


Pain Management and End-of-Life Care CME Program

Module 8

Registration: The registration page and test questions are at the end of this article. The questions must be answered and submitted to the CSA in order to receive the CME credit. The full text of each module of this CME program, along with references, also will be accessible through the CSA Web Site, www.csahq.org, in the *Bulletin/Online CME* section and as part of the online *CSA Bulletin*.

Fees: This is a free service for CSA members. Non-members will be charged \$25  CME credit hour. Your CME certificate will be mailed from the CSA office.

Availability: This module is available from December 31, 2005, until December 31, 2008.

Target Audience: California law now requires that every licensed physician complete 12 credit hours in pain management and end-of-life care by the end of 2006. This module fulfills one credit hour of CME toward that requirement. This program is intended for all licensed physicians, including anesthesiologists, residents, and physicians with an interest in pain management.

Faculty and Disclosures for Module 8:

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All faculty participating in continuing medical education activities sponsored by the California Society of Anesthesiologists are required to disclose any real or apparent conflict(s) of interest related to the content of their presentation(s) or any of the industry sponsors of the meeting. In addition, speakers must disclose when a product is not labeled for the use under discussion or when a product is still investigational.

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For this program, Dr. Pham has no disclosures to make regarding any real or apparent conflicts of interest.

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CME Sponsor/Accreditation: The California Society of Anesthesiologists is accredited by the Accreditation Council for Continuing Medical Education to sponsor continuing medical education for physicians.

The California Society of Anesthesiologists Educational Programs Division designates this educational activity for a maximum of 1 credit hour toward the AMA Physician's Recognition Award.

Evaluation: An evaluation of Module 8 of this series is offered after the test questions. Please fill in your responses and return them to the CSA office.

Objectives: At the conclusion of this course, participants should be able to:

- Describe the various exercise therapies that may be beneficial in pain management;
- Identify the indications and contraindications for physical therapeutics; and
- Apply the use of physical medicine modalities in the management of pain.

Resources: These materials, including questions, are offered online at the CSA Web Site at www.csahq.org. Instructions for the *Bulletin* version are on the registration page.

Rehabilitation In Pain Management

By Quynh Pham, M.D.

Dr. Pham is currently the program director for the AGCME accredited Pain Medicine Fellowship Training program at the University of California, Los Angeles and Greater Los Angeles VA Healthcare System (UCLA/GLAVAHS). This program is based at GLAVAHS. She also serves as Residency Program Director for Physical Medicine and Rehabilitation (PM&R) at UCLA/GLAVAHS. She is the director of the Chronic Pain Program at the West Los Angeles VA Healthcare Center.

The main goal of rehabilitation is to restore function and improve patients' quality of life. Patients with chronic pain often experience impaired function, physically, emotionally, and socially. Thus, rehabilitation plays an integral role in the treatment plan for patients with painful conditions. Patients presenting with acute pain often receive various interventions (surgery, medication, et cetera) as the first line of treatment. However, with chronic pain, the same treatment used for acute pain is less effective. If patients have pain related to musculoskeletal conditions (such as deconditioning, poor posture, chronic

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muscle spasm, joint contractures, myofascial pain and joint pain), neuropathic pain such as radiculopathy, or complex regional pain syndrome, then rehabilitation should be included in the treatment plan. Rehabilitation in pain management includes the use of physical agents, physical modalities, adaptive and assistive equipments, therapeutic exercises, and manual therapy. Benefits and indications for various treatments are outlined below:

Therapeutic Exercises

Perhaps the most important treatment to restore musculoskeletal function (mobility and range) is therapeutic exercise. Therapeutic exercise ranges from relaxation, range of motion and stretching exercises to strengthening exercises and aerobic exercises for cardiovascular conditioning. Most studies showed that prolonged bed rest after an acute injury leads to decreased cardiopulmonary tolerance, muscle deconditioning, and depression.^{1,2,3} These conditions may contribute to a decrease in functional activities and soft tissue and joint contractures, as well as to chronic muscle spasms, shortening and deconditioning. The goal of therapeutic exercises is to assist the patient in restoring normal posture, body mechanics, joint range of motion, and resting muscle flexibility and strength.

