TCHP Education Consortium

Fundamentals of Pain

Introduction/Purpose Statement

Nurses play a vital role in helping patients maintain comfort. Research continues to indicate that patients are not maintaining adequate levels of comfort despite the increased focus on this area over time. The purpose of this home study is to give introductory information about the pain stimulus conduction and perception and a basic understanding of the physiologic rationale for various comfort measures. Pain management in the elderly will also be discussed.

Target Audience

This home study was designed for health care professionals with little to no familiarity with the physiology of pain or the management of pain in the elderly.

Content Objectives

1. Understand the neurological process of pain.
2. Explore terminology used in pain management.
3. Identify and describe pharmacological and non-pharmacological interventions to manage pain in the elderly population.
4. Describe basic principles of pain management in elders and implications of various treatments.

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Planning Committee/Editors

Linda Checky, BSN, RN, MBA, Assistant Program Manager for TCHP Education Consortium.

Lynn Duane, MSN, RN, Program Manager for TCHP Education Consortium.

Authors

Rhonda Gosen, **MS, RNC, CCRN**, Cardiovascular Clinical Nurse Specialist, Minneapolis VA Medical Center.

Annette Lawton, **BAN, RNC, CCRN**, Critical Care Educator, Minneapolis VA Medical Center.

Anna M. Toth, **MSN, RN, GNP,** VA Medical Center Primary Care Nurse Practitioner.

Content Experts

Sidney Guthrie, MSN, APRN-BC, CNS, Clinical Nurse Specialist in the Medical Surgery Department at Regions Hospital.

Deb Ryan, RN, OCN, CRNI, Staff Nurse in Oncology at Hennepin County Medical Center.

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Overview of the Pathophysiology of Pain

Pain is defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (International Association for the Study of Pain, 1991) McCaffery offers a more subjective definition: "pain is whatever the experiencing person says it is, existing whenever the experiencing person says it does." (McCaffery & Beebe, 1989, page 7).

A research study by Hallal (1985) suggests that pain is one of the most frequently documented nursing diagnoses. Despite the advances of science in the past two decades, the literature shows that little has changed in controlling pain and suggests one area for improvement is more education to physicians and nurses about pain management.

Conduction and Transmission of Painful Stimuli

Pain conduction and transmission occurs through the nervous system when specific nerve endings are stimulated and nerve impulses are transmitted to the brain through the pain pathways.

The nervous system

The nervous system is very dependent on its cellular structure.

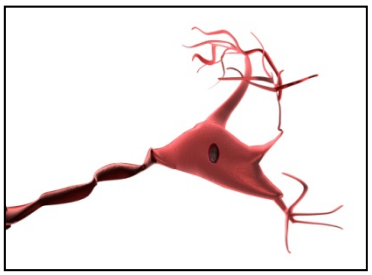
Neuron: The basic unit of function. The neuron is made up of the cell body, dendrites, and axons.

Dendrites: pick up impulses.

Cell body: site of depolarization involved in transmission of impulse between cells.

Myelin Sheath: protect, provide nutrients, and conduction for the axon. It provides insulation for the cell body. Damage to sheath may contribute to neuropathic types of pain.

Axons: Transmit impulses. Impulses must be strong enough for the brain (the thalamus) to recognize as significant.



Two types of neurons

Afferent neurons: receives information

coming in through dorsal root of cell bodies. Information is typically sensory. Helps determine type, quality and quantity of pain.

Efferent neurons: deals with information going out. Information is typically motor.

Receptors:
Mechanoreceptors: are mostly present in the skin. These receptors warn of potential harm and initiate the withdrawal reflex. They also provide rapid impulses such as in pin pricking or bee sting.

Polymodal Nociceptors: are nerve endings found throughout the tissues that respond to various stimuli including mechanical, thermal, and chemical. These receptors transmit impulses more slowly such as in chronic aches and dull pains.

Why is pain different for everyone?

It is the variation in the tolerance of pain at the level of the central nervous system, not the threshold at the periphery, which accounts for the wide variations in analgesic requirements of different patients. Thus, two patients may have widely differing pain levels for the same medical problem.

