

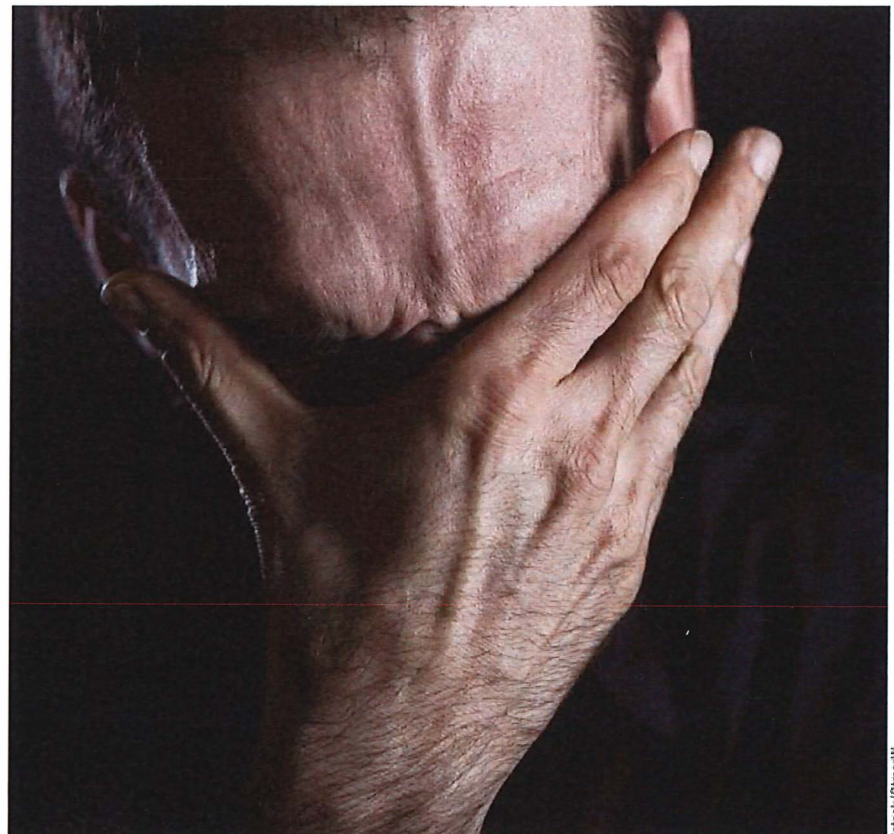


# Strategies in managing chronic pain

**By Harbans S. Deol, D.O., Ph.D. and Elizabeth Gondles, Ph.D.**

**C**hronic pain can be defined as, “a sensory and emotional experience of discomfort associated with tissue damage that persists for a significant amount of time” (IASP, 1994).<sup>1</sup> Chronic pain can persist for weeks, months and even years. About 15 to 33 percent of the U.S. population has experienced chronic pain throughout their lifetime, and chronic pain can have huge emotional and physical effects on an individual. The most common types of chronic pain experienced by individuals include headaches, back pain, joint pain and abdominal pain. Chronic pain takes on varying levels of severity; high severity of pain is characterized by emotional distress that causes a loss of control in daily-life activities (Murphy, et al, p. 11-14).<sup>2</sup>

There are two main types of pain classified by the Cognitive Behavioral Therapy (CBT) manual presented by the Department of Veteran Affairs. First, nociceptive pain is classified by pain resulting from damage to bodily tissues. Nociceptive pain stems from the inputs put forth by certain types of nerves called nociceptors. Most nociceptors will recognize deep, aching pain from soft tissues, (e.g., bones,



ligaments and tendons). Second, neuropathic pain is often described as burning or tingling, and it stems from nerve damage to the peripheral or central nerves (Murphy, et al, p. 11-14).