Range of motion exercises preserve and improve joint range of motion. The patient may do these initially with assistance from a therapist, then later, independently or with assistance from a family member. Range of motion exercises may be done passively (the patient is relaxed and doesn't help with the movement), or actively (with the patient using his/her muscles to move the joints through the normal range without assistance), or active assistively (the patient is moving the joint with assistance). Range of motion exercises should be avoided in patients with actively inflamed or infected joints.

Relaxation exercises help reduce muscle tension, stress and spasm. Several techniques are commonly used to help reduce chronic pain. These include autogenic training and progressive muscle relaxation.⁴ Often, relaxation exercises are done in conjunction with biofeedback sessions to give the patient more awareness and control over muscle tension. Biofeedback training utilizes an instrument to give patient feedback on their physiological responses such as body temperature and muscle tension. Patients usually undergo several training sessions, then practice these relaxation techniques repeatedly at home.

Stretching exercises consist of gentle passive stretching of the tight or contracted muscles. Overstretching of the joint may cause micro joint damage, reflex muscle spasm and joint trauma. The goal of stretching exercises is to regain the normal resting length of the muscle. At this length, the muscle

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registers no tension, and thus pain from spasm is not present. Stretching exercises should be done frequently throughout the day, especially before and after physical activities.

Strength training is done to improve muscle performance. Strength that is gained in the first few weeks of exercises is due to neuronal effects of improved synchronization of motor unit recruitment, rather than to muscle hypertrophy, which doesn't occur until after two to four weeks of training.¹ Strength training can be achieved through isometric contraction or isotonic contraction. Isotonic exercises occur when the muscle contraction moves a constant load through a range of motion (i.e., biceps curls). Isometric exercises are static muscle contraction with the muscle length unchanged. Isometric exercises are often prescribed in patients with inflamed or painful joints, as this does not create undue stress as does occur with isotonic exercises. However, it is important to note that the strength gained in isometric exercises is specific to the angle of the joint that the exercise was performed. Thus, patients should be given isometric exercises at different joint angles.

Aerobic exercises are prescribed to assist patients in improving cardiovascular and pulmonary conditioning. Aerobic exercises can increase endorphin release and help improve a patient's mood and coping skills.

A combination of the above exercises often is prescribed for patients with musculoskeletal pain as part of their treatment plan. Patients are encouraged to continue to perform frequent therapeutic exercises at home as part of maintenance and restorative therapy.

Physical Agents

Heat therapy works by increasing local blood flow, facilitating resolution of chronic inflammation,^{5,6} and increasing tendon extensibility when combined with stretching. Heat therapy also helps to decrease joint stiffness and reduce muscle tension. The analgesic effects of heat have been postulated to be secondary to vasodilatation resulting in washout of pain mediators, reduction of ischemic pain, release of endorphins, alteration of nerve conduction, and alteration of cell membrane permeability.^{7,8} Thus, heat may be beneficial in the treatment of various musculoskeletal conditions such as chronic tendonitis, capsulitis, myofascial pain, chronic muscle spasm/tightness, arthritis, and joint contracture.

There are a variety of heat therapies. These are generally divided into two types: superficial heat (heat packs/hydrocollator packs, paraffin bath, whirlpool, et cetera) and deep heat (ultrasound, shortwave and microwave

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diathermy). Electric heat packs generate heat with current flow. Hydrocollator packs are encased silicon dioxide, which are immersed in hot water tanks. Superficial heat may induce increase in skin and soft tissue temperature up to 2-3 cm deep. Superficial heat should not be applied for more than 30 minutes as longer duration of application can cause burns.

Ultrasound can be used to deliver deep heat to localized tissue/muscle/joints. It works by using high frequency acoustic energy to induce heat in tissues. Ultrasound may increase temperature up to 8 cm deep. The depth penetration of ultrasound depends on the orientation of the beam, frequency of the waves, power used per surface area, and duration of treatment time.^{13,14} Ultrasound can be used to decrease pain in chronic tendonitis and increase range of motion in tight and contracted joints. Ultrasound is contraindicated in growing children and pregnant and menstruating women, patients with high-density polyethylene joint components or pacemakers, over laminectomy sites, and in fluid-filled cavities such as eyes and uterus.¹⁵