Processing of Pain: The Spinal Cord

The first "processing" of painful stimuli occurs at the spinal cord where it is transmitted or inhibited.

The spinal cord is located inside the vertebral column, extending to the L1-2 vertebral body. The cauda equina and meninges extend beyond this area and are involved in the processing of pain.

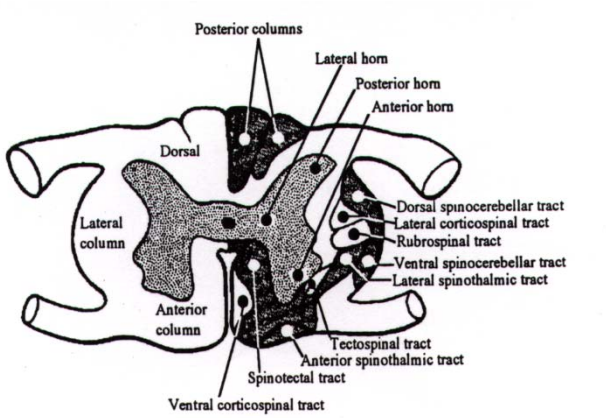
The vertebral column is composed of the seven cervical, twelve thoracic, five lumbar, five sacral, and four coccygeal vertebrae. The spinal cord is divided into segments, each of which has a peripheral nerve. There are eight cervical segments, twelve thoracic segments, five sacral, and one coccygeal segment. The spinal cord segments do not always correspond with the vertebral body. All cervical segments come out above their respective vertebral body except for cervical segment #8, which comes out above the T1 vertebral body. At the thoracic level, all the segments come out below their respective thoracic vertebral body and are located within that vertebral body except in the lower segment of T12. Here, the spinal cord shortens and the actual "core" of the cord ends, the peripheral nerves continue down to exit below their respective vertebral body.

The spinal cord is divided into the white matter (myelinated tracts) and the gray matter (nervous and un-myelinated fibers) which are located in the butterfly-shaped area.

Gray matter
The gray matter has a Posterior Horn (sensation) and an Anterior Horn (motor) on each side. Sensation arrives in the posterior area, synapses on the posterior horn, and then goes to its respective spinal tract. Motor information arrives in the posterior horn of the gray matter via the A and C fibers. Opioid receptors are also present in this area.

White matter
The tracts of the spinal cord are located in the white matter and are named by:

1. Location in the cord (first part of the name)
2. Point of origin (second part of the name)
3. Point of destination (third part of the name)



This is true for all tracts except the dorsal columns. The same tracts are located in each side.

Ascending tracts (sensory): Ascending pain impulses are transmitted mainly through the spinothalamic tract.

Dorsal
- Sensation of fine touch, vibration, pressure, proprioception
- Goes up spinal cord, crosses in upper medulla, travels in medial lemniscus, to thalamus, through internal capsule and to parietal lobe

Spinocerebellar
- Carries position sense
- Crossed and uncrossed fibers from spinal cord to cerebellum

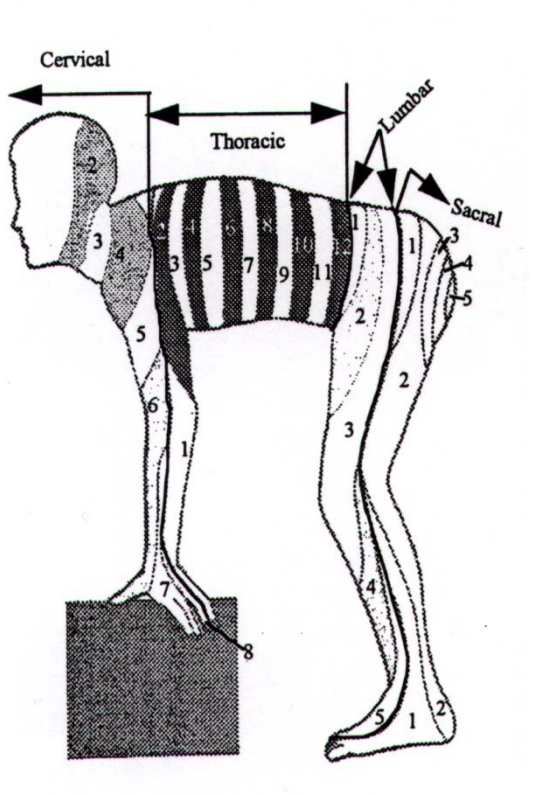
Spinothalamic (ventral)

- Carries crude touch and pressure
- Crosses in spinal cord, to thalamus and reticular areas and onto parietal lobe

Spinothalamic (lateral)

- Carries pain and temperature
- Crosses over in spinal cord and proceeds upward

Sensation is transmitted through the peripheral nerves that arise from the spinal cord. The area that each nerve serves is called a dermatome.