Chronic pain is determined by

duration. It can also be defined based on normal healing processes that can vary depending on the injury and its healing mechanism. Estimate of pain prevalence can vary, especially if the burden is substantial. The total cost in

the treatment of chronic pain is substantial and it is estimated to be greater than diabetes mellitus (DM) and coronary artery disease (CAD) combined. The 1992-2002 National Health and Nutrition Examination Survey estimates that 14.6 percent of adults have pain. Other surveys conducted during 2001-2003 found the prevalence of common musculoskeletal pain may be as high as 43 percent among U.S. adults (Tsang et al J. Pain, 2008).<sup>3</sup> It is also estimated that 11.2 percent of adults in the U.S. report living with daily pain (Nahin, J. Pain, 2015).<sup>4</sup> An estimated 39-100 million Americans are experiencing chronic pain at any given time (Gaskin & Richard, 2012).<sup>5</sup> Chronic pain is defined as continuous pain that lasts for at least three months or past the normal time for tissue healing (Chou et al., 2014).<sup>6</sup>

Pain is our most sophisticated, protective device. Damage caused to the tissues is neither sufficient nor necessary for pain. Receptors, especially nociceptors, send pain signals to the brain. Pain is then produced by the brain, and as such, the brain determines how much pain you are in, not necessarily how much danger you are really in. Pain can be defined as chronic if it lasts more than 9-12 weeks or past the time of normal tissue healing.

Pain can become a disease if it is prolonged and debilitating. It can be attributed to some other condition, and as a result, become chronic; only then can it be stipulated as a disease. The nervous system has spasticity that can change in terms of exhibiting

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**There is another reason to avoid opioids; they may not be the most effective treatment for acute pain after all.**

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symptoms. Pain medications that are not effective for nervous system pain are often used and current medications only mask the symptoms. Other modalities like physical therapy and psychotherapy are beneficial and important in the treatment of pain.

Other factors also contribute to pain. One that is most overlooked is the component of the psychological state of the patient — emotion can overlap pain. Central sensitization (i.e., the experience of pain even when it is gone) can also occur. An example of this is disc degeneration that occurs via continual trauma from the micro-fracture of a disc plate or increased body weight that can put pressure on the disc plate. Role of wellness is an essential balance in that the mind can minimize pressure on the disc and hence lessen pain.

It is estimated that 80 percent of the population will experience back pain in their lifetime. It is the second most common visit to a primary care office and the second most common reason for disability. Medications are prescribed routinely for pain, especially opioids in the treatment of back pain. Twenty percent of the

population seen in the clinic for non-cancer pain receives an opioid prescription (Daubredse et al, 2013).<sup>7</sup> Health care providers wrote 259 million prescriptions for opioid pain medication in 2012, which is enough to account for one bottle for every adult in the U.S. (Paulozzi et al, 2014).<sup>8</sup> There are other non-pharmacological and non-opioid pharmacological modalities that are considered to be effective treatments. CBT demonstrated positive effects on disability and catastrophic thinking (Furlan et al, 2011).<sup>9</sup>

