PAIN MANAGEMENT
A COMPREHENSIVE REVIEW

PART II

Jassin M. Jouria, MD

Dr. Jassin M. Jouria is a medical doctor, professor of academic medicine, and medical author. He graduated from Ross University School of Medicine and has completed his clinical clerkship training in various teaching hospitals throughout New York, including King’s County Hospital Center and Brookdale Medical Center, among others. Dr. Jouria has passed all USMLE medical board exams, and has served as a test prep tutor and instructor for Kaplan. He has developed several medical courses and curricula for a variety of educational institutions. Dr. Jouria has also served on multiple levels in the academic field including faculty member and Department Chair. Dr. Jouria continues to serves as a Subject Matter Expert for several continuing education organizations covering multiple basic medical sciences. He has also developed several continuing medical education courses covering various topics in clinical medicine. Recently, Dr. Jouria has been contracted by the University of Miami/Jackson Memorial Hospital’s Department of Surgery to develop an e-module training series for trauma patient management. Dr. Jouria is currently authoring an academic textbook on Human Anatomy & Physiology.

Abstract

There are a number of approaches in the management of pain, each with respective advantages and disadvantages. Ultimately, there should be proper pain management measures in place in order to reduce the root cause of pain, the length of pain, and the effectiveness of pain management. This course aims to offer a comprehensive review of pain management that is currently available, as well as offer some new insight into the modern and innovative measures of pain management.
Continuing Nursing Education Course Director & Planners
William A. Cook, PhD, Director, Douglas Lawrence, MS, Webmaster,
Susan DePasquale, CGRN, MSN, FPMHNP-BC, Lead Nurse Planner

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Statement of Need
Individuals experience pain in unique ways. Health professionals need to be informed of the various pain theories and tools to help identify individual perceptions of pain and methods of treatment.

Course Purpose
To provide nursing professionals with knowledge of types of pain, methods to identify pain and options for treatment.
Learning Objectives

1. Demonstrate appropriate use of pain measurement instruments
2. Explain the pharmacological management of pain
3. Describe the non-pharmacological management of pain
4. Explain alternative therapies for the relief of pain
5. Discuss the patient self care method to relieve pain

Target Audience

Advanced Practice Registered Nurses, Registered Nurses, Licensed Practical Nurses, and Associates

Course Author & Director Disclosures

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Please take time to complete the self-assessment Knowledge Questions before reading the article. Opportunity to complete a self-assessment of knowledge learned will be provided at the end of the course.
1. Preventative treatments for headache pain include the following medications:
   a. Anticonvulsants
   b. Beta-blockers
   c. Calcium channel blockers
   d. All of the above

2. True or False. The faces pain scale is particularly useful when assessing children.
   a. True
   b. False

3. Anti-seizure drugs treat pain by:
   a. a calming effect on the nerves
   b. treating nerve damage, neuropathy
   c. a narcotic effect
   d. answers a and b above

4. Aromatherapy is a complementary treatment that is used to:
   a. treat pain sensations, including chronic pain sensations
   b. promote relaxation, key to pain relief
   c. help the individual focus on other than pain
   d. all of the above

5. True or False. Researchers are now utilize imaging techniques to see what is occurring chemically when a person is injured. This may lead to new therapies to reduce or destroy severe and chronic pain.
   a. True
   b. False
INTRODUCTION

Pain today is a costly and very serious public health issue.² It is also a challenge for friends and families as well as health care practitioners there to offer support to the individual suffering from the pain. Pain related issues currently account for approximately a majority of patient visits to their health provider.³

There are many things that affect how pain is felt. One is the type and extent of the injury itself. Another big thing that affects how pain is felt is the emotions the individual feels during the injury and recovery periods. Emotions strongly affect the perception of pain. Pain is not something that has any single unit of measure. While practitioners can measure the extent of severity of an injury, there is no way for them to measure how or why some people feel more or less pain than others with the same injury.⁴ However, there are a number of ways to address pain conditions, from pharmacological to non-pharmacological options as well as alternative therapies.

It is also important to address the education of both practitioners as well as the individual, friends and family to ensure that pain is managed effectively. The better practitioners communicate with and educate their patients, the more likely that pain will be effectively addressed and managed. Additionally, there is a treatment gap that exists in pain management, which cannot be ignored. Women, children and older adults are at greater risk of being negatively affected by chronic pain and frequently end up receiving treatment that falls short. Understanding why this happens as well as what to do about it is essential for practitioners who are seeking to adequately and fully treat a variety of pain conditions that are experienced differently from individual to individual.
INSTRUMENT FOR ASSESSING THE PAIN PERCEPTION

Visual analogue scale

The visual analogue scale is useful for people who have a strong ability to define what they are feeling as pain. This scale utilizes a numerical rating system to allow practitioners to determine the severity of pain.

![Visual Analog Scale (VAS)](http://www.ttuhs.edu/provost/clinic/forms/ACForm3.02.A.pdf)

Faces pain scale

The faces pain scale is particularly useful when assessing children, as children aren’t always able to adequately describe pain. Oftentimes, children do not even understand that what they are feeling is pain – the faces pain scale allows for description of physical discomfort in ways that children can understand. The faces pain scale is illustrated below.
How to interpret pain in infants

It is more difficult to determine magnitude of pain in infants since they are unable to talk or describe their pain. However, there is a scale that may be utilized to assess pain in infants, as shown on the following page.

Obtained from:
http://www.ttuhsc.edu/provost/clinic/forms/ACForm3.02.A.pdf

<table>
<thead>
<tr>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very happy, no hurt</td>
<td>Hurts just a little bit</td>
<td>Hurts a little more</td>
<td>Hurts even more</td>
<td>Hurts a whole lot</td>
<td>Hurts as much as you can imagine (don’t have to be crying to feel this much pain)</td>
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PAIN MANAGEMENT STRATEGIES

Pharmacological management

Pharmacological pain management refers to the use of medication to manage pain. There are a number of pharmacological options available for pain management. These range from mild sedation to oral medication to general anesthesia that is utilized in the operating room.

Pain medication may be administered in a number of ways, including:

- Orally, through swallowing of a liquid or pill
- Intravenously, by way of a needle inserted into a vein
- Via a skin patch or cream

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Pain Assessment of Infants

<table>
<thead>
<tr>
<th>Pain Score</th>
<th>Degree of Pain</th>
<th>Behavioral Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No Apparent Pain</td>
<td>Not Crying, Resting, Calm, Sleeping, Relaxed Body Position, Comfortable Without Intervention, Baseline HR, B/P, Respiratory Frequency &amp; Pattern</td>
</tr>
<tr>
<td>1</td>
<td>Uncomfortable</td>
<td>Intermittent Whimpering, Cry, Restlessness, But Able to Sleep, Intermittently Tense Muscles, Comforts, Calms Self, Increase in HR by 5-10 BPM</td>
</tr>
<tr>
<td>2</td>
<td>Mild Pain</td>
<td>Whimpering Cry, Moaning, Restless, Irritable, But Able to Sleep, Tense Muscles, Difficult to Distract and Console, Increase in HR by 10-15 BPM, Periodic Breathing</td>
</tr>
<tr>
<td>3</td>
<td>Moderate Pain</td>
<td>Sobbing, Strong, Loud Cry, Continuous Restlessness, Irritability, Sleep Disruption, Tense, Rigid Body, Only Intermittently Distractible, Increase in HR by 15-25 BPM, Increase in BP by 10 mm Hg</td>
</tr>
<tr>
<td>4</td>
<td>Severe Pain</td>
<td>High Pitched Scream, Thrashing, Tremulous, Unable to Sleep, Very Still, Increase in HR by &gt; 25 BPM, Apnea or Tachypnea</td>
</tr>
</tbody>
</table>

Obtained from:
http://www.ttuhs.c.edu/provost/clinic/forms/ACForm3.02.A.pdf
**Premedication assessment**

Premedication is the administration of drugs before anaesthesia. Premedication can prove quite useful, and there are three main useful effects that are seen with the use of premedication. These effects are listed below as:

- Anxiolysis, which can be achieved with phenothiazines or benzodiazepenes if needed.
- Reduction in bronchial secretions. Reduction of secretions is not as much a major issue as it used to be. However, if needed, secretions may be reduced with hyoscine.
- Analgesia through the use of strong opiates, as recommended.

**Balanced anesthesia**

Balanced anesthesia allows practitioners to minimize the risk to patients as well as maximize the comfort and safety for the patient. There are several main objectives of balanced anesthesia, which include: calming the patient, minimizing pain, and reducing the likelihood of adverse effects that are associated with analgesics.

It is essential to calm the patient because it allows for easy handling as well as decreases stress on the patient’s body. Easing stress is very important because it can cause other medical conditions such as tachycardia and hypertension. These conditions can all prove detrimental to the individual, as stress and anxiety play a part in the nociceptive pain process. Frequently, medications such as acepromazine, diazepam, or medetomidine are utilized to help the patient remain calm.

Minimizing pain is also essential, as pain has been shown to decrease appetite, delay healing, and contribute to mortality. This is particularly the case in pediatric patients. Therefore, the best way to minimize pain is to stop the pain before it starts.
There is always the risk of potential adverse reactions. Some of the more marked negative effects occur with inhalant anesthetics. These drugs are generally safe and prove extremely useful; however, it is important to consider that dosage of anesthesia can often be reduced through utilizing calming agents or analgesics properly.