Descending tracts (motor): Descending pathways are mainly <u>inhibitory</u> in nature. Stimuli are produced in response to cortical and subcortical activation responding to sustained peripheral pain input.

Corticospinal

- Carries major motor movement
- Originates in the frontal lobe of the brain, travels down to the thalamus, to the brainstem, the pons, and the pyramids in the medulla; the tract crosses in the low medulla and becomes the corticospinal tract in the spinal cord where it will leave the cord after synapsing on the anterior horns of the gray matter

Extrapyramidal tracts include the reticulospinal, rubrospinal, vestibulospinal tracts

- Carries information to either facilitate or inhibit motor function and tone
- Originates from several areas of the brain and goes down the spinal cord

An easy way to remember if a spinal tract has motor or sensory function is to look at the name of the tract. When a tract is going <u>out</u> of the spinal column, it has motor function (descending); and if the tract is going <u>into</u> the spinal column, it has sensory function (ascending).

Perceiving and Processing Pain at the Brain

In order for there to be either perception of pain or reaction to pain, the central nervous system needs to be intact. The spinal cord and brain have involuntary "reflexes" which are sent through the motor part of the nervous system to the skeletal muscles. The central nervous system also allows for voluntary control of the skeletal muscles through transmission of sensory impulses from the periphery and integration of sensations in the higher brain centers. Motor function is determined by the segmental level of the spinal cord.

Centers in the brain are responsible for the "meaningfulness" of pain. The thalamus, in the brainstem, is the first level to sense pain. The thalamus works with the somatosensory part of the cerebral cortex to pinpoint the area, quality, and quantity of pain. The parietal cortex associates the pain to other remembered sensations to add to the perception of pain. Finally, the thalamus connects with the limbic cortex to recognize the pain as a hurtful stimulus, as well as to alter the mood and attention of the person.

The Autonomic Nervous System (ANS)

While a major part of the nervous system is under voluntary control and is concerned with activation of skeletal muscles, the other part of the nervous system is

totally involuntary. This is called the autonomic nervous system, a part that controls the activities of smooth muscles, cardiac musculature, and glandular secretion.

Sympathetic Nervous System (SNS)

- Located in the thoracolumbar, intermediolateral area of gray matter of spinal cord
- The pre-ganglionic cells terminate in the spinal cord; the post-ganglionic cells in sympathetic chain
- Generate the adrenergic, "fight or flight" response
- Use acetylcholine as a neurotransmitter in the pre-ganglionic cells and norepinephrine in the post-ganglionic cells
- Interacts with the limbic system, posterior hypothalamus, and reticular formation

While the autonomic nervous system works with the flight or fight response, it is also responsible for the maintenance functions of the body, such as metabolism, absorption, and elimination.

The SNS, when stimulated, causes the following effects:

- increased HR, contractility, BP, RR
- dilation of heart & skeletal muscle blood vessels
- increased perspiration
- constriction of blood vessels in skin, viscera & external genitalia
- relaxation of bladder & contraction of sphincters
- dilation of bronchioles
- dilation of pupil
- contraction of pilomotor muscles of skin (goose bumps)
- decreased peristalsis
- increased conversion of glycogen to glucose

Parasympathetic Nervous System (PNS)

- Located in the brainstem and sacral area of spinal cord
- The pre-ganglionic cells terminate in cranial nerve nuclei of III, VII, IX, and X and sacral 2 through 4. The postganglionic cells terminate in or near the organ they affect
- Generate the cholinergic response to build and restore with a more localized reaction
- Use acetylcholine as a neurotransmitter in both pre- and post-ganglionic cells
- Interacts with the limbic system, anterior hypothalamus, and reticular formation