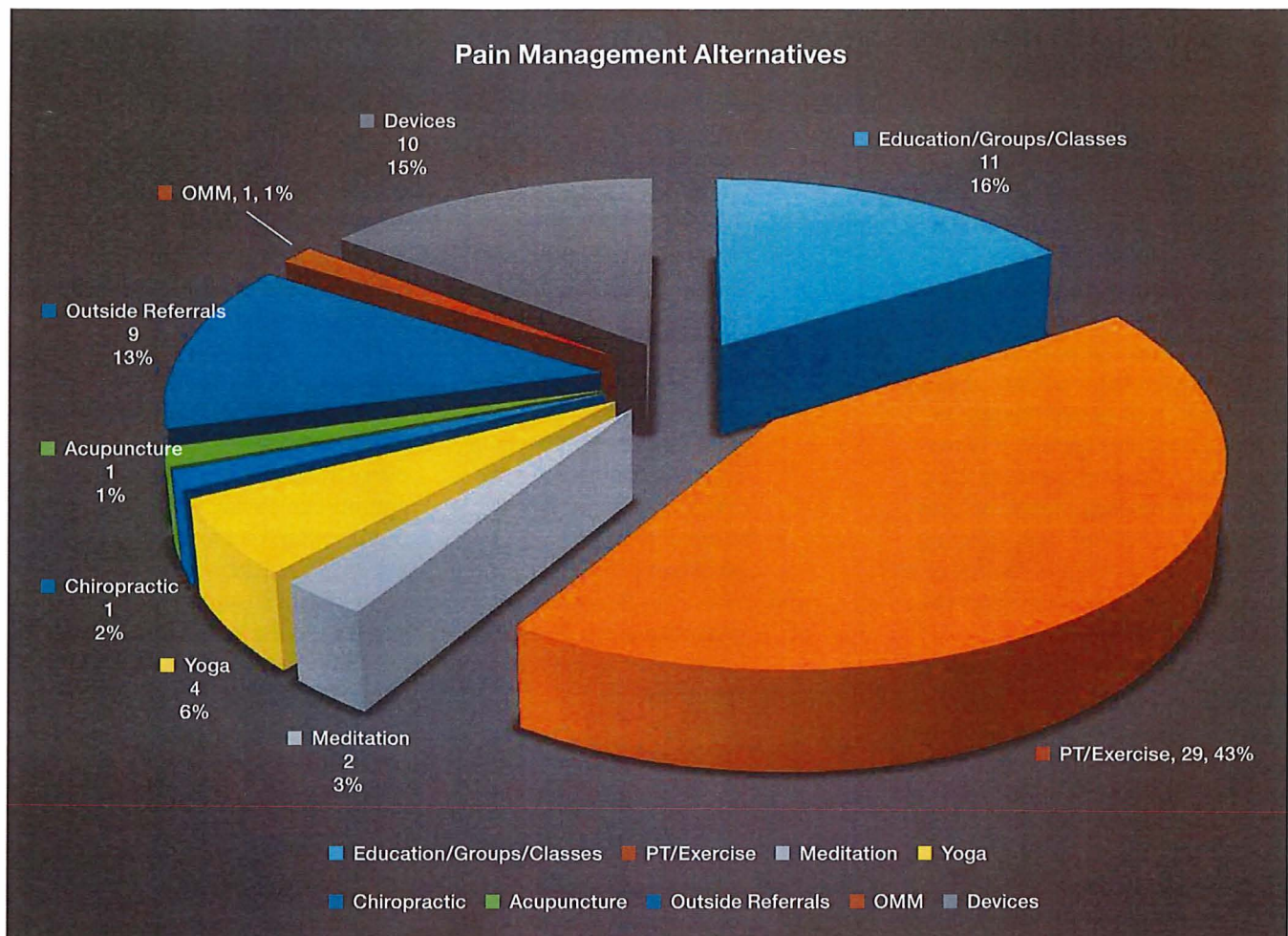
Prescription opioids like oxycodone, hydrocodone, codeine and morphine have long been considered some of the most helpful drugs for managing acute pain, where the body is immediately reacting to trauma or injury. Each year, over 200 million opioid prescriptions are given out in the U.S. Unfortunately, the rates of opioid abuse and overdose deaths have skyrocketed in recent years, leading healthcare providers and patients alike to be cautious about the use of opioids. There is another reason to avoid opioids; they may not be the most effective treatment for acute pain after all.

**Do opioids work better than other drugs?**

A recent study in the “Journal of the American Medical Association” throws into question how well opioid drugs actually treat acute pain. In the study, researchers assigned 416 emergency room patients with moderate-to-severe



**Figure 1**



pain to one of four treatment groups. Three of the treatment groups received a combination of a common opioid painkiller, either oxycodone, hydrocodone or codeine, plus 300 mg of acetaminophen and a common non-opioid pain medication often sold over the counter as Tylenol. The fourth

group received 400 mg of Ibuprofen, a non-opioid painkiller, plus 1,000 mg of acetaminophen. The result: All four groups experienced the same levels of pain relief. While opioid drugs did help to reduce pain, they were no more effective than a combination of non-opioid painkillers (Kyriacou, 2017).<sup>10</sup>

Multimodality and multidisciplinary therapies can help reduce pain and improve function more effectively than single modalities (Kamper et al, 2015).<sup>11</sup> A survey of correctional facilities revealed that the most effective way to treat pain is the use of the multimodalities therapy (See Figure 1).

The balance between benefits and harms is a critical factor that the Center for Disease Control and Prevention (CDC) influenced their recommendation for managing pain — acute and chronic. Below are some of the recommended guidelines that CDC developed for providers. Recommendations for short-term opioids, especially immediate release, were moderately effective for pain and functional outcomes in the management of pain. The best suggestion for the treatment of acute pain is a trial of opioid therapy as demonstrated in Figure 2. It is recommended for three to seven days, utilizing immediate release opioids for maximal benefit. Longer-acting medications are not as effective or as immediate and minimize the potential for addiction.