The best approach to balanced anesthesia also includes an individual assessment of both the patient and the procedure to properly plan anesthesia. In keeping the objectives of balanced anesthesia in mind, anesthesia may be utilized more effectively.

**Pro re nata (PRN)**

Pro re nata comes from the Latin meaning “as the circumstance arises”. This generally refers to the dosage that is unscheduled for prescribed medication; administration is left to the discretion of the practitioner, or if the patient chooses to take an unscheduled dose. However, pro re nata is not an endorsement for exceeding the daily dosage of a prescribed medication. Patients should take care not to exceed the dose recommended by their doctor. Pro re nata is also utilized for blood tests, wherein the practitioner will order a pro re nata for blood work that the patient can then use as the blood work is needed.

**Preventive approach**

The best way to manage pain is to stop the pain before it starts. This can be attained by properly utilizing analgesics. Some analgesics that are good for the management of pain are opioids such as morphine, butorphenol, fentanyl, and buprenorphine. Also NSAIDS such as carprofen, ketoprofen, and meloxicam are useful for preventing pain. Preventative approaches are sometimes called “pre-emptive pain control”, meaning that pain management measures are taken prior to the occurrence of pain or prior to the procedure. Often this is accomplished through utilizing a combination of medications.
Practitioners will often engage in a multi-modal approach to pain, which involves utilizing a combination of medications and techniques that help address the various ways in which an individual’s body is reacting to pain. These techniques may include some approaches that are non-pharmacological or alternative, such as distraction, hypnosis, or guided imagery.

**Individualized dosage**

The goal of individual dosing is to provide a customized recommendation for dosage that provides the optimal efficacy with no adverse reactions. Individualized dosing is primarily determined by characteristics about the patient, such as age, weight, gender, renal and liver function, and other diseases to ensure that patients receive the medication dose that is right for them. An individualized dosage approach may be taken with even over the counter medications. The approach is worthwhile because it allows practitioners to prescribe a combination of medications in dosages that are just right for each individual’s pain experience.

**Patient-controlled analgesia**

Patient controlled analgesia (PCA) is a process in which the person who is in pain is permitted to administer his or her own pain medication. Practitioners can program the infusion pump, which is the intravenous method of medication delivery. Morphine is frequently delivered this way. Programming the pump helps the patient to control their pain without resulting in an overdose. Dosage is also controlled when the patient reaches a point in their pain relief where they are too sedated to administer more. This also keeps an overdose from occurring.

However, a route other than an infusion pump may deliver patient controlled analgesia. For instance, the most common way patient-controlled analgesia is delivered is through the patient self-administering
oral medication. An example of this would be a medication that a patient may take more of if the initial dose did not effectively alleviate their pain.

Patient-controlled analgesia may also be delivered through inhalation, or through intranasal analgesia, which allows for pain relief to be delivered via a nasal spray that has a built-in feature designed to control how many doses may be sprayed within a certain time period. This control feature helps prevent overdose of the medication.

Finally, patient-controlled analgesia may be delivered transcutaneously. Opioids such as fentanyl are frequently delivered this way. Additionally, local anesthetics – lidocaine, for example – may be delivered transcutaneously.

There are some distinct advantages and disadvantages to patient-controlled analgesia. Advantages would include the fact that the patient can self-deliver their medication, pain is alleviated more quickly because the patient has the control to address the pain immediately, and dosing levels may be monitored very easily through precautionary controls. It has been indicated that patients who utilize patient-controlled analgesia use less medication than do patients who are not on patient-controlled analgesia;\textsuperscript{67} this is because patient-controlled analgesia allows the individual to spend less time in pain, which then leads to fewer overall doses being used.

Disadvantages include the likelihood for abuse of medication (in particular narcotics), as well as the problems that result – such as under or overdosing on the medication – when the delivery system is not properly programmed. Also, it is important to note that patient-controlled analgesia is not appropriate for all individuals. For example, those who are easily confused or mentally disabled may not understand how to properly self-administer. Also, patients who have problems with dexterity
may be physically unable to work the device. Patient-controlled analgesia is not generally appropriate for use in children.

**Local anaesthetic agent**

Local anesthesia is accomplished through the injection of a drug into the immediate area where surgery will take place. It is widely used and accepted in a variety of clinical settings. Surgery in the office is highly dependent on local anesthesia. While this is convenient it is also associated with pain during administration of anesthesia. This pain can be attributed to factors involving the patient as well as the drug and technique. However, it is important to note that some patients are so adverse to this pain experience that they will either postpone or completely decline the surgery.

Factors involving the patient:

The first step any practitioner should take is to carefully explain to the patient exactly what will happen. This will help alleviate anxiety and better prepare the patient psychologically. It is also useful to utilize medications such as diazepam to help relieve anxiety in those patients who are very anxious. Additionally, practitioners can utilize other methods to better help the patient cope with local anesthesia, such as using distraction methods to make the patient more comfortable. Also, rubbing the skin on the injection site reduces that pain of the prick of the needle by stimulating A-fibers and inhibiting C-fibers, a process also known as the *gate control* mechanism.

Another way that pain at the injection site can be reduced is by utilizing a topical anesthetic prior to injection. Yet another way of reducing this pain is by precooling the skin’s surface with ice packs. Factors involving the drugs utilized for local anesthesia: Lignocaine and Sensoricaine are considered to be the most commonly used drugs for local anesthesia.
These drugs have an acidic nature, which is what is responsible for the pain response.

Technical factors:

Twenty-seven to 30 gauge needles are preferred for the initial injection; this is because finer needles cause less pain. When the initial infiltration is made, expanding tissues cause pain; therefore, if the drug is delivered at a slower rate there will be less pain. Additionally, the volume of the medication delivered at the infiltration site is proportional to the amount of pain experienced; this means that whenever possible a smaller volume of medication should be used.

What is most important about local anesthesia is reassuring and counselling the patient so that they are prepared for the experience. If this is done in a confident, encouraging, and unhurried way it will allow for better results overall.

**Opioid analgesics**

Opioid analgesics have been used for the treatment of both acute and chronic pain for thousands of years. The ancient Greeks were the first to identify and use opioids – which were originally derived from opium. From these humble roots, opioid analgesics became one of the main medical therapies utilized for pain each year. Although there have been a number of drugs developed to treat different kinds of pain, there is no other single class of medication that has reached the same level of effectiveness for treating moderate to severe pain.

Opioids are frequently the first course of treatment for a number of painful conditions. Additionally, they may possess certain advantages over NSAID pain relievers. For instance, opioid analgesics do not have a real “ceiling” dosage; they also do not cause direct organ damage. There are, however, possible side effects that come with opioid analgesics.
These include constipation, nausea or vomiting, decrease in sex drive, drowsiness, and depression of the respiratory system. Most patients do develop a tolerance to many of the side effects of opioid analgesics.77

There is some debate over the use of opioid analgesics. It should be noted that some practitioners express concern over the use of opioids for pain conditions. However, opioids are frequently the only suitable course of treatment to control pain that is severe. This is particularly the case post-operatively.75 Morphine is most commonly used in the post-operative period; however, some practitioners feel that other treatment action, such as the use of hydromorphone, is more suitable and better tolerated. Even given this, some recent studies indicate that there is no evidence to support the use of hydromorphone as opposed to morphine, and state that there are risks to using both drugs.78

There is also debate over utilizing opioid analgesics to treat neuropathic pain. This is an area of study that remains a bit controversial. Recently, however, the Cochrane Review discovered that the results of utilizing opioids for neuropathic pain are mixed – shorter-term trials produced contradictory results while intermediate trials indicated the efficacy of opioid analgesia for spontaneous neuropathic pain. Across all trials, the side effects that were most commonly seen were constipation, drowsiness, dizziness, and nausea.79

It is also important to note that some individuals experience adverse reactions to opioid analgesics. This sometimes limits the effective use of opioids in certain patients. One long-term study of patients who took opioid analgesics for an extended period of time indicated that 80% of patients reported suffering at least one adverse consequence; 24% of patients stopped taking the medication as a result of experiencing one of more adverse consequences.80 Of those who discontinued the medication as a result of an adverse consequence, 41% did so because they experienced constipation, 32% did so because they experienced nausea,
29% did so because they experienced somnolence, and 15% did so because they experienced vomiting.\textsuperscript{80}

Discontinuation of opioid analgesic treatment may result in pain being treated inadequately. This is not just an inconvenience; there are consequences to inadequate pain control that may be more far reaching. For example, patients who experience significant pain will experience an increase in autonomic and sympathetic activity.\textsuperscript{81} In particular, older patients have a chance of developing delirium or other cognitive dysfunction.\textsuperscript{82} Using opioid analgesics excessively may also lead to problems. There have been some reports that using opioids excessively can lead into a state of hyperalgesia;\textsuperscript{74} this prompts some practitioners to express concern over utilizing opioid analgesics to control pain. However, the lack of effective pain control can on its own lead to a hyperalgesic state that presents as persistent pain.\textsuperscript{81}

In addition to medical issues that are tied to opioid use, there are some nonmedical issues that sometimes affect the prescribing of these drugs as well as the patient usage of the drugs. Some physicians express concern over prescribing opioids because potential legal issues may arise.\textsuperscript{83,84} Additionally, addiction is a concern, particularly among patients.\textsuperscript{85} Clinical opinion polls on the subject indicate that true addiction to opioids occurs in a small percentage of the patient population who receive opioids for chronic pain.\textsuperscript{86} Appropriate dosing and use can help ensure that addiction does not become a problem.