Shortwave diathermy is essentially radiowaves that heat up tissue by inducing electrical currents on a molecular level. The shortwave diathermy machine resembles a radio transmitter with two plates that generate magnetically induced eddy currents in tissue placed between the plates. Shortwave diathermy has advantages over ultrasound in that it is less labor intensive and can warm up larger areas. Microwave diathermy is used to heat up more superficial tissues or joints, since it does not penetrate as deep as ultrasound or shortwave diathermy. Microwave radiation is selectively absorbed in water-rich tissue such as muscle. In addition to the general contraindication for heat therapy, shortwave and microwave diathermy are contraindicated in patients with any lead implants such as nerve or brain stimulator, metallic clips or devices. These modalities should not be used over inflamed joints or fluid-filled cavities (eye, gravid uterus, etc.).¹⁴ Due to the large and cumbersome size of the equipment and the many contraindications, the use of shortwave and microwave diathermy is limited.

Heat therapy, in general, is contraindicated in acute trauma or inflammatory conditions, impaired sensation or circulation, heart failure, malignancy and edema.

Cold therapy (cryotherapy) produces vasoconstriction, reduces nerve conduction velocity, reducing muscle spindle firing and decreases the muscle stretch reflex.^{6,12} This helps decrease inflammation and edema, produce analgesia, and increase muscle relaxation by reducing muscle tone and spasm.⁹ Analgesia can be achieved in seven to nine minutes, with treatment limited to 30 minutes to reduce frostbite. Skin and muscle cooling up to 2 cm deep can

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be achieved after 20 minutes. Cryotherapy is most commonly used to reduce acute inflammation after musculoskeletal injury, pain and swelling after minor procedures and muscle spasm. Cryotherapy can be achieved by using cold packs (reusable gel), home ice packs, immersion in cold water, or vapocoolant spray. Cold therapy should be avoided in people with cold intolerance, cold hypersensitivity and allergy, insensate skin, cryoglobulinemia, Raynaud's disease and ischemia.

TENS (Transcutaneous Electrical Nerve Stimulation)

The mechanism of TENS remains controversial, but one proposed mechanism is the Gate Control Theory by Melzack and Wall, where stimulation of large peripheral nerve fibers block the transmission of signals from smaller pain fibers.¹⁷ The second proposed mechanism of TENS is the increased endorphins level after use,¹⁶ which has an effect in reducing pain. The TENS unit usually comes with a rechargeable battery, control panel for intensity and frequency of the impulses, and set of electrodes. Success rates from TENS vary from equal to placebo to 95 percent, depending on the studies and experimental designs. Many studies on supporting TENS use for pain relief were done for chronic knee pain from arthritis and post surgical pain (orthopedic and gynecological).¹⁵ The effect of the TENS varies depending on electrode placement, frequency and intensity of the pulse setting, and duration of use. Benefits from TENS may be established with a few trials to determine the most effective setting. A TENS unit should be used a few times a day for approximately 30 minutes at a time, as habituation to the stimuli may occur with continuous use. Due to the increased popularity of TENS use, the cost for the unit has become more affordable. It should be noted that a TENS unit may interfere with pacemaker or other electrical implant devices.¹⁸ Nevertheless, given the minimal side effects (skin irritation from electrode placement), TENS trial should be considered in patients who failed other treatment options.

Mechanical Traction

Traction is used in the lumbar and cervical spine to relieve pain. The major effect of traction is to achieve spinal elongation and widening of neuroforamina to relieve nerve root compression. Traction is often used in patients with chronic pain due to disc pathology or muscle spasm. The many types of traction include manual traction (pulley system), auto traction (with a device), and gravity traction (body weight provides the pull to distract the vertebrae). Traction may be continuous or intermittent. Most patients tolerate the intermittent traction better.²⁰ In the cervical spine, the minimum weight to accomplish any vertebral separation is 25 lbs.²² In the lumbar spine, a decrease in

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lumbar intradiscal pressure has been documented with 50 to 100 pounds of force.²³ Spinal traction is not recommended in the treatment of patients with acute low back or spine instability.

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Pain Management and End-of-Life Care CSA Educational Program

California law now requires that every licensed physician complete 12 credit hours in pain management and end-of-life care by the end of 2006. The CSA Educational Programs Division is providing a 12-module program to satisfy this requirement. Each article is written by a current or former director of a university-based pain management program in California. The full text of each article, along with references, will be accessible through the CSA Web Site. Joshua P. Prager, M.D., M.S., of the David Geffen School of Medicine at UCLA is the Coordinator of this series.