Utilization of non-pharmacologic and non-opioid pharmacologic treatments may be preferred in combination with a standard approach. Below are the suggested guidelines for the management of chronic pain:

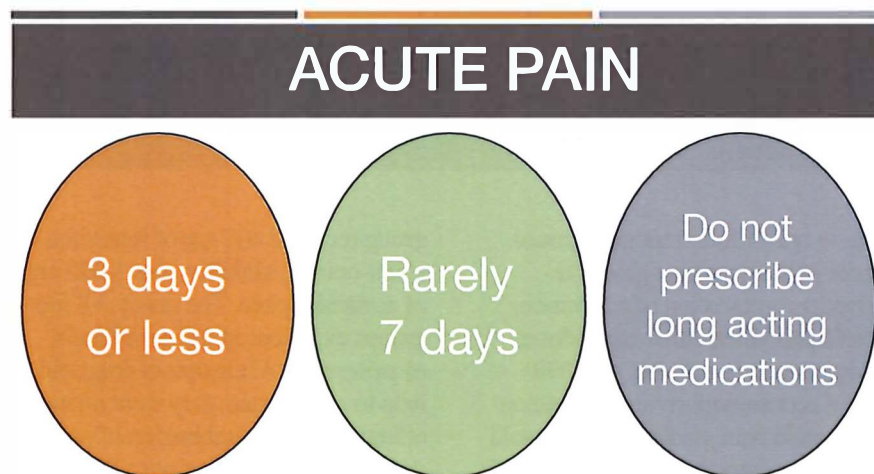
- A. CDC Guidelines are based on pain that lasts over three months
  - a. Guidelines are voluntary, rather than prescriptive standards.
  - b. Effectiveness of short-term opioids were moderately effective for pain and functional outcomes (12 weeks or shorter).
- B. Multimodality Therapy
  - a. Reduced pain.

- b. Improved function.
- c. Reduced pain in osteoarthritis (OA).
- d. Improved wellbeing.
- C. Alternatives to treatment non-opioid
  - a. Acetaminophen – First for OA or lower back pain (LBP).
  - b. Nonsteroidal Anti-inflammatory Drugs (NSAIDs) – First line treatment for OA or LBP.
  - c. First and second line medications for neuropathic pain, including Gabapentin, Tricyclic Antidepressants (TCA) and Serotonin-norepinephrine reuptake inhibitors (SNRIs).
  - d. NSAIDs – Associated with hepatic toxicity, gastrointestinal (GI), renal and cardiovascular risk.

Non-opioid pharmacotherapy treatments include NSAIDs, acetaminophen, anti-depressants and anticonvulsant. A non-pharmacologic approach includes CBT, exercise therapy and interventional treatment among other multimodal approaches for relief of peripheral and central pain. Treatments can be stratified for optimal benefit. Figure 3a shows alternate treatments of non-pharmacologic approach.

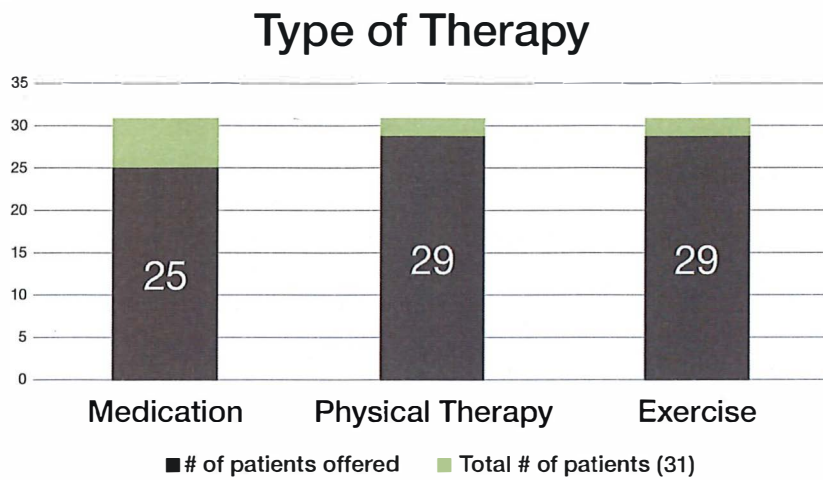
Chronic pain recommendations evaluate benefits and harms within one to four weeks of starting opioid use. Patients must be reassessed every three months. Along with appropriate dosing with opioids; a prescription drug monitor program allows providers tools to review compliance. Urine drug testing is also recommended before and after as well for periodic monitoring. Concurrent use of benzodiazepine is

