychosocial approach**. The biopsychosocial approach is an essential tool when considering treatments options because physical, mental and social health can affect each other.

How the physical component of pain affects psychological and social health is the easiest to comprehend. Consider migraines. During a migraine episode, many patients experience blurred vision, a pounding sensation, nausea, or sensitivity to light. This can translate to difficulty thinking, working, interacting with friends and family, and completing every day tasks. Over the course of days, months, or years, these episodes may cause feelings of hopelessness and depressions, which in turn, causes social withdraw.¹ For those suffering from more frequent migraine episodes, a more significant decrease in quality of life might occur.^{iv}

The psychological component of pain affects social and physical health as well. It is common for someone suffering from chronic pain to experience anxiety, fear, anger or sadness. These negative emotions can further heighten the physical sensation of pain. Increased levels of depression and anxiety increases pain sensitivity and pain-related disability and reduce quality of life.^v The effect of referred to as *pain catastrophizing*, in which an exaggerated mental set is brought to bear in the setting of pain. Catastrophizing behavior includes ruminating over the painful complaint, magnifying the pain, and feeling helpless.^{vi} This type of response can get in the way of treatment. For example, chronic lower back pain can sometimes be treated with

¹ Out of all the types of chronic pain, migraines are believed to be the most common cause of suicide.¹ If you have experienced suicidal thoughts, regardless of the cause or pain you're experiencing, seek medical attention.

exercise and stretching. Unfortunately, many people suffering from chronic lower back pain and display catastrophizing behavior may feel helpless and fear exercise or stretching. This fear of movement, known as *kinesiophobia*, and the resulting inactivity, can cause pain to progress in severity and reach a point where treatment options will have limited success. Positive thoughts may have the potential to help manage the severity of pain and result in better outcome. They can result in better social interactions and improve one's ability to cope.^{vii} So even if we cannot actually fix the pain problem, we can help you to live better with the pain you have.

Social health influences the physical and psychological aspects of pain. Many people suffering from chronic pain find it difficult to carry out social roles and they experience changes in personal relationships. Some, particularly the elderly, find themselves withdrawing from social interaction and work.^{viiiix} Decreased social interaction may lower self-efficacy, or self-worth. This is unfortunate because greater self-efficacy, or the belief that you can do things for yourself, may improve functional ability and have positive psychological adjustments.^x To illustrate this relationship, people suffering from chronic knee pain find themselves unable stand or walk for long periods of time. This can limit their ability to attend work functions or participate in certain activities with friends. Less social interactions and the potential resulting social withdraw may result in the belief that one cannot fulfill their social role. Failure to feel like a member of the group can cause lower self-worth and, consequently, physical and psychological consequences such as lower function ability, lower pain tolerance, depression and sadness.

Because of the interplay between the physical, psychological and social components of pain, both treatment and preventative measures must be specific to the individual. The goal of treatment and prevention is to see improvements in each component of health. There are certain situations where treating the underlying condition is the best way to correct pain, for example, surgery to repair a broken bone. Such direct intervention may not be available for some forms of chronic pain. Chronic pain may require treatment directly.

-CHAPTER THREE-

How to Classify and Describe Your Pain

Pain Can Change

Pain can progress from acute to chronic and can also progress in severity. It can present in different locations and with different sensations. It can even continue despite treatment, it can recur or cause other problems. When your pain changes, it's important to inform your physician. Effectively communicating any changes in pain will allow your physician to make adjustments to the course of treatment or order tests. This is one reason that it is beneficial to create a strong patient-physician relationship and to listen to your body. Again, pain is unique to the individual. It affects everyone's physical, psychological and social health differently. To help you accurately communicate your pain to your physician, we will describe pain communication skills and briefly touch on the importance of pain descriptors.

Pain Scales (Numeric vs. Functional)

The purpose of a pain scale is to establish a communication system between the patient and physician describing the severity of pain. Unfortunately, many pain scales can be misleading. **Numerical pain scales** that ask you to rate your pain on a spectrum (often 0-10) are very subjective. As we have learned, pain changes. One day your pain might be on the lower end of the spectrum, the next, on the higher end. To compensate for the possible range of experienced pain, many physicians will ask you to select a number that represent your pain over the last twenty-four hours or choose an average rating score. While this may appear to be slightly more practical, it's still an inaccurate, non-objective measure that doesn't adequately capture the pain experience.

Reducing pain to a number doesn't represent the effects pain has on your life. You are more than just a number. Your pain should be too. A number cannot describe how pain impacts daily activities, influences thoughts and feelings or changes relationships. Instead of a numerical pain scale, it's more appropriate for a physician to employ a **functional pain scale**. A functional pain scale focuses on the effect pain has on daily living. It may range from no pain or tolerable pain with little effect on daily activities to intolerable pain impacting even simple, sedentary activities such as reading, watching television or communicating.