One module worth one CME credit hour is presented in each quarterly issue of the *CSA Bulletin* for Volumes 53-55 and it is also offered online through the end of 2006 at www.csaHQ.org.

In this issue of the *Bulletin*, Module 8 is available. Modules 1 through 8 are available on the CSA Web Site now. You may also contact the CSA office at (800) 345-3691, and we will send you the materials by fax or mail.

Watch for Module 9 by Dr. Sean Mackey in Volume 55, No. 1 issue.

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Registration

To register for the CSA CME Course in Pain Management and End-of-Life Care, Module 8, fill out this form. Then complete the test and the evaluation, and **mail or fax** all three to the CSA office at:

951 Mariner's Island Boulevard #270
San Mateo, CA 94404
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Pain Management and End-of-Life Care CME Course, Module 8

Available December 31, 2005, to December 31, 2008


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I authorize the California Society of Anesthesiologists to charge my account for the registration.

OR

Mail with check payable to California Society of Anesthesiologists

Signature: _____

Rehabilitation in Pain Management (cont'd)

Questions

1. What is the **main** goal of rehabilitation in Pain Management?
 - a) to help reduce the use of medications
 - b) to immediately ameliorate patient's pain
 - c) to restore function and improve patient's quality of life
 - d) to prepare patient for pre- and postsurgical procedure
2. Therapeutic exercises include all of those listed below, EXCEPT:
 - a) range of motion exercises
 - b) relaxation exercises
 - c) speech training exercises
 - d) stretching exercises
3. Aerobic exercises are often prescribed to:
 - a) improve patient's mood by increasing endorphin levels
 - b) block peripheral pain impulses at the level of the spinal cord
 - c) improve range of motion in large contracted joints
 - d) reduce inflammation in acutely inflamed joints
4. All of the following is true regarding strength training EXCEPT:
 - a) Isometric exercise is the preferred type of exercises in patients with painful joints
 - b) Isometric exercise should be given at only one joint angle to maximize strength gain
 - c) Strength gained in the first few weeks of exercises is due to neuronal effects rather muscle hypertrophy
 - d) Isotonic exercise occurs when the muscle contraction moves a constant load through a range.
5. Indications for heat therapy include all of the following conditions EXCEPT:
 - a) chronic tendonitis
 - b) myofascial pain
 - c) joint contracture
 - d) peripheral neuropathy
6. Heat therapy includes the following modalities:
 - a) ultrasound
 - b) electric heating pads
 - c) microwave therapy
 - d) all of the above
7. Deep heat therapy such as ultrasound and shortwave diathermy should be avoided in the following conditions:
 - a) pregnancy
 - b) chronic joint contracture
 - c) peripheral vascular disease
 - d) a and c

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- 8. Cold therapy may reduce pain locally by:
 - a) increasing blood flow
 - b) increasing muscle stretch reflex
 - c) reducing muscle tone
 - d) improving nerve conduction velocity
 - 9. Which of the following statements regarding transcutaneous electrical nerve stimulation (TENS) is accurate?
 - a) TENS treatment can be used on soft tissue tumor to induce shrinkage
 - b) TENS unit will not interfere with pacemaker unit if it's placed away from the heart
 - c) TENS treatment efficacy varies depending on the setting and duration of use.
 - d) TENS unit should not be used as the recent increase in cost makes it unaffordable for most patients.
 - 10. Mechanical traction is often use to alleviate pain in patients with
 - a) acute muscle spasm
 - b) disc pathology
 - c) spinal instability
 - d) post laminectomy pain
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Evaluation of Module 8

As part of the CSA Educational Programs Division's ongoing efforts to offer continuing medical education, the following evaluation of this program is requested. This is a useful tool for the EPD in preparing future CME programs.

- 1. How well were the learning objectives of this program met?

Very Well	5	Above Average	4
Average	3	Below Average	2
Not Well at All	1		
- 2. How relevant was the information in this program to your clinical practice?

Very Relevant	5	Above Average	4
Average	3	Below Average	2
Not Relevant at All	1		
- 3. How would you rate this program overall?

Excellent	5	Above Average	4
Average	3	Below Average	2
Poor	1		
- 4. Did you detect any commercial bias in this module?

Yes		No	
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