Figure 2

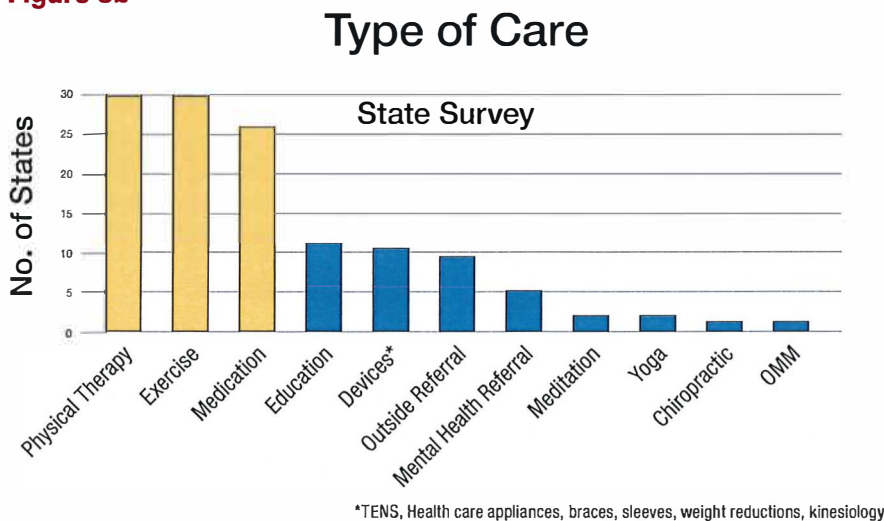




**Figure 3a**



**Figure 3b**



not recommended to avoid a synergistic effect. Extensive evidence shows harm of long-term opioid use. A survey was conducted of all state

and federal prisons of the use of opioids and/or modalities utilized in the management of acute and chronic care (See Figure 3b).

Results are from a questionnaire sent to state and federal prisons — response rate was 62 percent. Twenty-five of 31 states reported utilizing medications. However, it is opined that all states used pain medications, but our survey was based on the response received. Interestingly, 27 of 31 states used other approaches that included multimodality therapy, including exercise and other therapies. Eleven states do use education therapy, along with groups to assess pain management. Referral for mental health is an essential component of chronic pain management. Education of the patient into the complex issues and treatment often empowers the patient to better, long-lasting results. For example, an understanding of how personal stress and immobility leads to tense, tight and painful muscles is important information. This may explain why good compliance in mental health and in physical therapies needs to be a part of everyday life, not just a temporary adjustment.

For the management of chronic pain, it is recommended to alleviate pain in order to perform activities of daily living (ADL) and gain some degree of relief. Medical management, along with other modalities, is the best approach to manage co-morbid conditions. The role of mental health professionals is overlooked in the management to control pain. The recommended approach is outlined below with the intention to use a combination of medication to decrease dependence and improve

efficacy. CBT and mindful meditation should be considered as a part of the current modality along with other modalities.

## Treatment recommendations

- A. Non-opioids
  - a. Acetaminophen – 3000mg/24hr.
  - b. Salicylates (e.g. Acetylsalicylic acid [ASA] or Salsalate – 2000mg/24hr).
  - c. Propionic acid derivatives.
    - i. Ibuprofen – 2400mg/24hr.
    - ii. Naproxen – 1500mg/24hr.
- B. Acetic acid derivatives.
  - i. Etodolac – 1200mg/24hr.
  - ii. Ketorolac injection.
  - iii. Sulindac 400mg/24hr.
  - a. Naphthyl-alkanone.
    - i. Nabumentone – 1500mg/24hr.
  - b. Oxicam.
    - i. Meloxicam – 15mg/24hr.
- C. Other adjuvants that can be considered in combination of above are:
  - a. Muscle Relaxants.
    - i. Flexeril – 10mg bid.
    - ii. Tizanidine – 4-8mg bid.
    - iii. Dacogen – 10-20mg bid.
  - b. Antiepileptics.
    - i. Gabapentin – 1200mg bid.
    - ii. Tegretol.
    - iii. Divalproex.
    - iv. Topiramate.
  - c. TCAs.
    - i. Amitriptyline.
- d. Selective Serotonin Reuptake Inhibitor (SSRI).
  - i. Treat comorbid depression/anxiety.
- D. Non-pharmacologic therapy should be an integral part of treatment plan.

## What are other options for pain treatment?

While opioids are usually given for acute pain, some of the following options also work well for chronic pain, or pain that lasts longer than six months.