An advantage of the functional scale is rooted in your pain specialist's goals. When providing treatment, a pain specialist wants to put you back in control of your life. Pain has the tendency to become a top priority in someone's life when it disrupts simple tasks and activities. It becomes the first thought when getting out of bed and the last thought when trying to fall asleep. If a pain specialist understands your limitations, he or she can create a treatment plan that will allow you to regain the ability to carry out activities that were once unachievable. This is especially important to understand for those with permanent pain. Yes, it's possible to have pain that cannot be relieved. In order to provide a better quality of life, a pain specialist works to reduce the pain to a tolerable level so these patients can return to living their lives.

Location and Quality

In addition to severity, your physician will ask you to describe the location and quality of your pain. This refers to the location of your pain and how your pain *feels* ("burning", "shooting", "aching" etc.). An accurate description of location and quality will inform your physician as to the type of pain you're experiencing such as mechanical, referred, visceral, neuropathic or mixed pain.

Mechanical pain can result from overuse or abnormal use of an anatomical structure. It often presents in the same location that has been compromised, but not always. For example, a patient with arthritis in a knee or shoulder usually experiences pain in that joint or immediately surrounding it. This information and descriptors of the sensation of pain (i.e. "sharp" or "achy") will help the physician make an accurate assessment of the condition and treat it accordingly.

Referred pain usually manifests in a location other than the site of the underlying source. This is due to crossover between multiple nerve pathways, and is classically represented by pain from organs manifesting as back or arm pain. For example, during a heart attack, patients often describe pain in the left shoulder and arm rather than the classic chest pain we all expect. Because your brain is not used to receiving a strong signal from the underlying source, it confuses the message as coming from another pathway within the same network.

Neuropathic pain, or nerve pain, is when one of these pathways within the network of nerves is damaged or under stress. Neuropathic pain manifests from an insult anywhere along the length of a nerve, and can be focal in one location or more diffuse. This is common in patients

with herniated discs causing a condition known as lumbar radiculopathy, but more frequently referred to as sciatica by laypersons. Normally, the discs are located between the bones (vertebrae) of your spinal column and function to absorb shock and reduce compression. When damaged, they can bulge or even herniate out and put pressure on nearby nerves. If nerves extending to the legs are impacted, the patient can feel a “shooting” or “radiating” pain past the knee into the foot, calf, and/or ankle.

Other terms often used to describe quality include “stabbing”, “cramping”, “aching”, “burning”, “itching”, “tingling”, “cold-freezing” and “electric shock-like”. Remember, no one but you can feel *your* pain. Being able to communicate how your pain feels using these terms in addition to describing the location will help your specialist diagnose your condition.

-CHAPTER FOUR-

Self-Management: How Can I Help Myself?

Believe it or not, you have already taken the first step to managing your pain. As we've previously discussed, becoming informed about your pain gives you the power to regain some control over it and the way it influences your day to day. Now, you can partner with your physician to develop a program that works to reduce your pain and increase your capacity to do the activities you enjoy. Being informed about your pain can also improve function, symptoms and cognition. We know the physical sensation of pain and psychological health are interlinked. When a patient becomes informed about their pain, some uncertainty about their pain may disappear and relieve stress.^{xi} Less stress can lead to a decreased perception of pain.^{xii}

Being educated about self-management techniques can also prove beneficial to overall wellbeing. Self-management techniques are ways to limit, control or treat pain without the help of a physician, other health professional, or medical intervention. They include, but are not limited to, stretching, weight loss, and relaxation techniques. It should be understood that certain techniques would be more appropriate for some conditions than other. You should also be aware that its common to be misinformed about pain management techniques. We often hear about these techniques through friend, family and advertisements. Because you are hearing this information through word of mouth, its possible that you are being told wrong information or information that may not necessarily address your specific needs. This is why communicating with a primary care physician or pain specialist is an important and necessary step to take. Your physician can inform you about the efficacy of the management technique as well as incorporate it into a pain management program. The success of using appropriate self-management techniques has been proven with patients suffering form chronic lower back. It was shown that manual therapy, exercise, and education for lower chronic back pain resulted in effective pain management at one year follow up.^{xiii}

Examples of Pain Management Techniques

In order to provide a better understanding of self-management techniques, we will briefly explain a few different modes for providing relief and the circumstances where they have supporting evidence. Exercise is a common and proven way to help manage several types of chronic pain. Exercise strengthens muscles and joints, prevent the onset or progression of your bones weakening and improve mood by producing endorphins. For person's suffering chronic lower back pain, it has been concluded that exercises that increase flexibility and strengthen the back work to support the spine and relieve pain. When appropriately performed, exercise will not pose a risk to causing future back pain.^{xiv}

For individuals suffering from chronic pain associated with being overweight, weight loss has shown to help provide relief. Consider walking around with a thirty to forty pound backpack strapped to your chest. As you can imagine, this added weight causes additional stress on joints and the lower back. Aerobic exercises specifically designed for weight loss will reduce the load that is causing additional stress - just like taking twenty pounds out of the backpack. The relationship between weight loss and pain relief has been seen in obese patients with osteoarthritis in their knees. As their weight decreased, so did their pain.^{xv}

Stretching to increase flexibility can help relieve pain associated with tight muscles. A study of women with neck pain showed that a stretching program led to a decrease in pain and increased range of motion.^{xvi} It should be noted that stretching is most effective when the internal muscle temperature has increased through what is commonly known as "warming up". Patients that may benefit the most from stretching are those who work jobs that require a significant amount sitting. These sedentary jobs can cause muscles in the lower back and legs to tighten up as well as strain the due to poor posture or computer ergonomics. In order to prevent this from occurring, stretching can be complemented with using a stand-up desks or going for periodic walks. Attention should also be paid that the height of your computer monitor is appropriate for your seated position. The monitor should be approximately arms distance, and the top of the screen is at or slightly below eye level.

