

**Course Number/Title:** DH 215 Dental Pain Management

**Year:** Fall 2012

**Department:** Dental Hygiene

**Credit Hours:** 1

**Instructor:** Dr. Jay Sekavec

**Days/Time:** TBA

**Required Text:** Stanley F. Malamed. *Handbook of Local Anesthesia*. 6<sup>th</sup> edition. Mosby, second ed. 2008.  
NTC Pain Management Course Manual

**Office Hours:** By Appointment

**Room #:** TBA

**Course Placement:** Sophomore

**Phone #:** 719-481-9645

785-672-4289

## Prerequisites:

1. For dental hygiene students in program
2. Anatomy & Physiology I
3. Anatomy & Physiology II
4. Oral Anatomy & Histology
5. Pharmacology
6. 4<sup>th</sup> or 5<sup>th</sup> semester of clinical curriculum
7. Evidence of current health-care provider certification in Cardiopulmonary Resuscitation & student liability insurance

## Rationale

This course is designed for Dental Hygiene sophomores interested in attaining certification in the administration of local anesthesia. This course is designed to enhance the curriculum.

## Course Description

This course will encompass basic and current concepts in administration of local anesthesia and pain management. Principles of drug interactions, emphasizing dental related therapeutics and drugs associated with common system disorders; information on the selection of professional anesthesia armamentarium; and, principles necessary for administering local anesthesia will be incorporated in the learning process. Content of this course meets educational requirements for certification in the state of Kansas. There is no challenge test available for this course.

## Course Outline

1. Characterize common emergency situations and measures used to treat these emergencies, including drugs.
2. Apply principles of head and neck anatomy relating to the administration of local anesthesia.
3. Analyze pharmacology of anesthetic solutions and their pharmacological properties.
4. Use appropriate local anesthesia armamentarium.
5. Deliver local anesthesia.

## Course Learning Objectives and Competencies

### 1. Characterize common emergency situations and measures used to treat these emergencies, including drugs.

#### Linked Core Abilities

- ❖ Act responsibility
- ❖ Work productively
- ❖ Work cooperatively
- ❖ Think critically & creatively
- ❖ Apply scientific concepts effectively

#### Performance Standards

Criteria—Performance will be satisfactory when:

- learner acquires and evaluates a thorough health history
- Learner assesses the dental implications that the drugs a patient is taking might have on the person as a whole
- Learner assesses the importance of what drug related allergies the patient might have
- Learner assesses the drugs and/or disease states which influence the administration of local anesthesia on dental treatment
- Learner is aware of what prescription and non-prescription medications patients are taking and the effect they might have on the person as a whole
- Learner names, describes and associates the most common emergency situations with the drugs or other measures used to treat these emergencies
- Learner actively participates in medical emergency role play opportunities involving common emergency situations
- Learner creatively problem solves with a group of peers common emergency situations and the protocol to follow to resolve them appropriately
- Learner discusses with a peer group the legal and ethical issues associated with administration of local anesthesia

Competence will be demonstrated:

- ◆ On mock patient medical records, to minimal competency
- ◆ On a written test, without assistance or references, to minimal competency
- ◆ On a written project, including the following factors: allergy relating to local anesthetic; predisposing factors; prevention; dental practice management; clinical manifestations; signs & symptoms; and management of patient reactions, to minimal competency

#### Learning Objectives

- a. Contrast the basic forms available for completing health histories in relation to pain management techniques. (Page 122)
- b. List three tools necessary to assess patient's physical and mental status. (Pages 116-123)
- c. Explain how the ASA classification of physical status can be used to determine client treatment. (Page 42 & 123)
- d. Discuss personal reactions and beliefs regarding pain and pain control.
- e. List six vital signs which are important to monitor during the use of pain management techniques. (Page 122-123)