### Nonsteroidal anti-inflammatory drugs (NSAIDs)

- Ibuprofen, naproxen and aspirin are known as nonsteroidal anti-inflammatory drugs (NSAIDs). They control pain, lower fevers and reduce inflammation. NSAIDs are often considered to be the first line of defense for acute pain, especially pain that does not respond to non-drug treatments.
- NSAIDs are available over-the-counter with brand names, including Advil, Motrin, Aleve, Bayer and Excedrin. NSAIDs are also available in prescription strength with common brand names, including Celebrex, Naprelan, Anaprox, Voltaren and Feldene. One word of caution: Long-term use of NSAIDs can lead to stomach distress or bleeding in your

gastrointestinal tract, and the FDA warns that non-aspirin NSAIDs may increase the risk of heart disease and stroke.

### Acetaminophen

Acetaminophen is used on its own as a painkiller and is also an active ingredient in many combination medicines for pain and colds. It is a popular over-the-counter option, sold under brand names like Tylenol. Acetaminophen is especially helpful in addressing acute pain for conditions like headache, arthritis and cancer pain. Acetaminophen does not cause the gastrointestinal or cardiovascular side effects of NSAIDs but taking amounts in excess of the recommended dosage may lead to liver damage or even liver failure. Because acetaminophen is present in so many medications, check whether other medications you're taking contain acetaminophen as well.

### Antidepressants

A category of antidepressants called tricyclic antidepressants have the most evidence for treating pain, especially nerve pain. Imipramine (Tofranil), nortriptyline (Pamelor), desipramine (Norpramin) and amitriptyline (Elavil) are tricyclic antidepressants. While these drugs can be helpful, they are not effective for everyone. Some evidence shows that two other categories of antidepressants — SSRIs, such as fluoxetine (Prozac) or SNRIs, such



as duloxetine (Cymbalta) — are also helpful for chronic pain, but more research is needed.

### **Anti-epileptic medications**

Anti-epileptics can be taken to address chronic nerve pain and chronic pain from conditions like diabetes, shingles, chemotherapy, herniated disks and fibromyalgia. Research on how well anti-epileptic medications work for pain is unclear. Some people may receive significant benefits while others may not receive any pain relief at all. Newer anti-epileptic drugs such as gabapentin (Neurontin) and pregabalin (Lyrica) have more evidence of being effective painkillers than older drugs, and they carry fewer side effects. But some studies have shown that older antiepileptic drugs such as carbamazepine (Tegretol) and phenytoin (Dilantin) can also help certain pain conditions. However, these older medications cause more side effects.

### **Holistic approach to pain management**

Holistic approaches to pain management should always be used as part of a wider treatment plan, including advice on physical activity or physiotherapy, sleep and support in achieving improvements in mental health and quality of life. Medicines do not work for all patients. Medicines can help reduce the intensity of pain sufficiently so that patients can do things that would otherwise be difficult, but it will not make

them completely pain free. In correctional environments, there are unique opportunities where facilities and support are available to provide multidisciplinary care for pain that avoids or complements the use of medicines. Examples include psychological or occupational therapies and access to specialized gym activities. Partnerships between prison and healthcare teams to deliver these opportunities are essential to providing a holistic approach to pain care that avoids the sole reliance on medicines (American Pain Society, 2014).

### **Acupuncture**

The New England Journal of Medicine suggests acupuncture therapy for treatment of lower back pain. Acupuncture, a traditional medical technique originating in China, is a medical intervention technique where fine needles are inserted into or through the skin at specific sites, based on medical conditions. In the case of chronic back pain, there are five most common-used point names referred to as UB 23, UB 25, GV 3, UB 40 and GB 30. Before patients decide to undergo acupuncture therapy, a careful, thorough diagnostic evaluation must be completed. Those with chronic pain from cancer or infection are not considered for candidacy.

Some clinical evidence that has evaluated the use of acupuncture for treatment of chronic pain suggests real or sham acupuncture therapy are more effective for chronic lower back pain than no treatment at all.

This meta-analysis, conducted in 2008, displays great evidence that acupuncture can be used as an alternative to traditional forms of western medicine. Another clinical trial conducted in Germany, containing 3,093 patients with chronic back pain for a mean of seven years, were randomly assigned to either acupuncture therapy or none at all. According to the results, back function, measured by the Hannover Functional Ability Questionnaire, was significantly improved. The Hannover Functional Ability Questionnaire measures back function on a range of zero-100, 100 being the optimal back function. After three months, the mean back score for the participants receiving acupuncture increased from 61.8 to 74.5. For the control group receiving no acupuncture the mean score increased from 61.8 to 65.1. This evidence clearly demonstrates acupuncture therapy as a potential intervention for chronic pain.