Another popular and effective type of self-management technique is stress and tension reduction. This mode of pain reduction focuses on breathing and relaxation techniques through activities such as meditation, controlled breathing and yoga. Yes, you read that correctly. Focusing on breathing can actually help reduce pain. It has been shown that deep and slow breathing while in a relaxed state has shown to help with pain modulation and increase one's

pain threshold.^{xvii} One specific type of meditation that has been studied in pain management is called Mindfulness Based Stress Reduction (MBSR). One study compared mindfulness to opioid pain medication and found that patients who practiced mindfulness had significant improvements in pain, activity levels, anxiety, depression, and self-esteem. They also took less pain medications during the study. These positive effects were still present one year later after mindfulness training. (Kabat-Zinn, Lipworth, & Burney, 1985).

The Problem with Self-Management Techniques

Not all of the discussed self-management techniques may be right for you. A self-management technique or program will be most effective if it addresses your specific needs, if it is something you will adhere to, and if it doesn't place all of the burden of pain relief on you. For example, someone experiencing lower back pain as a result of being overweight may need a combination of aerobic exercise (running, swimming, biking) in addition to some light resistance training (weight lifting) and dietary changes in order to lose weight and the associated burden on their body frame. In contrast, someone whose lower back pain is not linked to being overweight may want to focus solely on strengthening their muscles and joints to provide relief.

Most importantly, there is no expectation that a self-management technique needs to be undertaken alone. Our hypothetical, overweight individual will likely find it difficult to come home from a long day of work and exercise alone. If he has a support system, perhaps a friend, family member or fitness group holding him accountable, he is more likely to stick with the program and also generate other positive effects such as reducing social isolation. Also, if he knows that his self-management technique is being incorporated into a pain-relief program and has the support of his pain specialist and primary care physician, he will feel as if he is also doing his part as an active patient rather than just receiving passive treatments.

-CHAPTER FIVE-

Seeking Medical Attention

When Should I Consider Seeing a Pain Specialist?

The first step most patients take after the onset of pain is to try to figure it out themselves, either through home remedies or over the counter treatments. When these fail, or if they are incidentally at a doctor's visit, they typically bring any new issues to their primary care. Meeting with a primary care physician at the onset of pain provides several key benefits. First, if the primary care physician has been a long time healthcare provider, there may already be a strong patient-physician relationship. If so, your primary care doctor will likely have a good understanding about your lifestyle, work, the activities you enjoy, your family, medical history, etc. Using this information, he or she may have suggestions on self-management techniques that may provide some relief. Also, primary care physicians are often easily accessible. This provides the opportunity for early medical intervention that may slow or stop the progression of pain. Lastly, they can provide some short-term relief by prescribing short-course analgesic drugs.

Unfortunately, primary care physicians are not specialized to treat patients with chronic pain. While they are taught to treat a wide range of conditions and may have experience with pain, their training is not focused on considering pain as its own disease and limited in their capacity to provide advanced diagnostic and interventional care. Treating pain as its own disease is unique and what distinguishes Pain Medicine doctors from all other specialists.

When a primary care physician is unable to provide pain relief, patients find themselves being bounced around to various specialists who attempt to determine an underlying cause of the pain. A patient with neck pain meets with their primary care physician who sends them to an orthopedic surgeon. The orthopedic surgeon may determine the cause of pain is not a surgical problem and advises the patient to see a neurologist. The neurologist fails to determine a neurological cause and the cycle continues. With each step, the patient racks up another copay as his or her pain persists or progresses. One of these specialists may identify a diagnosis, but

typically they will then refer the patient on to a pain medicine specialist to treat the issue with the vast armamentarium of interventional and medical treatments at their disposal.

Patients with pain that does not respond to first-line treatments like physical therapy, medications, or just time (some episodes of pain are limited on their own to a short period of time) should seek treatment with a pain specialist. For many reading this book, you have already taken this step. For others, you might be considering this step.

When should you approach a pain specialist? The answer is sooner rather than later. New persistent pain should be investigated to make sure that there is no sinister cause of it, like a tumor or a blocked blood vessel. Even though most pain is benign, it does not feel benign – it is unpleasant and can progress. It has the potential to reach a point where management, rather than relief, may become your reality as it permeates your mind, your body, and your social life. If you have already experienced failed attempts to relieve pain from various physicians, then you should meet with a pain management specialist.

What Should I Expect During My First Visit?