The PNS causes:

- decreased heart rate, contractility, RR and BP
- constriction of heart blood vessels
- increased peristalsis and GI secretions
- dilation of viscera and external genitalia blood vessels
- contraction of bladder and relaxation of sphincter
- constriction of bronchioles
- constriction of pupil

Modulation of Pain: The Gate Control Theory

The best known theory describing how painful stimuli may be altered at the spinal level is known as the Gate Control Theory suggested by Melzack and Wall in 1965. They postulated that painful stimuli have to pass through a "gate" in order to be relayed to the central nervous system. This theory demonstrates three general categories of activity that may contribute to pain relief by closing the "gate" through which painful stimuli pass.

First of all, the gate can be closed by non-painful sensory input carried in the spinal cord, by nerve fibers, or large myelinated fibers from mechanoreceptors responding to low threshold stimuli such as tactile stimuli. This category is useful in explaining how cutaneous stimulation such as TENS, heat, or massage can work to help control pain (example: the immediate response of "rubbing" to make it feel better).

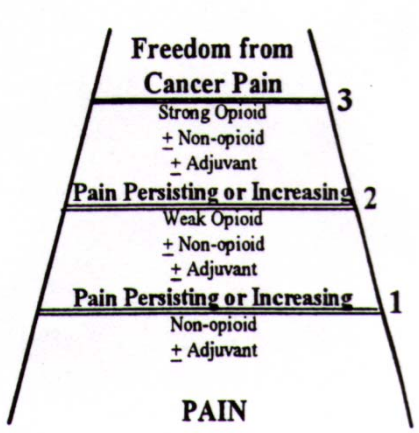
Second, the brain stem can project inhibitory impulses that close the gate to the transmission of painful impulses. This mechanism works so that if the person is receiving excessive sensory input, the gate is closed to some incoming stimuli. Distraction strategies such as guided imagery can be an excellent source of sensory input that may allow the person to "tune out" pain.

The third general category to assist in "closing" the gate is thought to be controlled by the cerebral cortex and thalamus. These are the areas where thoughts, emotions, and past experiences are stored. It is felt that pain can be reduced by inhibitory signals from these areas. Therefore, pain can be decreased by reducing fear or sources of anxiety, and increasing feelings of confidence and control with respect to pain relief. This category demonstrates

the importance of education related to pain and the value of the nurse/patient relationship in reducing anxiety.

Pharmacologic Modulation of Pain

When using pharmacologic or chemical methods of pain control, the World Health Organization (WHO) has very specific recommendations. The WHO recommends a ladder approach to pain management that grants incremental analgesia increases based on the severity of pain. This basically means, the more severe the pain, the stronger the analgesic should be.



The chemical modulation of nociceptive impulses is complex. The role of drugs and their relationship to neurotransmitters for controlling pain transmission continues to be evaluated. There is hope that through chemical modification of endogenous opioid peptides, an agent with few side effects may yet be developed.

This approach to pain control has been accepted by most pain experts, and is included in the AHRQ (also known as AHCPR) clinical practice guidelines for the management of pain.

Glossary

Acute pain
Pain of short duration, usually self-limiting, lasting less than 6 months. The underlying cause is usually known.

AHRQ (formerly known at AHCPR)
Agency for Health Care Research and Quality. Federal agency established as part of the U.S. Department of Health and Human Services in 1989. Call toll free (800) 358-9295.

Agonist
Any morphine-like compound that produces bodily effects including pain relief, sedation, constipation, and respiratory depression.

Agonist-antagonist
An opioid compound with an affinity for two or more types of opioid receptors that blocks opioid effects on one receptor type while producing opioid effects on a second receptor type.

Analgesic
A drug that reduces the intensity of pain without causing loss of consciousness.

Chronic pain
Prolonged pain, usually lasting 6 months or longer.

Distraction
Techniques that help patients focus their attention on stimuli other than at the pain, placing pain at the periphery of awareness.

Endorphins
Endogenous substances that bind to opiate receptors and act the same as opioids to relieve pain.