A typical acupuncture therapy session for lower back pain contains a minimum of 12 sessions. Therapy begins with two sessions a week for four weeks, then tapering off acupuncture begins. At the beginning of the fifth week, a patient will receive therapy once a week. If a patient sees no improvements after acupuncture therapy, they are encouraged to stop treatment.

There is little evidence to suggest that acupuncture therapy results in adverse health outcomes. A study conducted in Germany reported that 8.6 percent of 229,230 patients had

one adverse health outcome following acupuncture therapy. Of those 229,230 patients, 2.2 percent reported that their adverse health outcome required treatment assistance as a result of acupuncture. Once again, this research supports acupuncture therapy as a safe alternative for treatment of chronic pain (Berman, B., Langevin, H., Witt, C., Dubner, R., 2010).

### Reducing pain directly

There have been ways to effectively reduce pain by utilizing topical preparations, along with an increased focus to develop new routes of drug administration providing tailored treatments for patients, without decreasing efficacy of analgesia, in proportion to the progression of the knowledge of pain mechanisms. However, the role of topical presentations, when compared to traditional routes, has not been fully explored and thus remains unclear (Journal of Pain Research, Pain Res. 2011; 4: 11–24).

### Hypnotherapy

According to a controlled study published by Hannan et al (1991), 40 patients suffering with fibromyalgia pain were assigned to eight-hour sessions of hypnotherapy (with a self-hypnosis home practice tape) or a physical therapy treatment group for three months. Hypnotic therapy included an arm-levitation induction and strategies for ego strengthening, relaxation, improved sleep and “control of muscle pain.” Results

concluded that individuals who received hypnotic therapy as compared to physical therapy showed better health outcomes in terms of muscle pain, sleep disturbance and distress. After a three month follow-up period, there was a 35 percent average decrease in pain among those who received hypnosis as compared to physical therapy (Elkins, G., Jensen, M., Patterson, D., 2007).

### Cognitive behavioral therapy

Another alternative to tackle chronic pain is CBT. CBT surpasses traditional medications in addressing chronic pain, in the sense that it addresses and fine-tunes undesirable negative thinking patterns that are associated with chronic pain. At first, CBT was primarily used for the treatment of anxiety and depression. At the heart of CBT lies a primary concept that there is an inseparable link between cognitions, emotions and behaviors. CBT for chronic pain was first developed with the basic thought that people experiencing chronic pain are negatively affected (emotion) by their interpretation of their pain (thought) rather than the physical pain itself. In this case, people may think their pain is way worse than the physical pain itself and are unable to function in daily-life activities (behavior). CBT for chronic pain aims to address these matters through problem-solving and goal-setting. Some crucial problem-solving components of CBT for chronic pain include exercise,

spacing, relaxation training, cognitive restructuring and behavioral activation (Murphy, et al). For example, relaxation training helps an individual develop strategies to decrease muscle tension and stress. Cognitive restructuring aims to identify obstructive, negative thoughts and increase sensible thinking about their chronic pain (Murphy, et al).

Based on empirical support from the behavioral health field, Cognitive Behavioral Therapy for Chronic Pain (CBT-CP) intervention has gained much backing as an alternative treatment option for chronic pain. In 2006, Tuner, Mancl and Aaron conducted a large randomized-controlled trial to study the short- and long-term effects of CBT for patients diagnosed with chronic Temporomandibular Joint Disorder (TMJ). Individuals diagnosed with TMJ have similar symptoms to those who suffer with chronic pain, such as longevity of the problem, psychosocial dysfunction and the inability to manage disease outcomes. Study design participants were assigned to either the CBT condition group or the control group. The CBT condition group received four biweekly individual treatment sessions focusing on developing CBT techniques to manage pain such as relaxation. The control group received four biweekly individual sessions, involving education about their chronic disease, and how to communicate with health providers on their treatment decisions. After a 12-month follow-up period, the CBT study group was two times as likely to





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report improvement in managing their TMJ diagnosis and was three times as likely to report no pain interference (Murphy, et al).