Your first visit to a pain specialist will require you to provide a lot of information. While every practice is different, this information will usually be obtained through questionnaires and face-to-face conversations. Take your time. Provide as much detail as possible. By now, you should understand that your perspective and beliefs are vital to constructing a successful treatment plan. If your pain specialist is not inquiring about aspects of your lifestyle, mental health, and social life in addition to the physical component of your pain, then he or she are failing to view your pain using the biopsychosocial approach.

You will also be asked to provide information about prior physician visits, self-management techniques and your primary care physician. If you have experienced the cycle of seeing multiple specialists and have undergone different imaging techniques and/or treatments, then be prepared to provide up-to-date medical records. This information will help your pain specialist develop an appropriate diagnosis and treatment.

Prior to your visit, you should also construct a list of all prescribed and over-the-counter medications, vitamins and supplements, ointments, etc., you are currently using to manage your pain as well as other self-management techniques such as exercise, deep breathing, stretching etc. The list should include frequency, strength/dosage, and the effectiveness of each medication

and technique. Your pain specialist may require you to stop some of these remedies prior to certain treatments or, they may incorporate the more successful ones into your treatment program.

Lastly, treating your pain will become a team effort. It will require contributions from a team of physicians, therapists, support persons, and most importantly – you. Many patients see their pain physician more frequently than their primary care physician or even some of their family. An ideal treating relationship creates trust between you and your doctor, which the authors believe is paramount to treatment success. Providing your pain specialist with your primary care physician’s contact information will allow for open communication about your treatment plan and progress.

After a review of your records, a medical history, and a physical examination, your pain physician will formulate a list of possible or even definite diagnoses. Sometimes further diagnostic testing (e.g. MRI, blood work, EMG) will be ordered. However, pain is a little weird – it does not always obey MRIs or other tests. Meaning, one person can have a terrible-looking MRI and no pain and another can have terrible pain and a normal MRI. Pain physicians tend to rely on more practical ways to identify the pain generator. One of the most common ways pain docs do this is by targeted injections of numbing medicine. The premise is that we numb up a nerve and the pain goes away, then we just need to figure out how to change the signals along that nerve and voila, no pain.

-CHAPTER SIX-

Treatment Overview

Treatment options for chronic pain can be categorized based on their invasiveness. Multimodal pain care plans utilize a combination of conservative, pharmacologic, and interventional measures. **Conservative treatment options** often overlap with self-management techniques providing the opportunity for relief between physician visits. Conservative treatments can be further divided into pharmacological and non-pharmacological. Pharmacological intervention includes non-steroidal anti-inflammatory drugs (NSAIDs), opioid painkillers, antidepressants, anticonvulsants, muscle relaxants, and even cannabinoids (medical marijuana). Non-pharmacological intervention includes a wide range of options such as physical therapy, home exercise, complementary and alternative medicine (hypnosis, meditation, relaxation

techniques, massage, acupuncture), and psychological therapy (remember the biopsychosocial approach? Pain affects psychological and social health!).

For many patients seeking help from a pain doc, conservative treatments have proved insufficient when relied on alone. But do not underestimate their importance. They will likely be incorporated into a **comprehensive, multidisciplinary treatment plan**. This treatment plan can include any number of treatment combinations and will be created through the scope of the biopsychosocial approach to address all of your needs. The role of conservative treatments will likely be to compliment **minimally invasive treatments** (chapter 7) and/or **surgical intervention** (chapter 8) to maximize the level and duration of relief. Consider treatment for chronic pain resulting from osteoarthritis. In 2012, the Chronic Osteoarthritis Management Initiation of the US Bone and Joint Initiative laid comprehensive guidelines for treatment. They identified five main areas that contributed to pain relief:

1. Education and self-management (joint protection, stretching)
2. Exercise and weight loss (low-impact aerobic exercise)
3. Assistive devices (walking aids or assist devices to improve activity)
4. Alternative and complementary approaches (injections, heat, ice)
5. Surgical interventions (joint replacement- should be considered as a last resort)

Notice anything about these guidelines? Every major topic that contributes to relief emphasized in this book has been included in their ideal treatment plan.^{xviii}

- CHAPTER SEVEN -

Minimally Invasive Treatment Options for Chronic Pain

Your pain management specialist may use one or more minimally invasive interventions if conservative therapies prove ineffective. You may have heard technical terms for some of these mostly needle-based treatment options such as epidural injections, joint injections, trigger point injections, nerve blocks, radiofrequency ablation, spinal cord stimulation, and even morphine pump implants. The treatment recommended by your pain specialist will depend on several factors such as the location, type, cause, frequency and intensity of pain. Also, the success or failure of previous treatments will be considered, further highlighting the importance of patient-physician communication. New treatments are always being developed, so it is important to keep your physician abreast of changes in your pain or new painful conditions.