- f. List four physical signs or reactions to observe when completing a visual inspection of the patient during and after administration of pain management techniques. (Page 122)
- g. List factors to be evaluated when monitoring patient's pulse during the use of pain management techniques. (Page 122)
- h. Distinguish the causes, problems, prevention and management of emergency responses to complications in relation to local anesthesia. (Pages 246-258)
- i. Determine a set of guidelines for dental management of adult patients according to their blood pressure readings. (Page 122)
- j. Discuss rationale for the questions asked while completing a health history. (Page 116)
- k. Analyze the significance of the following health complications and necessary modifications to treatment in regard to local anesthesia: atypical plasma cholinesterase, methemoglobinemia, malignant hypothermia, heart failure, heart attack or angina pectoris, high blood pressure, heart murmurs, artificial valves or joints, pacemakers, operations, anemia, stroke, renal dysfunction, allergies, thyroid problems, liver dysfunction, jaundice, hemophilia, AIDS, HIV, HBV. Analyze any other significant health complications not listed here. (Pages 27, 116-122, 126-129)
- l. List four questions necessary to further determine any medical risk to the patient following the review of the health history in relation to pain management techniques. (Pages 120-124 & Ch. 10 & 18)
- m. Manage an emergency case scenario when given a specific problem.
- n. Identify legal and ethical issues associated with the administration of pain control methodologies. (State Practice Act)
- o. Analyze current and future trends in pain management techniques. (Pages 2870301)

## 2. Apply principles of head and neck anatomy relating to the administration of local anesthesia.

### Linked Core Abilities

- ❖ Work productively
- ❖ Work cooperatively

### Performance Standards

Criteria—Performance will be satisfactory when:

- Learner reviews the skeletal landmarks of the head and their importance relating to the administration of local anesthesia.
- Learner reviews the musculature of the head and neck region.
- Learner reviews the neurological pathways supplying the head and neck region.
- Learner reviews the circulatory pathways supplying the head and neck region.
- Learner constructs a diagram identifying and locating significance of nerves, muscles, ligaments, blood vessels and bony structures.
- Learner writes a short explanation of the diagram they develop explaining the significance of nerves, muscles, ligaments, blood vessels & bony structures.

Competence will be demonstrated:

- ◆ On a peer patient by demonstrating appropriate landmarks, according to checklist guidelines, to minimal competency.
- ◆ On a laboratory test, without assistance or references, to minimal competency.
- ◆ On a written test, without assistance or references, to minimal competency.

- ♦ On a written project or diagram, to minimal competency.

### **Learning Objectives**

- a. Discuss physiology of the skull, musculature, nerves and circulatory systems of the head and neck.
  - b. Discuss physiology of the peripheral nerves. (Pages 5-6)
  - c. Describe the electrophysiology of nerve conduction. (Page 6)
  - d. Breakdown nerve impulse propagation. (Page 9-10)
  - e. Compare impulse spread and function of both myelinated and unmyelinated nerves. (Page 9-10)
  - f. Diagram transmission of a nerve impulse, including the description of the resting state, depolarization and repolarization phases. (Page 9-10)
  - g. Describe during which phase the primary effects of local anesthetics occur. (Page 10)
  - h. Diagram the trigeminal nerve and its components (hard and soft tissue landmarks) including: motor and sensory roots, major divisions and their origins, branches-ophthalmic V/1, maxillary V/2, mandibular V/3. (Pages 143-154)
  - i. Demonstrate on a skull the location of bony structures/landmarks of the maxilla and mandible of specific injection sites: Anterior Superior Alveolar (ASA), Middle Superior Alveolar (MSA), Posterior Superior Alveolar (PSA),; Nasopalantine (NP), Greater Palatine (GP), Supraperiosteal Infiltration (SI) injection, Inferior Alveolar/Lingual (IAL), Mental/incisive (M), Buccal (B); Periodontal ligament (PDL), Intraseptal (IS).
  - j. Demonstrate on a peer partner the location of bony structures/landmarks of the maxilla and mandible of specific injection sites: Anterior Superior Alveolar (ASA), Middle Superior Alveolar (MSA), Posterior Superior Alveolar (PSA), Nasopalantine (NP), Greater Palatine (GP), Supraperiosteal infiltration (SI) injection, Inferior Alveolar/Lingual (IAL), Mental/incisive (M), Buccal (B), Periodontal ligament (PDL), Intraseptal (IS). (Pages 160-219)
  - k. Diagram modes of action of an anesthetic agent.
  - l. List the anatomical areas innervated by the following nerves: anterior superior, posterior superior, middle superior alveolar, infraorbital, greater palantine, nasopalantine, mental, incisive, lingual, buccal. (Pages 160-219)
- 3. Analyze pharmacology of anesthetic solutions and their pharmacological properties.**

### **Linked Core Abilities**

- ❖ Communicate clearly
- ❖ Act responsibly
- ❖ Work productively
- ❖ Work cooperatively
- ❖ Think critically & creatively
- ❖ Apply scientific concepts effectively

### **Performance Standards**

Criteria—Performance will be satisfactory when:

- Learner discusses mechanisms of action for pharmacological solutions.
- Learner discusses indications and contraindications for pharmacological solutions.
- Learner discusses possible complications of specific pharmacological solutions.