#### **Mindfulness meditation**

Another form of pain management that provides an alternative to most medications and western medicine is mindfulness meditation. A main part of mindfulness is awareness and attention about one's experience of pain. Mindfulness meditation helps an individual "moderate their awareness and attention to present-moment experience" (Zgierska, 2016, p. 1865).

An article in Pain Management suggests that Meditation-CBT intervention can reduce pain sensitivity and severity in patients with opioid-treated chronic lower back pain. Subjects were eligible for the 26-week randomized control trial (RCT) study if they had experienced chronic lower back pain and were prescribed more than 30 mg/day of morphine for at least three months. Of the 35 participants, 21 were assigned to a meditation-CBT intervention study group, and 14 individuals were assigned to the control group. The intervention design included eight weekly group sessions, including meditation and CBT components. Each weekly session was designed to have sessions six days a week, which were 30 minutes a day. Outcomes were measured at eight- and 26-week periods. Outcome measurements included primary pain severity,

function/disability, secondary pain acceptance, opioid dose and pain sensitivity to thermal stimuli. Results from this RCT suggest that a combination of mindfulness meditation and CBT can improve health outcomes of individuals experiencing chronic lower back pain. Researchers revealed a dose-response relationship between amount and consistency of meditation practice and intervention outcomes for pain (Zgierska, A., Burzinski, C., Cox, J., Kloke, J., Stegner, A., et al, 2016).

#### **Animal-assisted therapy**

In addition to the previously stated forms of alternative treatment for chronic pain, animal-assisted therapy has shown promising outcomes. According to research conducted by Marcus et al. (2012), animal-assisted therapy could be beneficial to those suffering with chronic pain. Researchers evaluated the outcomes measured after 295 therapy dog visits in an outpatient waiting area. After a two-month period, there were significant enhancements in patient mood, pain and distress. After a visit with a therapy dog in the outpatient area, patient pain decreased by 23 percent, whereas patients' pain without dog therapy decreased by two percent (Marcus D., Bernstein, C., Constantin, J., Kunkel, F., Breuer, P., Hanlon, R., 2012).

#### **Future treatment for pain – Blue Therapeutics, Blue-181**

A promising alternative to addictive opioid prescription drugs has

made headway into the pharmaceutical industry. Blue Therapeutics, headquartered in Cambridge, Massachusetts, has joined the race to create another pain management medication that suffices pain management, called Blue-181. Blue-181 has begun the beginning stages of clinical trials. On June 18, 2018 (Cambridge, MA), Blue Therapeutics, a biotechnology company developing safer, more effective painkillers using its novel G-protein-coupled receptors (GPCR) heterodimer targeting platform, announced the advancement of its lead compound Blue-181 into investigational new drug (IND) — enabling studies towards FDA approval for human clinical trials.

The developers of Blue-181, three Harvard trained scientists, described the difference between their new drug and older prescription opioids. Blue-181 targets different areas of the central nervous system, specifically the spine, rather than areas in the brain, reducing dependency on pain management medications. Although it may be five years before founders of Blue Therapeutics discover the long-term side effects of the drug and its effectiveness, they join other biotech companies in the race to discover a new pain management prescription drug that is non-addictive. Blue Therapeutics has received more than two million dollars in funding from the National Institutes of Health (NIH) and the Department of Defense (CBS News, 2018). Researchers say they're on

the verge of creating a revolutionary, non-addictive painkiller. Blue Therapeutics is an early-stage drug development company focused on developing safe, effective painkillers for acute and chronic pain. The company is supported by the National Institute on Drug Abuse, The Department of Defense and the Roddenberry Foundation.

**Within the correctional environment, there is often a dramatic improvement in pain sufferers once brought into a controlled system.**

Chronic pain has become more prevalent and reached near epidemic levels in the U.S. This problem likely represents a failure in the approach problem. Inadequate education, exercise and stretching in a lifestyle of stress and inactivity are likely causes of the problem. Healthcare providers face a daunting task of prescribing medications to ease the pain with the likelihood of discussing lifestyle modifications that may be contrary to patient expectations or unwilling to make necessary changes. Overmedication often results with unhealthy consequences.

Within the correctional environment, there is often a dramatic

improvement in pain sufferers once brought into a controlled system. A system that employs proper diet, mental evaluations (stress reduction if necessary), stretching and exercise education and physical therapy modalities will have many people

who have suffered from pain for years that will no longer require any medications after several months due to multimodality therapies. The strategies suggested will reveal the best evidence in the reduction of pain to maintain functionality in daily life.

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