What to Expect with Injections

Interventional pain physicians frequently employ needle-based treatments in the treatment of your painful condition. There are a wide variety of targets for different pain complaints that will be discussed in this section. Prior to describing all the potential targets for interventions, let's get some of the basics out of the way about the experience and expectations for injection therapies. The goals of the injection can be different depending on the type of injection and the pain problem. Interventions fall into two categories, diagnostic and therapeutic:

Diagnostic injections function like any other medical test (MRI, CT, X-ray, lab work) in that they help diagnose the pain generator. Diagnostic injections are not typically expected to give long-term pain relief. (Example: medial branch blocks, selective nerve root blocks)

Therapeutic procedures are intended to give long-term relief, typically by using steroids, radiofrequency energy, medications, or even electrical circuitry.

Regardless of what type of injection you are having, the experience is similar. After informed consent and the opportunity to ask questions, the patient is brought to the procedure room and positioned. If the procedure is being performed in a surgical center, an intravenous sedative may be given. Then the site is cleaned with antiseptic and draped sterilely. Live X-ray is used to identify the target for the injection and the skin overlying the area is then numbed up using a small needle. Patients report a 'pinch and burn' sensation, and oftentimes this is the worst part of the procedure. Once the area is numb, the procedure needle is then advanced to the target with live X-ray or ultrasound guidance. The procedure is carried out and the needles are removed and band aids placed on the skin. It is common to have some procedure site pain just as you would feel sore for a few days after having a vaccination at your primary care doctor's office.

Epidural Steroid Injections

Epidural steroid injections are used to relieve neuropathic pain that radiates down the neck, arms, back, and legs. The target site for an epidural injection is inside the bony spine but outside the sac that holds the spinal fluid in an area known as the epidural space. Think of the

bony spine as a trash can – rigid and fixed in volume, then think of the sac that holds the spinal fluid as a trash bag. The space in between the trash bag and the trashcan is akin to the epidural space in the spine. Needles can be placed into the epidural space from a few different trajectories, as the approach change depending on your anatomy and/or your pain problem. be accessed through various approaches and your physician will choose a safe and effective approach for your anatomy and pain problem. Sedation may be considered for patients with fear of needles or extremely sensitive pain, but most people do not need to be sedated for the procedure. After the numbing medicine takes effect, you will only feel pressure as the physician places a second needle into the epidural space using X-ray guidance. With the second needle in place, you may feel pressure or a slight worsening of your typical pain as contrast dye is injected. This ensures that the medication will spread to the appropriate area. Finally, a mixture of steroids and/or numbing medicine will be administered before removing the needle. The numbing medicine feels good right away, but the effect of the steroid may take 3-10 days to set in depending on the person.

Sacroiliac Injections

Sacroiliac (SI) injections are used to treat pain at the SI joints, the joints where the two hip bones (iliac bones) interact with the triangular shaped bone (sacrum) at the bottom of the vertebral column (the bony spine). The SI joints are unique because their components are fused together making them relatively immobile. This improves stability. Pain at one of sacroiliac joints is often mechanical pain and results from degeneration and inflammation. Patients experiencing these complications often describe the pain as a one-sided ache that radiates to the buttock, groin, and/or thigh area, but rarely continuing below the knee.

The actual sacroiliac injection procedure feels similar to the epidural steroid injection, except that the target is different. The physician will locate the joint using an X-ray machine, sterilize and numb the overlaying skin and insert the injection needle into the joint. The patient should expect to feel a pinch or burning sensation as the needle is inserted. For patients with significant inflammation, they will experience a familiar “zing” of pain. Many times they will say, “That’s the spot!” Then, the specialist will confirm the needle is in the joint using contrast dye before administering numbing medicine and steroids. The steroid medication takes 3-10days to treat the inflammation and provide long-lasting relief. Sometimes there is too much

inflammation in the SI joint for the injections to last longer than a few hours, days, or weeks. In that case, there are other interventional options to treat the SI joint. One option involves injection of substances other than steroids into the joint, such as stem cells or platelet rich plasma (PRP). Another option involves making small, controlled burns (radiofrequency ablation), of the nerves that supply the joint. In this approach, if we can't fix the source of the pain we have decided to cut the signal telling the patient about the pain. The last option is surgical fusion of the SI joint, an operation performed by a spine surgeon, where several rods or screws are placed along the joint to stabilize it.

Joint Injections

Joint injections are commonly performed by pain specialists, usually in the treatment of inflammation caused by arthritis. Intra-articular injections are used to treat mechanical pain occurring within movable joints such as the hips, knees and shoulders. The procedure is almost identical to the previously discussed injections with the exception of the location. The skin will be sterilized and numbed, the injection needle will be inserted into the appropriate joint (using X-ray guidance and accompanied by the usual pinch and burn), contrast dye will confirm correct placement of the needle and numbing medicine and steroids will be administered. After several days, the medication and steroids will reduce inflammation, thereby relieving pain and increasing function.

Piriformis Injections

The piriformis muscle is involved in rotation of the thighbone and is accessed through the buttock area. When enlarged or inflamed, the piriformis muscle can compress a neighboring nerve called the sciatic nerve. In fact, there are several variations of normal anatomy where the nerve may actually pass through the muscle itself. Compression of the sciatic nerve manifests as pain running down the back of the leg – but in this case, instead of being caused by a herniated disc, a muscle is pinching the nerve. Physical examination and imaging is usually required to diagnose this condition, known as *piriformis syndrome*.