**NSAIDs (Non-steroidal anti-inflammatory drugs)**

NSAIDs is an abbreviation for *nonsteroidal anti-inflammatory drugs*. These are a class of drugs that provide relief for pain and fever, and in higher doses have anti-inflammatory effects. The name is meant to distinguish this class of drugs from steroids, which have a similar anti-inflammatory action. NSAID are unusual because they are non-narcotic. The most well-known members of this class of drugs are: aspirin,
naproxen and ibuprofen. All of these drugs are available for purchase over the counter in most areas of the world.

NSAIDs are generally indicated to treat acute or chronic pain conditions, particularly those where inflammation is present. Research is currently being done to examine the potential of NSAIDs in treating or preventing other conditions, such as some cancers.

NSAIDs are usually indicated for relieving symptoms for a number of conditions, including.\(^{87}\)

- Rheumatoid arthritis and osteoarthritis
- Inflammatory arthropathies
- Gout
- Mestatic bone pain
- Pain post-procedure
- Pain due to Parkinson’s disease
- Fever
- Renal colic
- Menstrual pain
- Headache, including migraine
- Pain from inflammation and tissue injury

Though commonly thought of as an NSAID, acetaminophen is in fact not in this class of medications. This is because acetaminophen has little anti-inflammatory properties. Acetaminophen works to relieve pain by blocking COX-2, primarily in the central nervous system.\(^{88}\)

NSAIDs are advantageous, but they are also not without risk. The two most prominent adverse reactions seen with NSAIDs are gastrointestinal and renal problems. Side effects, however, are dose dependent. In some cases they are so severe that they present as a risk of ulcer perforation or gastrointestinal bleeding, or death. This limits the usage of NSAIDs.
It is important to remember that NSAIDs are drugs that have the possibility of interacting with other medications. For instance, using NSAIDs and quinolones together can raise the risk of effects in the central nervous system, including seizure.\textsuperscript{89,90} Additionally, people who are on a daily aspirin regimen should be wary of taking other NSAIDs at the same time, as this may affect the cardioprotective aspects of aspirin.

There are still many unexplained aspects of the mechanism of action for NSAIDs. One hypothesis is that there are further COX pathways to explore.\textsuperscript{88}

**Muscle relaxant**

Pain management is a high priority for those individuals who suffer from pain. The usage of muscle relaxants to manage pain is gaining ground. These drugs include medications that reduce muscle spasms, such as diazepam, lorazepam, metaxalone, or alprazolam or some combination of drugs, such as orphenadrine and paracetamol.\textsuperscript{91} Additionally, these drugs include medications that prevent increased muscle tone, such as baclofen and dantrolene. Antispasmodic and antispasticity medications have gained clinical acceptance as well. However, research for antispasmodic and antispasticity medications indicate that there are doubts as to the effectiveness of these medications.

In one review\textsuperscript{91} conducted to determine the safety and efficacy of muscle relaxants for managing pain in patients with rheumatoid arthritis, researchers discovered that across six trials – and with a total of 126 participants – there was no indication of any beneficial effects of muscle relaxants over a placebo for treatment of pain, and that in trials that lasted longer than 24 hours, participants experienced a marked increase in the likelihood for adverse effects. These effects were primarily side effects in the central nervous system, including such effects as dizziness and drowsiness.
Anti seizure drug

Anti-seizure drugs were originally designed and intended for use in epileptics. However, these drugs work to calm the nerves, which in turn can aid in quieting stabbing, burning, or shooting pain, primarily that found in nerve damage.

Many things can damage the nerves, including injury, disease, surgery, or exposure to toxins. After damage, these nerves are activated in an inappropriate way and relay pain signals that do not serve any useful purpose. Pain from nerve damage is frequently one of the most difficult to control and can be debilitating.

Nerve damage, also called neuropathy, may be caused by a number of conditions, which includes:

- **Diabetes**: It is not uncommon to experience nerve damage as a result of high blood sugar levels, which are common in diabetes. Usually the first symptom of neuropathy in diabetics is numbness or pain in the hands and feet.

- **Shingles**: The same virus that causes chicken pox and presents as a rash that includes blisters that are extremely painful and itchy causes shingles. Postherpetic neuralgia is the condition that occurs if the pain from shingles continues after the rash has disappeared. The risk of shingles increases in an individual’s age, so it is a good precautionary measure for anyone over 60 to make sure they receive the zoster vaccine, which can assist in preventing this condition.

- **Chemotherapy**: Sometimes chemotherapy drugs may damage nerves, which in turn causes pain and numbness that is usually first experienced as a tingling in the fingers and toes.

- **Herniated disk**: Damage to the nerves may occur as a consequence of a herniated disk when the disk squeezes a nerve passing through the vertebrae too tightly.
• **Inherited neuropathies**: Some types of neuropathy are passed on genetically. These neuropathies may affect different nerves; this is all dependent on the type of disorder. The most common of these neuropathies is Chacot-Marie-Tooth disease, which works by affecting the individual’s motor nerves and sensory nerves.

It is not fully understood how anti-seizure medications help with pain management, but these medications seem to interfere with the overactive relay of pain signals that are sent from damaged nerves.

Anti-seizure medications, while helpful, do have their disadvantages. One such disadvantage – which is one of the warnings the Food and Drug Administration has indicated as a danger of anti-seizure medications – is that all of these medications are linked to an increase in suicidal thoughts or behaviour. Patients and practitioners must maintain effective communication through the prescribing period to ensure that these types of thoughts and behaviour are promptly caught and managed.

**Tricyclic antidepressants**

Antidepressants are usually seen as a mainstay for treating pain conditions, in particular those that are chronic. This is often the case even when depression is not a factor. While the FDA does not approve these to treat chronic pain conditions, they are widely utilized.

Antidepressants are utilized to treat a number of pain conditions, including those caused by:

- Arthritis
- Postherpetic neuralgia
- Migraine
- Tension headache
- Fibromyalgia
- Pelvic pain
Diabetic neuropathy
Low back pain

How these drugs work is not entirely understood. One theory is that antidepressants may increase the neurotransmitters in the spinal cord that in turn reduce pain signals. However, it is important to note that antidepressants do not provide immediate pain relief. Pain relief with antidepressants may occur in the first week following the initiation of an antidepressant regimen, but maximum pain relief can take several weeks. Pain relief that comes from an antidepressant regimen is usually moderate.

One of the most effective groupings of antidepressant drugs for pain are tricyclic antidepressants. These include:

- Amitrityline
- Clomipramine
- Desipramine
- Imipramine
- Nortriptyline

While useful, tricyclic antidepressants are not without their disadvantages. These disadvantages mostly come in the form of uncomfortable side effects, including blurred vision, dry mouth, weight gain, changes in blood pressure, drowsiness, constipation, and difficulty urinating. To help prevent side effects, practitioners should start patients at a lower dose and slowly work to increase the dose. The doses that are usually used for pain management are usually lower than the doses utilized to treat depression.

**Alpha adrenergic agonist**

Alpha adrenergic agonists are commonly utilized for ailments such as bradycardia. However, they have their uses for pain management as
well. Alpha-adrenergic agonists are a kind of sympathomimetic agent that works by simulating alpha-adrenergic receptors. There are two classes associated with the alpha-adrenergic receptor: α1 and α2.

Two drugs in particular have been shown to provide very effective pain relief. Both are alpha-2 adrenergic agonists. The first is tizanidine, which works very effectively at managing pain that results from tension headache as well as back, neuropathic, and myofacial pain. The second is clonidine, which works well at treating neuropathic pain that hasn’t responded well to other treatments.

**Treatment of migraine headache**

Migraine treatment is unique in that pain can often be anticipated with migraines, which means that the goal of treatment is focused on both prevention and relieving symptoms. There are several pharmacological treatments that specifically treat migraines, although some treatments that work on other types of pain – such as the application of ice to the forehead – are also useful in treating migraine headache.

Drug use for migraines is divided into two categories – acute, which involves medication that is taken at occurrence in an attempt to ease or abort migraine symptoms; and preventative, which means the individual would take medication every day to prevent occurrence of migraine headache.

Acute treatments include:

- **Triptan drugs** to help increase the levels of serotonin in the brain. This causes blood vessels to constrict, which lowers the pain threshold. These drugs are the preferred treatment method for migraine, and they ease moderate to severe pain. Triptans are available as injections, tablets, or nasal sprays.
- **Ergot derivative drugs** work by binding to serotonin receptors, which in turn decreases the transmission of messages of pain along
the nerve fibers. These drugs are more effective if the individual is still in the early stages of a migraine. Ergot derivative drugs are available as nasal sprays or injections.

- Nonprescription analgesics are also good choices for treating migraine. These include ibuprofen, acetaminophen, or aspirin. Some brands – such as Excedrin – are specifically formulated to treat less severe migraines. These brands are usually considered combination analgesics, as they frequently combine a non-prescription analgesic with another pain relieving agent, such as caffeine.

- Non-steroidal anti-inflammatory medication can help by reducing inflammation and alleviating pain.