Epidural
Situated within the spinal canal, on or outside the dura mater (tough membrane surrounding the spinal cord).

Equianalgesic
Having equal pain-killing effect. Ten milligrams of morphine sulfate IM/IV is generally used for opioid analgesic comparisons.

Half-life
The length of time it takes for half of the absorbed dose of a drug to be metabolized and eliminated from the body.

Interpleural
Situated between the membrane surrounding the lungs and the membrane lining the thoracic cavity.

Intrathecal
Within a sheath (e.g., cerebrospinal fluid contained within the dura mater is intrathecal).

Local Nerve Block
Infiltration of a local anesthetic around a peripheral nerve to produce anesthesia in the area supplied by the nerve.

Modulation
The step in pain conduction in which a neural pathway in the central nervous system selectively inhibits pain transmission.

Narcotic
Any morphine-like compound that produces bodily effects including pain relief, sedation, constipation, and respiratory depression. Synonymous with opioid.

Neuropathic pain
Pain that arises from a damaged nerve.

Neuralgia
Pain syndrome associated with damage of a peripheral nerve.

Nociception
The process of pain transmission.

Nociceptor
A sensory neuron that sends painful sensations.

NSAID
Nonsteroidal anti-inflammatory drug. Any of a group of nonopioid analgesics that reduce inflammation. The therapeutic effect is most likely due to the drug's ability to block the synthesis of prostaglandin.

Opioid
Any morphine-like compound that produces bodily effects including pain relief, sedation, constipation, and respiratory depression. Synonymous with narcotic.

Pain
Whatever the patient says it is, existing whenever (s)he says it does. An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.

Peak analgesia
Time after administration when an analgesic provides maximum pain relief.

Phantom Limb Pain
A chronic pain syndrome in which the patient feels pain in a body part that has been amputated.

Potentiator
A drug that supposedly increases the potency of an analgesic without increasing respiratory depression.

Prostaglandins
Pain-inducing substances released in response to tissue injury.

Relative potency
A precise measure of a drug's ability to reduce pain compared with other drugs.

Therapeutic ceiling
The dosage limit to analgesic potency.

Transduction
The step in pain conduction in which noxious stimuli trigger electrical activity in the endings of afferent nerve fibers (nociceptors).

Transmission
The step in pain conduction in which impulses travel from peripheral nerve to spinal cord. Projection neurons then carry the message to the thalamus, and the message is continued to the cortex.

Pain Management in ElderCare

The Aging Pain Receptor

Studies about the implications of age on the pain receptor are inconclusive. It should *not* be assumed that older people have a decreased sensation to pain.

Pain Management Principles

There are several types of pain: physical, emotional, neuropathic, mixed, and chronic or persistent pain. Pain of any kind requires timely, appropriate, and directed assessment on the part of the healthcare provider to ensure concise details are gathered and appropriate treatment can be provided. Pain is now considered the "fifth vital sign". There are a number of interventions nurses and families can do to help patients with pain including relaxation, massage, reassurance, the application of heat and cold.

Pain Assessment

Assessing pain in any population is no easy task. Effective assessment requires repeated, comprehensive questions that encourage the patient to relate their pain experience. Scales are often used to help quantify the patient's pain. The most common is the 0-10 scale with 0 being no pain and 10 being the worst pain possible. This scale should be used both initially and following treatment to determine effectiveness. The goal is to identify what value on that 0-10 scale is tolerable for the patient and to find the

appropriate regimen to maintain their pain at that level most of the time.

Pain assessment in the cognitively impaired elder is complicated. With this, as with anyone, nonverbal indicators of pain such as body language, moaning, grasping at particular parts of the body, or guarding-protecting a particular body area should be interpreted as pain and treated. The response to treatment should be based upon changes in those behaviors. While more qualitative in nature, this gives some sense of the effectiveness of the intervention when more quantitative measures of pain are not possible.

Some use the faces scale created for children's pain rating in the cognitively impaired older adult which may be useful in some situations. Caution should be advised to ensure the patient reports the face that describes the pain, rather than their overall mood.