During the piriformis injection procedure, the skin overlying the muscle will be sterilized before numbing medicine is injected. An injection needle is inserted into the belly of the muscle (the middle/thickest region) using either X-ray or ultrasound to guide needle placement. Finally,

contrast dye may be used to confirm proper placement of the needle before steroids are administered. The steroid injection can relieve pain and inflammation allowing for relatively painless stretching. The ultimate treatment of piriformis syndrome is lengthening and stretching the muscle so that there is less tension on the nerve. Several injections and a stretching routine may be needed in order to have long-lasting relief.

Trigger point injections

Trigger point injections specifically target areas of soft tissue that have become tender, firm or taut. These *trigger points* are thought to arise from trauma or microtrauma that cause muscle fibers to shorten. When shortened for a prolonged period, the muscle fibers become sore, tender, and even develop firm/crunchy knots due to calcium deposits. This is the cause of *Myofascial Pain Syndrome (MPS)*.

During the trigger point injection procedure, the physician will identify the trigger points through touch. After cleaning the injection site, the physician will place a thin needle into the trigger point and move it around to break up the knot. As the physician is moving the needle, they will inject numbing medicine. This eliminates the trigger points and helps to encourage restoration of normal tone and function to the muscles. While trigger point injections are the gold standard for treating MPS, they should not be the sole treatment modality. Instead, they are used in conjunction with post-injection stretching and/or exercise therapy as part of a comprehensive, multidisciplinary pain management regimen.

Nerve Blocks

A nerve block is a targeted injection used by pain specialists to diagnose and/or treat the cause of pain. A small amount of numbing medicine and/or steroid medication is deposited around a specific nerve root(s) in the neck, chest, or lower back. This is performed using X-ray or ultrasound guidance and is highly specific to a certain area. Meaning, the results are localized to the distribution of a single nerve or group of nerves. Typically these are test injections that are used to identify the pain generator for the patient's complaint –these injections are not intended to treat the problem, but rather to aid in diagnosis. After the medicine has taken effect, the pain signal traveling to the spinal cord will be blocked. When used for diagnostic purposes, it is important to pay close attention to your pain during the initial hours following the procedure. All

changes should be documented in a journal. Depending on the context, the information from the selective nerve block may be used to plan additional interventional procedures (see “Radiofrequency Therapy”) or even surgery.

Medial Branch Blocks (Facet Joint Block)

A medial branch block is specific for pain localized in the neck or middle/lower back. This pain may even extend towards the shoulders or the buttocks. The cause of pain is due to the small joints of the spine that allow you to bend, flex, and twist called facet joints. Pain occurs when these joints experience an increased load, such as arthritis, decreased disk space or weight gain. The nerves responsible for transmitting the pain from these joints are the *medial branch nerves*. Since these nerves do not provide any significant function other than to tell you that you’re in pain, a medial nerve block is essentially an attempt to ‘kill the messenger’ in order to relieve your pain.

During the procedure, the physician will sterilize your skin and use X-ray guidance to identify the area where the medial branch nerves are located. Then, the physician will numb the overlying skin and the injection needles will be placed where the nerves run. Once in satisfactory position, a long-lasting numbing medication is injected around the medial branch nerves. When used for diagnostic purposes, it’s important to be active following the procedure in order to test whether or not the injections worked.

Intercostal Nerve Blocks

Intercostal nerve blocks are specific for pain deriving from the nerves (*intercostal nerve*) running underneath the lower edge of the ribs. They are typically required after an injury to an intercostal nerve or the associated rib. Common causes of injury are rib fractures and chest surgery, but may also include post-herpetic neuralgia (pain after shingles).

During the procedure, you will be facedown on the X-ray table. The doctor will map out the area of your pain and use an X-ray machine to make sure the correct ribs are being blocked. Then, the overlying skin for all required injection sites will be sterilized and numbed. Next, using X ray guidance, a needle will be placed in contact with the lower edge of the rib and walked slightly forward to where the nerve lives. The physician will confirm placement with a small amount contrast dye and then inject numbing medicine with or without steroid around the nerve.

After the procedure, you may notice that the skin over the injection site and extending down the front of the chest or abdomen is numb – this is normal. Over the next few days, you will be asked to keep track of any changes to your pain. Also, it is important that you pay attention to whether or not you feel pain in the levels above or below the injection– i.e., you get excellent pain relief at the injection site but you still feel pain above the numb area.

Sympathetic Nerve Blocks

A sympathetic nerve block targets a specific division of the nervous system, the sympathetic nervous system. This network of nerves is under unconscious control, has a variety of effects throughout the body and is involved in the “fight or flight” response experienced under stressful conditions. Under certain circumstances, these nerves can also carry pain signals or maintain painful states. This is called *sympathetically-maintained pain* and is seen in Complex Regional Pain Syndrome, Post-Herpetic Neuralgia, nerve entrapment syndromes, certain types of facial pain, peripheral vascular disease, and should be suspected in any case of severe pain.