- Taking a combination that includes a nausea relief drug can help by easing queasiness that is frequently seen with migraine headache.

- Sometimes narcotics are the way to go in treating migraine. Narcotics should be used for severe pain. They should also only be used for brief periods – if the individual experiences chronic headaches narcotics are not good options.

Prevention treatment should be seriously considered if the individual experiences migraine one or more times per week, or if their migraines are disabling.

Preventative treatments include:

- Anticonvulsants, which are often helpful for people who experience other kinds of headache in addition to experiencing migraine. Anticonvulsants were originally developed to treat epilepsy; however, they are also useful for dampening pain impulses.

- Beta-blockers are frequently effective in treating migraine.

- Calcium channel blockers work to stabilize the walls of blood vessels and work by preventing the blood vessels from widening or constricting. This helps alleviate the occurrence of headache.
Additionally, there are several natural treatments available to help prevent migraine. These include vitamin B2, coenzyme Q10, magnesium, and butterbur.

**Non Pharmacological management**

The non-pharmacological management of pain refers to pain management without medication. Generally, non-pharmacological pain management uses ways to alter thoughts or focus to help decrease pain.\(^{55}\)

**Cutaneous stimulation and massage**

Massage therapy has ancient origins and can be highly varied.\(^{97}\) Massage therapy helps alleviate pain by releasing neurochemicals, including oxytocin, a neuropeptide. Massage has been linked to reduced blood pressure and heart rate and can also lower muscle or myofascial tension. The benefits of massage can become ongoing and give long-term pain relief when the massage therapy is regular and consistent.

Massage is particularly good for treating back pain or for treating certain types of headache, such as migraine. In one study of individuals with low back pain, those who received regular massage therapy had less intense pain as well as a decrease in the quality of pain. At a one-month follow-up, 63% of patients who received massage therapy reported having no pain.\(^{98}\) Likewise, in a study of 26 migraine sufferers, those who received regular massage therapy sessions (defined as two 30-minute massages per week for 5 weeks) experienced less pain and sleep disturbances as well as more days free of headache.\(^{99}\)

**Ice and heat therapies**

Ice and heat therapy is simple, yet effective, at managing certain types of pain, particularly pain in the lower back, muscle strains, or pain from arthritis.\(^{100}\) It is essential, however, to understand how to properly use these therapies to maximize pain relief.
Utilizing ice packs for the relief of back pain:101

An ice or cold pack should be applied to the affected area for not more than 20 minutes at one time; application can take place several times per day.

There are different types of ice or cold packs that may be used to help relieve pain in the lower back. Patients may select whichever option works best, or whichever option they prefer. These options include:

- **Reusable cold packs or ice packs:** There are a number of different kinds of reusable packs available for purchase at drug stores. These packs are often filled with gel and can be refrozen after each use. Individuals may also opt to make their own reusable gel ice packs. Filling a small sealable bag with liquid dishwasher detergent and freezing it is a way to do this.

  Other homemade, reusable options include: placing ice in a plastic bag and holding on the affected area; freezing a damp towel and then placing it on the affected area; freezing a wet sponge, and once it is frozen placing it in a bag that is then wrapped in a towel or sock before applying to the affected area; filling a sock with rice and freezing it before placing it on the affected area; utilizing a frozen bag of peas for a quick ice pack.

- **Disposable/Instant ice packs:** Some packs are for single use only. These are generally available at most drug stores. However, a distinct advantage that many single use packs have is that they have the ability to become cold almost immediately. They also generally stay colder for a longer amount of time, even when used in warmer temperatures. There are disadvantages to single use packs, one being that they can only be utilized once, which can make them more expensive than reusable or homemade ice packs.
Ice massage therapy may also be used for pain in the back. This can be done by using regular ice cubes, or by freezing water in a paper cup and then peeling part of the cup away to reveal the block of ice. Ice massages may be done by the patient themselves or by someone else. Patients can give themselves ice massages by lying to the side and reaching around the back to apply ice to the affected area.

There are five steps to a successful ice therapy massage:

- The ice should be applied gently and massaged on the skin in a circular motion.
- The focus of the massage should be kept to an area of six inches around where the pain is felt.
- It is important not to apply the ice directly to the bony portion of the spinal column.
- Ice therapy massage should be done in 5-minute increments to avoid ice burn.
- Massage may be repeated 2 to 5 times per day.

Patients should usually not apply the ice directly to skin without barrier in order to avoid burning the skin. In ice massage therapy, however, it is okay to apply ice directly to skin because the ice does not stay stationary. The aim of ice massage therapy is to make the area numb without burning the skin. After the numbness occurs, the individual can perform gentle movement that applies minimal stress to the affected area. Once the numbness wears off, ice massage therapy can be conducted once more for another cycle. Ice massage is most helpful in the 48 hours first following an injury. After this time period, heat therapy is generally more beneficial to healing.

There are some precautions individuals should take to avoid getting ice burns. These include:
• Being certain to keep ice moving in a slow and circular motion without staying in one place for too long.
• Limiting ice massage to five-minute periods.
• Making certain not to fall asleep with ice resting directly on skin.
• Avoiding ice application of all kinds if the individual has certain health conditions, such as those who have rheumatoid arthritis, cold allergic conditions, and areas of impaired sensation or paralysis, or Raynaud’s Syndrome.

Beyond being comforting, heat serves as an effective therapy for pain relief. Heat therapy has the ability to provide pain relief as well as healing benefits, particularly for those with lower back pain. Heat therapy works to prevent pain, particularly in the lower back, through a number of mechanisms, including:

• Dilation of the blood vessels in the muscles surrounding the spine. This increases oxygen flow as well as the flow of nutrients to the muscles, which helps to heal damaged tissue.
• Stimulation of the skin’s sensory receptors; this means that applying heat therapy serves to decrease the transmission of pain signals to the brain and relieve discomfort.
• Facilitate the stretching of soft tissues around the spine. This means that there will be a decrease not only in injury but also in stiffness. This serves to increase flexibility as well as provide a more universal feeling of comfort.

Heat therapy has the advantage of being inexpensive and easy as well as very beneficial. Heat therapy is much less expensive in general than many other forms of therapy – it is often even free, such as when the individual takes a hot bath. It is also easy – heat therapy can take place at home or even by utilizing on the go portable heat wraps. Finally, heat therapy is appealing in that it is non-invasive and non-pharmaceutical.
Lower back pain from injury is not the only kind of pain that heat therapy can alleviate. Heat therapy also has the ability to reduce pain or soreness post-exercising. One recent study of more than 60 participants that tested the effects of low level heat therapy to delay the onset of muscle soreness concluded that it is possible to prevent delayed-onset muscle soreness by wearing heat wraps on the lumbar region prior to exercise. This is a particularly important find because it is imperative to back health to remain active, as the back and spine benefits from activities that increase blood flow.

Exercise also helps maintain flexibility, which is important to back health as well. However, muscle pain that results from exercising proves to be a deterrent to maintaining regular exercise activity. Therefore, research indicates that since heat wrap therapy can help minimize or eliminate the muscular discomfort that results from exercise, more individuals who are concerned about pain now have hope of staying on track with an exercise program if they apply heat therapy before exercising. Low-level heat therapy wraps are very accessible as over the counter at most drug stores, or at medical supply outlets.

**Transcutaneous electrical nerve stimulation**

Transcutaneous electrical nerve stimulation (TENS) is a type of stimulation that utilizes small electrical pulses that are delivered to nerve fibers through the skin. These pulses cause the muscles to change in certain ways, such as becoming numb or contracting, which results in temporary pain relief. Additionally, there is evidence that TENS may activate certain subsets of nerve fibers that may block the transmission of pain at the spinal level.

**Distraction**

Distraction is a useful tool to help alleviate pain, particularly for children. In children, using colourful objects, singing, telling stories, or
reading books and viewing videos is particularly useful for distraction. Older individuals can engage in distraction techniques such as watching television or listening to music. Distraction in the form of video or board games can sometimes prove effective. Distraction eases pain by taking the individual’s attention away from the sensation of the pain.

Distraction need not be tangible. Mentally distracting oneself can work just as well as physically distracting oneself. Picturing a pleasant place or experience from the past can help the individual work through the pain sensation.

**Guided imagery**

Guided imagery offers patients the opportunity to form images of their pain and in turn conduct a dialogue with the pain. Guided imagery provides patients with an environment that is primarily established by a trained therapist asking questions, where the patient can create their own images that they will then use to understand their pain and communicate with it.

Pain is an excellent arena for the use of guided imagery, although the technique is used for a range of issues. Since many people who have pain worry about it and imagine that it may never end, they end up seeing themselves in a state of helplessness. The aim of guided imagery is to use images to change that perception of helplessness by allowing the patient to converse with the pain and therefore have some power to change the situation.

In one study of 177 individuals who had chronic back pain, 76% treated with guided imagery were living normal lives with little or no pain, 8% had experienced improvement in their pain, and 16% experienced no change. The majority of people in this study experienced immense improvement, which indicates that guided imagery is a viable treatment option for pain.
Biofeedback is often used along with guided imagery to allow practitioners to observe how the individual is making changes to their bodily functions. Biofeedback is accomplished through hand held machinery that offers the practitioner an audio and visual look at how heart rate and muscle tension changes as the individual moves through guided imagery.