Pain Management in Elders

It is estimated by Fine (2002) and Herr (2002) that 25-50% of community dwelling elders experience pain on a daily basis. This value is much higher for the institutionalized elder, as high as 80%. The reason for this increase among institutionalized elders is they frequently have multiple chronic diseases that are complicated at times by cognitive and physical deficits. Also, elders often do not express pain for fear of associated social stigmas. If injured, elders require increased time to heal compared to the younger adult due to a decrease in the frequency of new cell generation.

The pain assessment of older adults is as complex as the pain itself. Discrete changes in the patient's behaviors, such as restlessness or changes in mood, can be signs of pain. Elders often change social relationships to avoid other people seeing them in pain, which creates social isolation resulting in a new secondary type of pain: emotional. The majority of people over 65 have chronic or persistent pain. While not normal aspects of aging, osteoarthritis, neuralgias, and joint fractures are more common in this age group than the younger population.

If a patient is unable to take medication via the oral route, several medications, including acetaminophen, come in suppository form. If patients have feeding tubes, liquid forms of medications may also be used. Some pain medications are available in patch form, such as lidocaine, and can be applied locally for relief. Another option is using sublingual medication. Morphine and oxycodone are both available in this form.

Pharmacological Interventions

There are a number of medications that can be used to treat pain in any age group. Particular attention should be paid to the complex illnesses often present in the elderly population to ensure no drug interactions occur and that the treatment side effects do not outweigh the benefits.

NSAIDs, or non-steroidal, anti-inflammatory drugs (such as ibuprofen), and other non-opoid analgesics (such as acetaminophen), are the two most common over-the-counter pain relieving medications used in any population. The most common side effect of these medications is GI upset and the risk for overuse as they are available over-the-counter. Patients should be advised to take only the prescribed or dose on the directions on the bottle and to take with food.

Opiods are appropriate to use in the elderly population for acute and persistent pain. The initial dose, however, should generally be one half to two thirds the usual dose initially and then increased slowly, such as in increments of 25%. The reason for the lower dose is that elders are more susceptible to side effects related to aging organ systems that metabolize these medications.

Delirium, also known as acute confusion, can be associated with either overmedication or under-medication. When using opioids, it may be beneficial to use an additional, scheduled NSAID for one to two days after surgery or an acute injury in order to decrease the dosage needs of the narcotic agent. For elderly patients who are using a PCA (Patient Controlled Analgesia), the ability of the patient to use the equipment should be assessed and reassessed at regular intervals to make sure they are receiving adequate relief from pain (Robinson, Vollmer, Jirka, Rich, Didiri, & Bisby, 2008).

Adjunct medications such as tricyclic antidepressants or anticonvulsants are used to treat specific types of pain such as sharp, shooting, dull or burning pain. Adjunct drugs often have long half lives and stay in the system longer. In the elder, close monitoring of potential side effects should be provided.

Side Effects

While nurses are not prescribing medications to treat pain, they should be aware of the potential side effects and interactions with other medications. Many elders are on a number of medications; this is known as poly-pharmacy. The more medications a person is taking, the more likely it is that an adverse reaction will occur.

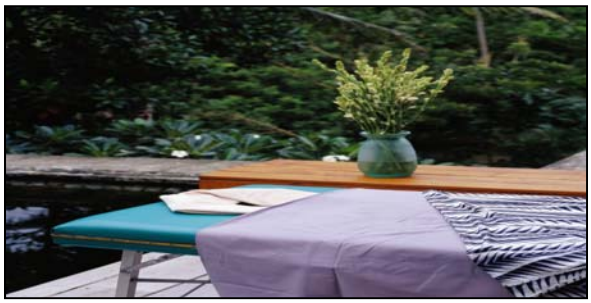
Common side effects of pain medications include:

- Lethargy
- Constipation
- GI upset
- Delirium or confusion
- Drug toxicity

Signs of adverse reactions in the elderly should be closely monitored for and medication adjustments made to reduce side effects when possible. When pain medications cannot be adjusted, side effects may be managed. Using a stool softener to manage constipation is one example.