Sympathetic nerve blocks can target a number of anatomical areas. For example, a *lumbar sympathetic nerve block*, where the injection is administered on either side of the spine in the lower back, will block the sympathetic nerves in the legs. This may reduce pain, swelling, sweating and any other unusual changes in the lower extremity. For sympathetically maintained pain in the head, neck, chest or arms, your physician will administer an injection in the front of the neck, known as a *stellate ganglion nerve block*.

Radiofrequency Therapy

Radiofrequency therapy is a needle-based, non-narcotic treatment option that uses special electric-tipped needles to relieve pain. First, the patient’s skin is sterilized and numbed. Next, the needles are inserted near the desired target using X-ray or ultrasound. Electrical stimulation is then passed through the needle to help confirm correct position. This may require the doctor to ask the patient some questions about where and how strongly they feel the sensation. After correct placement is confirmed, carefully controlled electrical energy is passed through the tip of the needle. There are two main types of radiofrequency treatments: pulsed radiofrequency neuromodulation and continuous radiofrequency ablation.

Pulsed Radiofrequency Neuromodulation

Pulsed radiofrequency (RF) treatment is a needle-based, non-narcotic treatment with applications in chronic shoulder, knee, joint pain, and almost any painful problem involving a nerve. Over time, inflammation in joints and ligaments is believed to cause small nerve endings to grow into the joint structures. These are not found in normal joints. These nerves can be treated using this advanced, minimally invasive, outpatient procedure, in which the physician directs the needle into the area of inflammation (the joint or over a particular nerve). Once the area is identified, pulsed electricity is used to create an electromagnetic field at the tip of the needle. This electromagnetic field is thought to change the balance between inflammatory (pain-causing) and inhibitory (pain-relieving) factors. Interestingly, these changes occur not only at the area that is treated, but also further up the nervous system at the spinal cord level. Studies have shown that pulsed RF reduced joint pain by 50-70% for up to 1 year, and was associated with increased function and better quality of life. (Masala) It is also effective for difficult to treat conditions such as occipital neuralgia, shingles pain, painful scars, and can be tried in many problems.

Continuous Radiofrequency Ablation

Remember how we said some injections/nerve blocks can serve both diagnostic and treatment purposes? Continuous radiofrequency ablation is a therapy that aims to treat painful conditions by using an electric needle that creates a small, controlled, burn at its tip. Just as in the block or other injections, the electric needle is placed at the target. Position of the needle is confirmed using X-rays and non-painful electrical stimulation. Numbing medicine is given through the needle. Once you are numb, the tip of the needle is heated up to create a small burn in the nerve. The burn is about the size of a grain of rice. The effects are not permanent, as the nerve regenerates slowly. A commonly performed RF procedure is medial branch radiofrequency ablation for low back pain. This procedure typically provides pain relief for 9-13 months.

Risks and Complications

Prior to any procedure, your pain specialist will inform you about the associated risks and complications. These risks and complications vary for each treatment previously discussed. Make sure you fully understand this information. If there is any confusion or if you have questions and/or concerns, do not hesitate to have your physician address them. A good

physician will always want open communication with their patients, especially for matters regarding safety.

- CHAPTER EIGHT –

Advanced Interventions for Chronic Pain

There are many painful conditions that are effectively treated with advanced interventional pain procedures. These have traditionally been used to treat patients who have ‘tried everything else’, meaning they have not experienced pain relief with conservative and/or minimally invasive treatments. Instead of being an ‘end of the line’ treatment, advanced therapies like spinal cord stimulation and intrathecal therapies are being recommended earlier into pain care treatment. The earlier these treatments are implemented, the better the outcomes overall.

Spinal Cord Stimulation

A **spinal cord stimulator** (SCS) is an advanced implantable device used to interrupt or mask painful signals on their way to the brain. Spinal cord stimulation can be thought of as a white noise machine for pain – it drowns out painful signals along certain pathways using wires placed close to the spinal cord. In the United States, spinal cord stimulation is most commonly used in patients who have undergone spine surgery and continue to have chronic back/neck and/or arm/leg pain. It has been shown to be as or more effective as repeat spine surgery in patients, and is much less invasive. It is also an excellent treatment for Complex Regional Pain Syndrome, which is a type of chronic nerve pain typically affecting a particular extremity. It has been studied in a variety of conditions, and your doctor may discuss a trial of spinal cord stimulation as a treatment option

The best part about spinal cord stimulation is that you can ‘try it before you it’. Spinal cord stimulation is really a two-stage procedure, and the first stage is the most important as it determines whether or not the therapy works for you. The first stage is the trial phase, during which thin stimulator wires are placed into the spine. During the procedure, you will work with your doctor and the programmer to make sure the wires are in the right position. You should feel the stimulation covering all of your painful areas during the procedure. The wires will then be attached to an external battery and taped to your back with a padded dressing. This will stay in place for a trial period of 3-10 days. During the trial period you will have the opportunity to test the system to find out if it works for you. In addition, you will be in constant communication with the device representative. They will answer any questions and troubleshoot any issues that may arise. You will have control over the stimulator much like you have control over your television at home. Using a remote control, you can turn the device on or off, increase or decrease the intensity (volume) of the stimulation and choose amongst several channels that are customized by your physician and the representative. Recent advances in spinal cord stimulation technology have been mostly focused on developing new programs to target painful problems. Talk with your doctor about the most recent developments and what the different options for programs are.