**Hypnosis**

Hypnosis was first approved by the American Medical Association in 1958 to be used in a medical environment. Hypnosis is an increasingly popular treatment, particularly when used in conjunction with medication. In hypnosis, a professional psychologist or physician guides the individual into a state of altered consciousness that permits the individual to focus their attention in such a way that pain is then reduced.\(^{55}\)

Hypnosis is generally utilized to control a physical response, such as the amount of pain a person can withstand. Hypnosis likely results in pain relief by acting on certain chemicals within the nervous system, in turn slowing impulses.\(^{108}\) While in a hypnotic state, the individual temporarily tunes out the conscious aspect of the brain; this leads to a reduction in distracting thoughts. Other physical changes occur, such as the slowing of respiration and pulse rate. Additionally, individuals become more open to suggestion, which makes hypnosis perfect for making suggestions to reduce pain. Following hypnosis, the practitioner can then reinforce the suggestions made to help the individual continue with the new, healthier behaviour.

An experienced practitioner generally conducts hypnosis in increments of half an hour to one hour to start, followed by 10 to 15 minute follow-up appointments. Some practitioners are able to give the individual post-hypnotic suggestions to allow the individuals to induce hypnosis by themselves after the course of treatment is complete.
Relaxation techniques

Relaxation techniques involve things such as deep breathing or stretching to reduce pain. Deep breathing allows for greater focus and mindfulness, which may lead to pain reduction by acting on chemicals in the nervous system. Additionally, greater delivery of oxygen to the brain can help alleviate pain in certain pain conditions, such as in some types of headache.

Stretching is commonly recommended to help reduce pain, with one of the most recommended stretching activities being yoga. Not only does stretching help with flexibility, and therefore pain, but also activities such as yoga refocus attention, which helps alleviate pain.

Another relaxation technique is performing muscle relaxation exercises. This involves the individual moving through a series of movements in which they at turns tense and relax certain groups of muscles in a certain order. Often this technique begins at the feet and moves upward to the head area.

Still another relaxation technique is meditation. Meditation involves clearing the mind by entering a state of mental and physical quiet to reduce anxiety. This practice leads to lowered blood pressure and slowed metabolism, as well as an increased threshold for pain. Even though the mind and body remain relaxed the individual is still awake and alert.

Relaxation training is often useful in those who suffer from migraine headache. Utilizing this kind of training allows the individual to control the development of their pain as well as monitor the body’s response to stressors.
NEUROLOGIC AND NEUROSURGICAL APPROACHES TO PAIN MANAGEMENT

Stimulation procedures

Electrical stimulation, which includes transcutaneous electrical stimulation (TENS), deep brain and spinal cord stimulation, or implanted electric nerve stimulation, is an extension of age old pain management practices where the nerves are subjected to a variety of stimuli. This includes cold or heat therapy, or massage. However, electrical stimulation requires a major surgical procedure and is not the right choice for everyone. Additionally, electrical stimulation is not 100% effective. The techniques utilized in electrical stimulation require special equipment as well as personnel that are trained in the exact procedure being used. These techniques are outlined below:

- **TENS** utilizes small electrical pulses that are delivered to nerve fibers through the skin. These pulses cause the muscles to change in certain ways, such as becoming numb or contracting, which results in temporary pain relief. Additionally, there is evidence that TENS may activate certain subsets of nerve fibers that may block the transmission of pain at the spinal level.

- **Deep brain and intracerebral stimulation** is a more extreme treatment that requires that certain areas of the brain, particularly the thalamus, be surgically stimulated. This type of stimulation is generally only used for certain conditions, such as severe pain, cancer pain, central pain syndrome, and phantom limb pain.

- **Stimulation of the spinal cord** utilizes electrodes that are surgically inserted into the epidural space in the spinal cord. Individuals are then able to deliver a small electrical charge to the spinal cord by using a small receiver.
• Peripheral nerve stimulation utilizes electrodes that are placed on certain areas of the body. Individuals are then able to deliver a small electrical charge to the area that is affected by using a small transmitter.

Administration of intraspinal opioid

Pain is extremely common, and is especially so in the low back. This type of pain can be devastating and disabling. While it is true that analgesics can provide relief in a fair number of patients, intraspinal opioids are a good option for those who are unable to tolerate oral medication. Intraspinal opioids are delivered via an implanted pump.

While intraspinal opioids can be advantageous, they come with similar side effects as do other opioid treatments. It is essential that practitioners work to identify those best suited for this type of therapy.

 Interruption of tract conducting the pain

Nerve blocks for management of pain are utilized both for diagnosis and for therapeutic purposes. Some common diagnostic and therapeutic blocks are identified below:

• **Epidural steroid injections**: These are used in particular if there is sharp, shooting pain in the spinal nerve and is performed if the pain is bilateral and includes multiple level nerve roots.

• **Selective nerve root blocks**: This type of block is done if there are only one or two nerve roots involved in radicular pain. This block is sometimes utilized for diagnosis.

• **Peripheral nerve blocks**: This type of block is done if the pain is in the distribution of peripheral nerves.

• **Autonomic ganglion blocks**: These types of blocks are utilized both for diagnostic and therapeutic purposes. There are a number of pain conditions for which these are used.
ALTERNATE THERAPIES OF PAIN CONTROL

A variety of factors affect how pain is perceived and dealt with. One factor is the extent and type of injury. Another is emotion and state of mind. Altering an individual’s mood or state of mind can be very effective when treating pain conditions.\(^4\) Regardless of the alternative therapy chosen, relief of pain is the number one reason why Americans consult alternative therapies.\(^1\) In an effort to locate alternative therapies that are effective at relieving pain and with few side effects, Americans spend billions each year on alternative treatments.\(^1\)

The National Center for Complementary and Alternative Medicine studied 31,044 adults and discovered that of these adults 36% had utilized some form of alternative medicine therapy in the preceding 12 months.\(^1\) The researchers suggested that alternative therapies might be seen as viable choices if other therapies proved to be ineffective or had too many side effects. It is therefore essential that practitioners be aware of the alternative therapies – and adequately educated in their usage – that may be utilized to treat pain and answer patient questions effectively to ensure that there are no interactions with drug therapies, if they are being used.

One study conducted by Eisenberg et al.,\(^1\) indicated that many medical providers do not adequately address the use of alternative therapies because they are not knowledgeable enough about them. Another study indicated that patients were likely to begin these therapies without speaking to their provider because of a perceived disapproval of the therapy. Therefore, it is essential that practitioners gain the necessary knowledge and remain open-minded to the use of alternative therapies in order to ensure that patients have the proper care.\(^1\)

**Music therapy**

Music therapy is a practice in which musical intervention is utilized to manage an individual’s pain. A credentialed professional who has
completed a course of education in a music therapy program typically performs music therapy. Music – along with the development of a therapeutic relationship – is utilized to address physical, cognitive, or psychological needs in individuals of all levels of functioning. Music therapy is a non-invasive therapy. Music therapy outcomes are mediated through the patient’s responsiveness to the music and the music therapy relationship. Emerging finds in the area of neuroscience indicate that some individuals respond better to music therapy than do others.\textsuperscript{115} The reason for this is not yet known.

**Herbal therapy**

Utilizing herbal therapies to treat pain is becoming increasingly popular.\textsuperscript{116} Herbal therapies may be used alone or as a way to complement traditional approaches. However, it is important to note that research in this area that examines the efficacy of such therapy is quite limited. There are still a number of questions that remain about the underlying mechanisms in herbal therapy to provide analgesia.\textsuperscript{117} In spite of the fact that they are utilized extensively, there is a lack of scrutiny or regulation on herbal supplements.

A great number of those who utilize herbal therapies have chronic conditions. One study by Boon \textit{et al.},\textsuperscript{118} indicated that some individuals who have breast cancer utilize alternative therapies – including herbal therapy – for a variety of reasons, including boosting the immune system, increasing the quality of life, providing a feeling of control in their lives, and to aid other medical treatment or to treat the cancer itself. There are many problems that lead individuals to utilize herbal therapies, but the most common are anxiety, chronic pain, back problems, and urinary tract problems.\textsuperscript{119} According to several studies,\textsuperscript{120} those most likely to seek alternative treatment are women and older adults.

Most individuals believe that herbal treatments have fewer side affects than do conventional medical treatments.\textsuperscript{113} However, those who use
herbal therapies do face the potential of adverse effects, including drug and herb interaction, as most alternative therapies are utilized in conjunction with conventional medical approaches. In fact, one survey indicated that 79% of survey respondents believe that the combination of alternative therapies and conventional therapies is more effective than is either approach on its own.

It is important to consider the possible risks associated with herbal therapies. For example, interactions between herbs or between herbs and standard medical treatment can produce undesirable side effects. One such interaction is the interaction between St. Johns Wart and certain antidepressants such as Zoloft (setraline); side effects of this combination include nausea or vomiting, or anxiety. Additionally, herbal remedies remain unstandardized; a fact that can prove difficult for practitioners to determine exactly what is causing an interaction. A study conducted by Abbott et al. indicated that 8% of those participants who tried herbal medicine had some sort of adverse reaction. Some researchers indicate that herbal remedies are simply dilutions of naturally occurring drugs, which may contain many different chemicals that are not well regulated or well documented.