Non-pharmacological Interventions

There are a number of things that can be done to treat, prevent, and manage pain that are non-pharmacological in nature. Biofeedback is the cognitive behavioral strategy of altering one's body response. Professionals can be trained to teach patients and family biofeedback. The studies that have been done are inconclusive as to it's effectiveness for a variety of types of pain. However, it is the perceived effect that is important. If patients feel this strategy helps to reduce their pain, the benefit largely outweighs the risk.



Distraction is often used in younger populations but is also valuable for use with elders. Distraction is another behavioral strategy that helps lessen the perception of pain by moving the person's attention to another topic. Some types of distraction include breathing techniques, singing, tapping, and guided imagery. Trials have shown distraction to help reduce pain in mild to moderate states. Relaxation, meditation, and imagery are other types of behavioral interventions that can be used to manage pain. Using the mind to focus on more positive experiences has been shown to alter the autonomic nervous system's response to pain.

Hypnosis is used to replace feelings of pain with other feelings and alter the meaning of pain to make it less of a priority for the person. Hypnotic training can decrease stress and increase a person's ability to control their perception of pain.

Touch is the most natural form of providing comfort and can be used to relieve pain. Massage has been shown to increase relaxation, decrease blood pressure and heart rate and increase body temperatures in some patients. Touch can help reduce anxiety and tension. In the healthcare system, there is a movement toward technology based care. With this change, touch becomes an increasingly important part of maintaining the humanness of the healthcare experience. Discussion with patients about what level of touch they prefer and are comfortable with will ensure boundary issues for a variety of reasons, are respected.

Acupuncture and acupressure can be performed by trained personnel and is thought to send impulses to the spine and brain that change the signals related to pain. It is believed that the body releases its own opiate-like substance, endorphins, when acupuncture and acupressure are used, thereby reducing the pain.

Physical therapy can be helpful in providing education to elderly clients with chronic pain to minimize the stress on affected areas and build up strength and endurance. TENS (Transcutaneous Electrical Nerve Stimulator) that stimulate nerves through the skin can be helpful as well to decrease pain (McCaffery & Pasero, 1999).

Pain Clinics

Many local healthcare groups are creating "pain clinics" where providers specifically trained in pain management work with patients to help deal with pain that has not been managed by traditional methods. Pain clinics offer pharmacological and non-pharmacological interventions and focus on goal setting with patients in order to obtain a tolerable level of pain.

Myth Busters

According the US Census Bureau…

☑ In 2003, 93% of elders lived independently in the community.
True

☑ In the year 2000, 4.5% of people over age 65 lived in long term care and structured organizational institutions.
True

☑ Older adults are living longer, healthier lives.
True
The average life expectancy increased from 47.3 in 1900 to 76.9 in 2000.

☑ Poverty amongst older adults is growing.
False
In 1959, 30% of elders lived below the poverty line compared to 10% in 2003.

☑ Pain is NOT a normal part of aging and requires careful, close monitoring and management to ensure the appropriate treatment while minimizing the side effects for the patient.
True

☑ If patients are in pain, they will tell you.
False
Patients may not openly express pain. It must be assessed for.

☑ Narcotics CAN be used in the elderly population. Precautions should be taken but they are appropriate therapy for pain.
True

Conclusion

The management of pain in any patient is challenging for all healthcare providers. Nurses should have a basic understanding of the pathophysiology of pain and various treatment options as well as side effects of medication used to relieve pain. Uncontrolled pain can defeat efforts to promote optimal health in patients. For everyone, but especially the elderly, adequate pain management can mean increased functional and cognitive ability and, therefore, an improved quality of life.

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Directions for Submitting Your Post Test for Contact Hours

To obtain a certificate of completion for this home study program, please complete the post-test and evaluation on the next few pages. If you are completing this home study as pre-reading for a TCHP class, please bring your post-test and evaluation to class with you for processing. The date on your certificate of completion will be the date that your home study is received. **Any materials received with a postmark after the expiration will be discarded.**

HealthEast, HCMC, & MVAMC Employees

If you are an employee of HealthEast, HCMC, or MVAMC, you may send the post-test and evaluation to TCHP for processing. Your post-test will be returned to you through your hospital. It cannot be mailed to your home.