At the end of the trial the doctor will remove the wires and then discuss the outcome of the trial. If the trial was successful in improving pain, function, medication use, and/or quality of life then a permanent implant can be considered. The permanent spinal cord stimulation implant procedure is similar to the trial, except that two 2-2.5” incisions are made to put the wires and battery under the skin.

Dorsal Root Ganglion Stimulation

The dorsal root ganglion (DRG) stimulator procedure is similar to a spinal cord stimulator, except that it targets specific nerve roots before they join the spinal cord. Imagine the DRG as the onramp to a major highway or as a relay station for signals coming from out in the body and entering the spinal cord. DRG stimulation involves placing a specialized thin wire right on this structure and changing the signal entering the spinal cord that then goes up to the brain and is interpreted as pain. The DRG procedure is indicated for a number of pain problems, and more applications are being identified every day as more trials are performed. This includes hard to treat problems like pain in the groin or genitals, peripheral neuropathy, shingles pain, and pain stemming from surgical procedures like pain after commonly performed operations like hernias, joint replacements, lung surgery, and amputations.

Intrathecal Pump

An intrathecal pump is a small pump implanted just underneath the skin. It delivers medicine through a thin tube directly into the fluid-filled sac that holds the spinal cord. Because the medication is delivered directly into the spinal fluid, pain relief can be achieved with tiny doses of medication. The most commonly used medication in intrathecal pumps is morphine, and people frequently refer to them as ‘morphine pumps’ for that reason. There are other medications aside from morphine or in combination with morphine that can be used in the pump. In most conditions, a trial of intrathecal medication is performed prior to considering an implanted pump. During the trial, a temporary catheter is placed and medication is administered through it to see if it helps the pain and/or causes side effects. If effective, the pump is implanted at a later date, and involves a 2” incision on the back and a 4” incision to place the pump in the belly. The pump does need to be refilled intermittently. This is done using a special needle that goes across the

skin and enters the pump reservoir. In general, candidates for intrathecal pumps must have no uncontrolled psychiatric problems, responded well to trial doses of intrathecal medication and have a condition where other surgical options cannot be used.

-CHAPTER NINE-

Surgery

Interventional pain doctors use minimally invasive treatments to make patients feel better, be more active, and get back to their normal day to day with minimal discomfort. In some cases, patients who have failed conservative treatment are referred to a surgeon to explore more invasive procedures. Pain is a common reason for patients to have surgery in general. It may be a hernia, a painful knee or hip, a herniated disc, or a fracture. Sometimes there may be a clear reason for the pain and a surgery fixes it for good. Fortunately that is the case for most people, but even the best surgeons have patients with chronic pain after an operation. Treating with a pain doctor earlier in the course of treatment can help to better identify the source of the pain and manage it until you can have surgery, or manage any painful complications of the surgery itself. For example, if chronic knee pain due to osteoarthritis cannot be managed by injections, weight loss, physical therapy, and prescription medications a knee replacement may be indicated. Chronic pain occurs at least 5-10% of the time after knee replacement surgery.

-CHAPTER TEN-

Final Words

We hope your time reading this book has served you well. We hope you understand that chronic pain is influenced by physical, mental and social health. We hope you've learned about the benefits of self-management techniques, how to communicate your pain to your physician and how different treatments can be used to manage your pain. But most importantly, we hope we've empowered you to take the next, best step for your condition.

At the Center for Interventional Pain and Spine, our goal is to make you, *you* again. As we said at the start, reading this book is only the first step towards managing your chronic pain. The next step is to find the right physician. Together, you and your pain specialist will work to return you to your former pain-free lifestyle, your friends and family and to a happy and productive life.

ⁱ Tsang et al.

ⁱⁱ Craft et al 2010

ⁱⁱⁱ IASP

^{iv} Terwindt et al., 2000

^v bair et al., 2008

^{vi} Sullivan et al., 2001; Keefe et al., 2009

^{vii} Park and Sonty, 2010

^{viii} Boersma and Linton, 2006

^{ix} simsek et al., 2010

^x Keefe et al., 2005

^{xi} Meng et al., 2001

^{xii} George et al., 2009

^{xiii} Moseley, 2002

^{xiv} Rainville et al. 2004

^{xv} Messier et al. 2004

^{xvi} Chuna et al., 2008

^{xvii} Busch et al 2011

^{xviii} Nelson AE, Allen KD, Golightly YM, Goode AP, Jordan JM. A systematic review of recommendations and guidelines for the management of osteoarthritis: The chronic osteoarthritis management initiative of the U.S. bone and joint initiative. *Seminars in Arthritis & Rheumatism*. 2014;43(6):701-712.