Further, labels on herbal therapies are not always a reliable source of information, not often listing details such as effectiveness or potential side effects. The lack of information is opposed to what the general public believes must be included on labelling on herbal remedies. For example, in one study 68% of study participants indicated that they thought the government required makers of herbal remedies to provide labelling that detailed the remedy’s possible side effects and dangers.

**Reflexology**

Reflexology involves applying appropriate pressure to certain areas of the feet, hands, or ears, which in turn alleviates pain or improves an individual’s general health. Qualified reflexology therapists perform
Reflexology should not be used to diagnose or cure medical problems; however, millions use it as a complement to other medical treatments. It is in particular used to address conditions such as anxiety, cancer, diabetes, asthma, cardiovascular problems, headaches, and premenstrual syndrome.

Reflexology is growing in popularity in particular in Europe and Asia and is used in these regions as a complement to other medical treatments as well as a preventative measure. The power of reflexology can be seen through the results obtained by corporations in Denmark who have employed reflexologists starting in the 1990s. Studies indicate that utilizing reflexology has resulted in a lowered amount of sick leave or absenteeism for corporations that have employed reflexologists. Employees also have reported experiencing greater satisfaction with their jobs after having 6 reflexology sessions. There are a number of reflexology points in several areas on the body. Reflexology theory indicates that there are reflexology points on the feet, hands, and ears. These correspond to certain organs, bones, or body systems. Applying pressure to certain organs can affect organs or body systems. Most reflexologists use maps to see what areas correspond with different areas of the body, as demonstrated below:

Reflexology points on the feet and their corresponding systems. Obtained from: UMN Center for Spirituality & Healing
Each foot on the map represents one half of the body, divided vertically. For example, the left foot corresponds to all organs and systems on the left side of the body; conversely the right foot corresponds to all organs and systems on the right side of the body.

Reflexologists may perform a general session in which multiple organ systems are addressed, or he or she may choose to focus on one specific problem area. For instance, if there is limited time and the person needs to relax quickly, the reflexologists may choose to work only on the ears. Regardless of the chosen approach, reflexology works to release stress in the nervous system and provide energy balance for the body.

Researchers from the University of Portsmouth who have studied the effects of reflexology have discovered that people perceived around 40% less pain as well as were able to withstand pain sensations for approximately 45% longer when reflexology was utilized as a mode of pain relief. Participants in the study conducted at the university were told to submerge their hand in a bucket of ice water. All participants participated in both a session where they received reflexology prior to submersion as well as a session in which they believed they were receiving a TENS treatment, although the machine was not actually turned on. Researchers discovered that participants receiving reflexology prior to submersion had the ability to keep their hand submerged longer as well as a greater ability to tolerate the pain from the ice for a longer time period.

Dr. Carol Samuel, who was a researcher on the study of reflexology, indicated that the study is one of the first to scientifically examine reflexology as a pain relief treatment. Samuel indicated that the results of the study suggest that reflexology may be effective when utilized as a complement to conventional drug therapy in certain conditions, such as cancer, osteoarthritis and backache. She went on to state, "As we predicted, reflexology decreased pain sensations. It is likely that
reflexology works in a similar manner to acupuncture by causing the brain to release chemicals that lessen pain signals". 127

Reflexology is commonly criticized for not being studied appropriately and under carefully controlled enough conditions. However, in this study TENS was utilized as the control against which reflexology was studied, and therefore has a greater scientific basis. Dr. Samuel has gone on to add, “This is an early study and more work will need to be done to find out about the way reflexology works... however, it looks like it may be used to complement conventional drug therapy treatment of conditions that are associated with pain...” 127

**Magnetic therapy**

Magnets have not been shown to work effectively for any purpose related to health; however, static magnets are widely marketed as a device to help alleviate pain. 128 Since scientific research does not support magnet usage as a viable technique to alleviate pain, it is not recommended that magnets be used in replacement for conventional treatments. Additionally, individuals should not utilize magnets in lieu of seeking help from a licensed health professional. It is important to note that magnets are not a safe treatment method for all individuals, particularly those who use insulin pumps or pacemakers, as magnets can interfere with these devices. 129 Generally, however, it is safe to use magnets; and, practitioners should simply be aware if an individual is trying magnet therapy and know the risks so that he/she can pass information on to the patient. There have rarely been side effects or complications resulting from magnet therapy.

Magnets produce a force that is measurable; this is called a magnetic field. Magnets that are static – the kind of magnet used in magnet therapy – have fields that do not change in measureable force. Magnets are generally made from certain metals or alloys, such as iron or some other mix of metals. Magnets come in different strengths that are
measured in gauss units. The type of magnet generally marketed for relief of pain have strength of 300 – 5,000 gauss.\textsuperscript{130} To put this into perspective, this strength is many times greater than the magnetic field of the earth, but much less strong than the magnets utilized in MRI machines, which are about 15,000 gauss or higher. Magnets are frequently marketed for a number of different kinds of pain, including pain in the back or pain that results from conditions such as fibromyalgia. Magnet therapy is also available in a number of different forms, including insoles for foot pain, bracelets or other types of jewelry, in mattress pads for back pain, and in bandages to prevent localized pain relief.

While there is no scientific evidence supporting utilizing magnet therapy for pain, a study sponsored by the National Institutes of Health\textsuperscript{129} that examined back pain in a small pool of participants has indicated that participants generally benefited from utilizing magnets. However, this study is not conclusive, as it was small; most of the more rigorous trials have indicated that magnets do not have any affect on pain.

**Electrotherapy**

Electrotherapy is a treatment that is commonly utilized to help reduce both acute and chronic pain.\textsuperscript{131} It is considered most helpful to utilize this treatment immediately following the injury. Electrotherapy works by stimulating the nerve fibers with small currents of electricity. This stimulation then in turn promotes the release of endorphins, which alleviates the pain. Electrotherapy treatment is conducted by a qualified health professional. Electrotherapy may be used in addition to other therapies such as heat and cold therapy or conventional medical treatments.

There are several types of this non-painful therapy, which differ in frequency, effect, and waveform. Some of the commonly utilized forms of electrotherapy are transcutaneous electrical stimulation (TENS) and
percutaneous electrical stimulation (PENS), inferential current (IFC), and galvanic stimulation (GS):

- **TENS** utilizes small electrical pulses that are delivered to nerve fibers through the skin. These pulses cause the muscles to change in certain ways, such as becoming numb or contracting, which results in temporary pain relief. TENS machines may be utilized in a clinical setting, or individuals will be instructed in how to utilize one of these units at home. TENS is a therapy that can be tolerated for hours, but pain relief lasts for a shorter period.

- **PENS** is an electrotherapy treatment that is similar to TENS, only PENS utilized thin, acupuncture-type needles. This electrotherapy treatment is generally tolerated for a shorter amount of time than is TENS, but pain relief also usually lasts longer.

- **IFC** is a deep form of TENS and works by delivering a high-frequency waveform that penetrates skin very deeply. This is a good therapy to target those deeper causes of pain sensation.

- **GS** is an electrotherapy that issues a direct current over the area treated. This current affects blood flow. This type of electrotherapy is most commonly utilized for acute injuries that result from major trauma and that are combined with bleeding or swelling. GS is also effective at treating lower back pain or muscle spasms.

**Polarity therapy**

Polarity therapy is a therapy that believes that the balance and flow of energy within the human body is a foundation of good health. In this therapy, optimal health is attained when the energy systems within the body function naturally and the energy within the body flows smoothly with no blockages or fixations. Polarity therapy asserts that when energy within the body is not correctly balanced, or is blocked or fixed due to certain factors (such as stress), pain and disease are the result.\(^\text{132}\)}
In the typical polarity therapy session, a trained practitioner assesses the energetic attributes present by utilizing such techniques as palpitations, interview, and observation. The polarity therapist works with clients through “energetic touch”, which means: “verbal interaction is energetic communication which has to do with reading the energy in people’s words and staying neutral vs. engaging in the emotions of the patient and verbal interaction.”132 Energetic contact can be light, medium, or firm. Generally the effects the patient feels during a session are feelings of warmth and tingling. The goal of polarity therapy is to increase the individual’s awareness of the energy flow in the body. While there is no scientific evidence to support the claims that polarity therapy effectively rebalances the body, many individuals like the therapy and utilize it in conjunction with other alternative therapies or with conventional medical treatments.

**Acupressure**

Acupressure is a “reflex therapy”133 that is similar to reflexology. Acupressure works with different points on the body to affect problem areas or even entire body systems. However, there are differences between acupressure and reflexology, the most prominent being that while reflexology focuses on the hands, feet, and ears, acupressure practices according to meridians, which are thin energy lines that travel the entire length of the body. Acupressure manipulates the more than 800 points on these meridians in an effort to provide pain relief.

Some individuals confuse practices such as acupressure with massage therapy. However, massage therapy seeks to “work from the outside in”133 by manipulating certain muscle groups to relieve pain and stress. Conversely, acupressurists view their work as “working from the inside out”133 by applying pressure to certain points that in turn stimulates the nervous system and releases pain and stress.
Acupressure points are also called “potent points”. These points on the meridians are believed to be places on the skin that are particularly sensitive to bioelectric impulses. When the points are stimulated, endorphins are released and pain is in turn blocked and relieved. Additionally, the flow of oxygen and blood to the target area increases, which allows the muscles to relax. In addition to pain relief, acupressure may help deliver new balance to the body by relieving the tension and stress that is causing it to function irregularly.