Paid Participants

If you are not an employee of one of the TCHP hospitals, please send the post-test and evaluation to TCHP with a check for $6.00. Please make check payable to **TCHP Education** and mail to:

TCHP Education Consortium
Capitol Office Building
525 Park Street, Suite 120
St. Paul, MN 55103

Your post-test will be returned to you with the certificate of completion.

Fundamentals of Pain
Post- Test

Please print all information clearly and sign the verification statement:

Name_____
(please print legal name above)

Birth date (required)
Format: 01/03/1999

M	M	D	D	Y	Y	Y	Y

For HealthEast, HCMC, or MVAMC, employees only:
Hospital _____Unit____

Personal verification of successful completion of this educational activity (required):
I verify that I have read this home study and have completed the post-test and evaluation.

_____
Signature

1. True False Pain is a physical and emotional experience.

2. True False Afferent neurons admit information and efferent neurons send information.

3. True False Mechanoreceptors transmit impulses slowly and are poorly localized.

4. True False Polymodal nociceptors transmit impulses rapidly and are localized.

5. True False The first processing of painful stimuli occurs in the spinal cord.

6. True False Each segment of the spinal cord is related to a peripheral nerve.

7. True False Myelinated tracts are gray matter.

8. True False Nervous and un-myelinated fibers are gray matter.

9. True False Ascending tracts transmit impulses that have a major role in pain sensation.

10. True False Descending tracts modulate pain.

11. True False The Gate Control Theory describes how pain can be altered at the spinal cord level.

12. True False When a person has an increased heart rate, respiratory rate, and blood pressure as a response to painful stimuli, the sympathetic nervous system is in action.

13. True False The WHO recommends increasing pain medications based on the patient's response to pain.

14. True False Pain is best determined by the nurse who has been working with the patient.

15. True False Transduction is the step in pain conduction in which impulses travel from peripheral nerve to spinal cord.

16. True False Pain is a normal part of aging and therefore should not be treated

17. True False Narcotics (opiods) are not appropriate for use in the elderly.

18. Essential components of a pain assessment include:
    a) Repeated assessments over time
    b) Comprehensive assessment details
    c) Identifying a tolerable level for the patient's pain
    d) All of the above

19. Non-pharmacological therapies for pain include
    a) Healing Touch
    b) Massage
    c) Imagery
    d) Hypnotism
    e) All of the above

20. True False Acupuncture and Acupressure are thought to cause the release of the body's natural opiates, endorphins, which alter the perception of pain.

21. Side effects of narcotic (or opiod) analgesics include:
    a) Constipation
    b) Lethargy
    c) Confusion
    d) All of the above

22. True False Patients will always tell you if they are having pain.

Expiration date: The last day that post tests will be accepted for this edition is **December 31, 2016**—your envelope must be postmarked on or before that day.

Evaluation: Fundamentals of Pain

Please complete the evaluation form below by placing an "X" in the box that best fits your evaluation of this educational activity. Completion of this form is required to successfully complete the activity and be awarded contact hours.

At the end of this home study program, I am able to:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Understand the neurological process of pain.					
2. Explore terminology used in pain management.					
3. Identify and describe pharmacological and non-pharmacological interventions to manage pain in the elderly population.					
4. Describe basic principles of pain management in elders and implications of various treatments.					
5. The teaching / learning resources were effective. *If not, please comment:*					

The following were disclosed in writing prior to, or at the start of, this educational activity (please refer to the first 2 pages of the booklet).	Yes	No
6. Notice of requirements for successful completion, including purpose and objectives		
7. Conflict of interest		
8. Disclosure of relevant financial relationships and mechanism to identify and resolve conflicts of interest		
9. Sponsorship or commercial support		
10. Non-endorsement of products		
11. Off-label use		
12. Expiration Date for Awarding Contact Hours		
13. Did you, as a participant, notice any bias in this educational activity that was not previously disclosed? *If yes, please describe the nature of the bias:*		

14. How long did it take you to read this home study and complete the post test and evaluation:
_____hours and _____minutes.

15. Did you feel that the number of contact hours offered for this educational activity was appropriate for the amount of time you spent on it?
____Yes
____No, more contact hours should have been offered
____No, fewer contact hours should have been offered.

Expiration date: December 31, 2016