Competence will be demonstrated:

- ◆ On a written quiz or examination, without references, to minimal competency.
- ◆ On a mock patient care, with a peer partner, to minimal competency.
- ◆ on a written project, including the factors: allergy relating to local anesthetic, predisposing factors; prevention, dental practice management, clinical manifestations, signs and symptoms, and management of patient reactions, to minimal competency.

### Learning Objectives

- a. Describe the ideal properties of a local anesthetic. (Page 2)
- b. Characterize how local anesthetics work. (Page 13)
- c. Identify clinical implications of pH and local anesthetic activity. (Pages 17-18 and 22)
- d. Describe how the pKa, pH, and other physiochemical factors of a local anesthetic solution influence the rate of onset of local anesthesia. (Pages 16-18)
- e. Characterize current theories of how and when local anesthetics work and factors that affect a person's reaction to pain. (Pages 22-23)
- f. Describe possible barriers to the diffusion of local anesthetic solutions. (Pages 18-20)
- g. Describe the process of recovery from a local anesthetic. (Page 20)
- h. Describe factors that affect the distribution of a local anesthetic throughout the body. (Page 26)
- i. Describe the systemic actions of local anesthetics on the cardiovascular and cerebrovascular systems. (Page 29-34)
- j. Examine the complexity of patients' emotional reaction to pain and pain control. (Pages 291-299)
- k. Identify the three major methods by which drugs produce adverse reactions. (Pages 254)
- l. Discuss the predisposing factors to local anesthetic overdose. (Page 263-264)
- m. Discuss the causes of local anesthetic overdose. (Page 263-264)
- n. Describe the clinical manifestations of minimal to moderate and moderate to high overdose levels. (Pages 266-268)
- o. Recognize the physiology of local anesthetic overdose. (Pages 269-270)
- p. Break down the steps associated with patient management procedures for mild/severe overdose reactions. (Page 270)
- q. Be aware of precipitating factors, prevention, clinical manifestations and management of epinephrine overdose. (Pages 272-273)
- r. Compare pharmacological principles of esters and amides and locations in terms of absorption, distribution, metabolism and excretion. (Pages 26-28)
- s. Determine factors to consider when selecting local anesthetic and vasoconstrictors. (Page 72)
- t. Differentiate between esters and amides in terms of metabolism (biotransformation). (Page 26)
- u. Demonstrate understanding of the clinical signs and symptoms of central nervous system and cardiovascular toxicity by local anesthetics. (Page 27)
- v. Classify local and systemic effects of local anesthetic on the body. (Page 29)
- w. Explain malignant hypothermia as a contraindication for amide anesthetic. (Page 35)
- x. Identify five purposes for vasoconstrictors. (Page 27)
- y. Relate chemical properties of local anesthetics and vasoconstrictors with clinical application of appropriate agents. (Page 38)
- z. Develop an understanding of the mode of action of vasoconstrictors. (Pages 39 and 70-72)
- aa. Examine how and why you would select a vasoconstrictor and what would be appropriate for a specific situation. (Pages 39 and 70-72)

- ab. Discuss why vasoconstrictors are added to local anesthetics. (Page 38)
- ac. Assemble a listing of the concentration of most commonly used vasoconstrictors and determine maximum safe dosage (MSD) for healthy and cardiac patients. (Pages 39 and 50-52)
- ad. Distinguish the differences between the pharmacology of epinephrine, norepinephrine and levonordefrin including: property name, chemical structure, source, mode of action, termination of action and elimination, side effects, overdose, clinical application and maximum doses. (Pages 40-44)
- ae. Discuss contraindications for use of vasoconstrictors. (Page 47)
- af. Create a table summarizing pertinent information associated with the following amide local anesthetics: Lidocaine, Mepivacaine, Prilocaine, Bupivacaine, Etioaine and Articaine. (Page 40-46)
- ag. Demonstrate understanding and use of the two most commonly used topical anesthetics: Benzocaine and Lidocaine. (Page 67)