Emu oil therapy

Emu oil is oil that contains elevated levels of Omega 3, 6, and 9. Emu oil is also a natural anti-inflammatory and is effective at easing the pain that comes from arthritis, back pain, and sports injuries as well as swelling. Emu devotees utilize emu oil as a rub to relieve pain. Emu oil is considered safe for all ages – from babies to senior citizens – and there...
are no known side effects of the treatment. There are also no scientifically proven benefits to emu oil treatment either, although emu oil is claimed to relieve a variety of ailments, including: headaches, cough, certain skin or hair conditions, burns, a variety of wounds, muscle problems, joint problems, pain from shingles, itching from insect bites, and arthritis. Given the lack of scientific data on this treatment, emu oil is best utilized in addition to conventional therapies.

**Pectin therapy**

Pectin therapy, while increasing in popularity, is not a proven remedy for pain management. However, it is popular among athletes in particular to use for aches and pains, particularly the types of aches and pains that accompany arthritis. In fact, in a profile of Bill Weinacht, an 84-year-old champion sprinter; Weinacht detailed how he utilized the combination of Certo and grape juice to help him return to competition. However, it is important to note, Weinacht admitted that he does not rely only on this remedy, but also take supplements such as glucosamine and chondroitin.

The source of pectin therapy is unknown, but this therapy has been around since the 1940s. Joe Graeden, who writes The People’s Pharmacy, has indicated that there are a couple recipes that are effective for managing osteoarthritis. The first recipe is a combination of Certo and grape juice, taken three times daily. The second recipe is also a combination of Certo and grape juice; however, it only needs to be taken once daily. Certo is a soluble fiber that is derived from the cell walls of certain fruit, including apples, bananas, grapefruit, and pears.

While there are no scientific studies that show that the combination of Certo and grape juice ease pain, some studies, such as a study done out of the University of Florida have indicated that grapefruit pectin does lower cholesterol levels. Additionally, researchers are interested in pectin as a possible cancer inhibitor, although studies are still in the early stages and have only been done on mice.
Graedon has indicated that the proof for pectin therapy is mostly found through individual experience, and that this remedy does not work for everyone. If it does, pain relief is not immediate; pectin therapy can take up to 2 months to show results.

**Aromatherapy**

Aromatherapy involves the use of certain sensory experiences to alleviate pain and stress. A variety of scents may be utilized in aromatherapy. There have been some studies done on the effectiveness of aromatherapy. One study conducted on 40 arthritic patients utilized aromas from essential oils lavender, eucalyptus, peppermint, marjoram, and rosemary mixed with carrier oils that were 45% almond oil, 45% apricot oil, and 10% jojoba oil. The study indicated that aromatherapy decreased pain in participants a significant amount as well as had an effect on decreasing symptoms of stress and depression. Researchers concluded that aromatherapy works well at decreasing levels of pain and depression and may be useful for pain intervention.

Aromatherapy is increasingly becoming a complementary treatment for certain pain sensations, including chronic pain sensations. This is primarily because even if aromatherapy does not contain ingredients that are known to be pharmacologically active, it does promote relaxation. Relaxation is key to pain relief. Relaxation leads to a lower heart rate, reduced blood pressure, and greater pain threshold. Relaxation also offers the individual a focus other than their pain, which has the potential to lead to pain relief. Therefore, there is merit to the idea of utilizing aromatherapy in conjunction with other, more conventional, treatments.

**Homeopathy**

Homeopathy is a system of medicine that is based in three main principles, as listed below.
- **Like cures**: One example of this principle is if you have a cold and the symptoms are similar to mercury poisoning, then you would use mercury as the homeopathic remedy.
- **Minimal dosing**: It is important to remember that homeopathic remedies are taken in a very diluted form.
- **Single Remedy**: Only one remedy is given regardless of the number of symptoms being experienced, but the remedy will be targeted at alleviating all of those symptoms.

Homeopathy ranks second as the most widely utilized system of medicine across the globe. It has gained in popularity in the U.S. at a rate of 25 – 50% over the last decade. This rise in popularity is influenced by certain factors, including:

- Homeopathy is considered very effective. Homeopaths believe that when the correct remedy has been administered, improvement will be seen rapidly.
- Homeopathy is considered safe, with treatment available even to babies or pregnant women. Homeopathy is not considered to interact with conventional medications.
- Homeopathic remedies are natural and usually based on the use of natural ingredients.
- Homeopathy is intended to work in harmony with the immune system. This is compared against conventional medication, some of which may suppress the immune system.
- Homeopathy offers remedies that are not addictive. Further, use of the remedy is only taken until the individual feels relief. If the remedy has not provided relief then the individual is likely taking the incorrect remedy.
- Homeopathy addresses the root cause of the ailment and treats the cause as opposed to the symptoms.
However, even though homeopathy has its advantages, there are also disadvantages, primarily on the side of the practitioner. Selecting the correct remedy often takes more time than it does when utilizing conventional medication. There are no standard correct remedies or doses, so the practitioner must be precise. Also, there is a huge range of homeopathic remedies, which presents problems for most pharmacies. This makes homeopathic remedies at times difficult to obtain.

**Macrobiotic dieting**

The term macrobiotics is derived from the Greek, with “macro” meaning great and “bios” meaning life. Macrobiotic dieting is considered a tool that helps individuals live within what is considered the “natural order” of life and effectively adapt to the constantly changing nature of life. Macrobiotics is not generally considered a “diet”; more, those who adopt this way of eating and working at their health consider it a lifestyle.

The macrobiotic diet emphasizes eating whole grains and fresh vegetables. It mandates that individuals should generally avoid eating meat, processed foods, or dairy. The goal of macrobiotic dieting is to provide body systems with needed nutrients without loading in toxins that need to be eliminated or stored as fat. There are frequent changes within the body as it adjusts to environmental changes and the aging process, so needs also change as time passes; therefore, the idea of the macrobiotic diet is that it aims to balance the effects of the food eaten with other external or internal influences on the body. In doing this, the body adjusts to changes in a way that is peaceful and controlled.

Those who practice eating macrobiotically believe that all things are made up of *yin and yang energy*, with yin being energy that moves outward and yang being energy that moves inward. The belief is that though everyone has both types of energy in their body, there is often an excess of one type of energy and a deficit of the other. Proponents of macrobiotics therefore believe that in balancing out these energies, the body will run
more efficiently and with fewer problems. Further, macrobiotics devotees believe that in balancing the body’s energies, the individual is able to gain some sense of control over what happens in their body as well as freedom from fear over what happens in their body, and can take comfort in the balance.

Devotees of this diet assert that macrobiotics allows the body to effectively heal itself according to the natural order of life. The macrobiotic approach is opposite of the conventional approach. The conventional approach to nutrition mandates that every individual require having certain amounts of protein, carbohydrates, fats, and vitamins and minerals each day. This approach determines these amounts by utilizing statistical averages to apply a blanket recommendation across many people. Conversely, macrobiotics approaches nutrition with the idea that the same thing may not work for every person as well as the thought that personal needs can change from day to day. This therefore means that when using macrobiotics the individual is tasked with determining the type of food that is best suited to them at that current time. Macrobiotics devotees believe that the macrobiotic approach “leads to real freedom” since it requires a shift in thought from a static view of nutrition to a more dynamic, flexible one.

There are several stages to becoming a macrobiotic eater, as most people find it difficult to shift from a diet that emphasizes meat and sugar (the typical American diet) to one that emphasizes grains and vegetables. These stages are outlined below as:

- **Beginning/Basic stage**: This stage is focused on cleaning the body of toxins and easing into the dietary changes. The idea is that in doing this, old excesses and pain are removed from the body. The mind is also clarified, allowing the individual to better use their natural good judgment in what they choose to eat. It is wise for the patient to consult someone well versed in macrobiotic dieting as they start the
regimen, as this type of plan has to be tailored to each individual and their unique circumstances.

- **Intermediate stage:** In this stage, individuals learn about the principles of macrobiotics; that there is a “natural order” to all life and that what the individual eats in large part determines who they are and how they feel. Therefore, if an individual lives and eats in such a way that the natural order is maintained, then that individual will experience good health and happiness. Conversely, if the individual lives and eats in such a way that is not harmonious, that individual will experience illness that eventually becomes serious illness and imbalance. Individuals in this stage of macrobiotics are urged to study yin and yang and to come to an understanding of what this means for their life and health. The idea is that the more an individual’s understanding of yin and yang is, the more that individual will enjoy life and experience an improvement in overall health on all levels. This increases confidence and leads to a greater positive outlook where life is concerned.

- **Advanced stage:** Individuals in the advanced stage will have reached the dietary goals of macrobiotics, which is to eat what they desire without fear. The advanced stage is much different than the beginning stage. In the beginning stage the individual is guided by the rules of macrobiotics as they learn how to eliminate toxins from their diet. The advanced stage is considered a stage of complete freedom wherein the individual has so developed good judgment when it comes to a healthy balance that they don’t have to stop to review the rules or the principles of macrobiotics. Individuals in this stage also search for more tools with which to improve their lives. Devotees of this diet believe that people in the advanced stage are easily recognized by the way they emit happiness, honesty, and a state of complete health.
Macrobiotics claims to have wide-reaching benefits, although these benefits are not hard claims and rather varies from individual to individual. These benefits include:

- Little to no fatigue
- Overall better health and relief from ailments and pain, particularly things such as the flu, colds, or cancer.
- Overall better appetite and an ability to consume food with joy.
- Better sex drive and satisfaction with sex.
- Deep sleep on a nightly basis that is free of disturbing dreams as well as an ability to fall into a restful sleep within minutes of getting into bed.
- Improvement in memory, which in turn leads to an improvement in personal relationships. Also, an improvement in thought process and reasoning.
- Freedom to live without fear, anger, or suffering.
- A new ability to view difficult times as positive experiences.
- The ability to act in ways that are more generous.
- Greater honesty and a heightened understanding of oneness with a higher power

A number of these benefits are generally linked to good health. However, there is not much scientific evidence supporting the idea that a change in eating patterns such as macrobiotics leads to much better health or relief from illnesses and pains. Macrobiotics may, however, be somewhat effective because it focuses on low fat and high fiber food choices, lending to decreases in blood pressure and cholesterol levels, which may in turn calm individuals and lead to feelings of a more centred, controlled life.

Consultation with a medical professional is essential before beginning a macrobiotics regimen. Those who have serious illnesses are often not suited to this type of diet, although there are those who may benefit.
Determining whether an individual will benefit from a macrobiotic diet should be made after a thorough physical examination.

**FUTURE THERAPIES**

The primary goal of researchers with regards to pain is to develop better treatments to help alleviate or prevent pain more effectively. One important goal as pain medications are developed is to block or interrupt pain signals, particularly when there is no trauma to the tissues. While there is currently no ideal pain medication, researchers are examining the body’s “pain switching center”\(^1\) in an effort to formulate new drugs that will keep pain signals from becoming amplified or even will stop them before they start.

There are quite a few areas where research has and is being conducted in efforts to come up with new and more effective pain treatments. The section below outlines research areas to improve the practice of pain management.

Imaging advancements:

There are now imaging techniques such as positron emission tomography (PET) and functional magnetic resonance imaging (fMRI) that provide a vivid picture of what is occurring in the brain as pain is processed. Researchers have discovered that pain activates a minimum of 3 or 4 key areas in the cortex of the brain. Further, researchers have discovered that when patients are hypnotized in order to keep from feeling pain sensations, activity in many of the brain areas is severely reduced. This is one indication that pain involves more than the sensory experience of pain, and that there is an emotional component to pain as well.
Channels:

These are gate-like passages that are found along cell membranes that allow for electrically charged ions to pass into cells. The study of channels leads researchers to explore the development of new classes of pain medication – including medication cocktails – that would work at the site of channel activity to alleviate pain.

Trophic factors:

Trophic factors are natural chemical substances that are found within the body that affect the function and survival of cells. These also promote cell death, but there is little that is known about how trophic factors can go from being beneficial to being harmful. Researchers have discovered that the over-accumulation of some trophic factors within the nerve cells in animals result in heightened sensitivity to pain as well as the fact that certain receptors found on cells react and interact to trophic factors. These receptors offer new area of study and a target for a new class of "restorer" drugs.

Plasticity:

After an injury, the nervous system experiences a large-scale reorganization, which is referred to as plasticity. Researchers are now able to identify and examine the changes that occur in the body as pain is being processed. One example of this is use of a technique known as polymerase chain reaction, wherein scientists can research the genes that are induce by an injury or persistent pain. Evidence has been found that proteins that are synthesized by the genes may be good targets for new therapies.

Scientists assert that the changes that occur when a person is injured or experiences persistent pain should be thought of as a nervous system disorder, not simply a symptom of the injury. Therefore, scientists have the hope that new therapies that are focused on preventing long-term
changes in the nervous system will allow prevention of development of chronic pain.

**Neurotransmitters:**
Researchers believe that gene mutation may have an impact on the number of neurotransmitters that are involved in controlling pain. Researchers are now able to utilize certain imaging techniques to see what is occurring chemically when a person is injured. This is important work because it may offer the opportunity to develop new therapies that would reduce or destroy severe and chronic pain.

**Future research on headache relief**

Studies being done or sponsored by the National Institute of Neurological Disorders and Stroke are examining the ways headaches progress and searching for new treatments to relieve the pain of headache or block the headache altogether. A number of factors affect headache and are being researched in an attempt to develop new treatments. These factors are discussed below.

**A molecular basis for migraine:**
While researchers currently do not entirely understand migraine headache and aura, there are several studies being done to determine how migraine and migraine with aura affects metabolism and neurophysical function. Researchers are also examining whether or not certain regions in the visual cortex are more susceptible to the events leading up to headache with aura. Results from this research could provide a larger-scale understanding of migraine and help with the development of new migraine treatments.

**Mast cells:**
Mast cells are involved in the inflammation response in headache. Researchers are studying the relationship of the cells’ antianalgesic
components and the proximity to nociceptors. It has been posited that mast cells may release certain substances that activate nociceptors. Discerning the link mast cells have to the resultant headache pain may help determine drug targets that could in turn lead to the development of new analgesics.

Cortical spreading depression:

Cortical spreading depression is the process that occurs in a migraine with aura where there is a period of increased activity in the brain followed by a period of decreased activity. There are currently some drugs being tested in clinical trials that inhibit cortical spreading depression to determine the effectiveness of such drugs in treating migraine. Research into these drugs may lead to a greater understanding of how migraine begins and offer an opportunity for the development of new treatment options that would interrupt the process and in turn prevent migraine.

Cutaneous allodynia:

Examination of why cutaneous allodynia, which is pain resulting from an innocuous stimulus, is present in the head or face in those who suffer from cluster headaches is covered here. In researching cutaneous allodynia, investigators are looking to gain a greater understanding of the kinds of neurological changes that occur with cluster headaches. This research may offer a greater understanding of how and why the nervous system changes and experiences heightened sensitivity post-repeated stimulation (which leads to chronic pain); and, offer the opportunity for the development of new medications to effectively treat headache pain before it becomes a chronic issue.

Other social and genetic factors:

Certain other social and genetic factors may make a difference in who gets a migraine and how they experience the pain. Such factors include race, psychiatric conditions, quality of life, ability and willingness to follow
a treatment protocol, and response to treatment. These factors are currently being examined in those who suffer migraine, tension headache, headache resulting from substance abuse as well as cluster headache. Genetics in particular has been found to predispose individuals for migraine.

In general, those who suffer migraine have at least one family member who also experiences migraine. Determining whether or not there is a certain gene responsible for migraine is currently being researched. In one study conducted using 1,675 participants who either suffer from migraine or are close relatives of those who suffer from migraine, findings indicated that there is a link between a gene variant on certain chromosomes and the susceptibility to developing migraine. Another study replicated these findings and indicated that there was in particular a link in females who suffered from migraine. Other factors, such as sleep patterns, were also determined to play a role in migraine development. Researchers found that those older adults who experienced migraine were often triggered by changes in sleep patterns. Therefore, it is essential that individuals who are susceptible to migraine maintain a regular sleep pattern.

SUMMARY

Pain and its management today is a costly and very serious public health issue. It is also a challenge for friends and family as well as health care practitioners there to offer support to the individual suffering from the pain. In order to offer this support, practitioners as well as the friends and family of those who suffer pain must be willing to try a variety of pain management methods, or even a combination of methods. Further, both practitioners and friends and family must listen carefully as the patient describes symptoms in order to ensure that the pain is treated effectively.

The best way to manage pain is to stop the pain before it starts. This can be attained by properly utilizing analgesics useful for preventing pain.
Preventative approaches are often used so that pain management measures are taken prior to the occurrence of pain or prior to a procedure. This is often accomplished through utilizing a combination of medications or dual modalities.

A multi-modal approach to pain involves utilizing a combination of medications and techniques that help address the various ways in which an individual’s body is reacting to pain. These techniques may include some approaches that are non-pharmacological or alternative, such as distraction, hypnosis, or guided imagery. Individualized care involves engaging the patient in their care management and determining their preferences for the various medical and complementary approaches to control pain.

The primary goal of researchers with regards to pain is to develop better treatments to help alleviate or prevent pain more effectively. The future course of research is focused on new and more effective pain treatments.

Please take time to help the NURSECE4LESS.COM course planners evaluate nursing knowledge needs met following completion of this course by completing the self-assessment Knowledge Questions after reading the article. Correct Answers, page 58.
1. Preventative treatments for headache pain include the following medications:

   a. Anticonvulsants
   b. Beta-blockers
   c. Calcium channel blockers
   d. All of the above

2. True or False. The faces pain scale is particularly useful when assessing children.

   a. True
   b. False

3. Anti-seizure drugs treat pain by:

   a. a calming effect on the nerves
   b. treating nerve damage, neuropathy
   c. a narcotic effect
   d. answers a and b above

4. Aromatherapy is a complementary treatment that is used to:

   a. treat pain sensations, including chronic pain sensations
   b. promote relaxation, key to pain relief
   c. help the individual focus on other than pain
   d. all of the above

5. True or False. Imaging techniques view what is occurring chemically when a person is injured. This may lead to new therapies to reduce or destroy severe and chronic pain.

   a. True
   b. False
Correct Answers:
1. d
2. a
3. d
4. d
5. a

Footnotes:
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5. AMA. Pathophysiology of pain and pain assessment. 2010.
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