#### **4. Use appropriate local anesthesia armamentarium.**

##### **Linked Core Abilities**

- ❖ Apply scientific concepts effectively

##### **Performance Standards**

Criteria—Performance will be satisfactory when:

- Learner selects and assembles the appropriate local anesthesia armamentarium, based on patient need.
- Learner demonstrates the proper steps in loading an anesthetic syringe.
- Learner demonstrates the proper steps in recapping the needle.
- Learner demonstrates the proper steps in unloading the anesthetic syringe.
- Learner demonstrates the proper technique for placing an additional cartridge into the anesthetic syringe.
- Learner uses the appropriate local anesthesia armamentarium, based on patient need.

Competence will be demonstrated:

- ◆ By selecting and assembling appropriate local anesthesia armamentarium, based on patient need, to checklist criteria and minimal competency, without assistance or references.
- ◆ By showing local anesthesia techniques on peer and clinical patients, to minimal competency, according to checklist criteria.

##### **Learning Objectives**

- a. Diagram the parts of an anesthetic syringe. (Page 77)
- b. Assemble and demonstrate with peer partners the proper loading procedure of an anesthetic syringe. (Pages 103-104)
- c. Assemble and demonstrate with peer partners the proper unloading procedure of an anesthetic syringe. (Page 105)
- d. Assemble with and demonstrate with peer partners the proper technique for placing an additional anesthetic cartridge in the syringe. (Page 110)
- e. Demonstrate proper needle recapping techniques with peer partners. (Pages 104-105)
- f. List five types of syringes used in dentistry today. (Page 76)

- g. Assess the advantages, disadvantages and limitations associated with the five differing types of anesthetic syringes. (Page 76)
- h. Identify the most commonly used type of syringe; name and identify its various components. (Pages 76, 80-81)
- i. Develop a list of steps involved in proper maintenance and sterilization of the syringe. (Page 82)
- j. Identify a list of mechanical problems which can occur with the use of anesthetic syringes. (Page 82)
- k. Describe the differing parts of the needle. (Page 85-88)
  - l. Compare differing needle gauges and where/when they are used. (Pages 85-88)
- m. Discuss complications associated with needle use. (Pages 84-90)
- n. Distinguish proper from improper care and handling of needles, including following CDC guidelines and proper disposal. (Page 88-89)
- o. Give the common name for the anesthetic cartridge. (pages 91-93)
- p. Recognize the components of an anesthetic cartridge. (Pages 91-93)
- q. Identify the basic components of the anesthetic solution contained within the cartridge. (Pages 92-93)
- r. Demonstrate appropriate care and handling of the anesthetic cartridge. (Pages 93-94)
- s. Calculate the amount of milligram of anesthetic and vasoconstrictor are in each anesthetic cartridge. (Page 93)

## 5. Deliver local anesthesia.

### Linked Core Abilities

- ❖ Act responsibly
- ❖ Work productively
- ❖ Work cooperatively
- ❖ Think critically and creatively
- ❖ Apply scientific concepts effectively

### Performance Standards

Criteria—Performance will be satisfactory when:

- Learner prepares proper armamentarium for delivery of local anesthesia.
- Learner orally explains rationale for why/why not the patient is acceptable to receive a local anesthetic.
- Learner demonstrates skills on peer and clinical patients.

Competence will be demonstrated:

- ◆ By showing local anesthesia techniques on peer and clinical patients, to minimal competency, according to checklist criteria for the following injections, for Anterior Superior Alveolar (ASA) injection.
- ◆ By showing local anesthesia techniques on peer and clinical patients, to minimal competency according to checklist criteria, for Middle Superior Alveolar (MSA) injection.
- ◆ By showing local anesthesia techniques on peer and clinical patients, to minimal competency, according to checklist criteria, for Posterior Superior Alveolar (PSA) injection.
- ◆ By showing local anesthesia techniques on peer and clinical patients, to minimal competency according to checklist criteria, for Greater Palantine (GP) injection.

- ◆ By showing local anesthesia techniques on peer and clinical patients, to minimal competency, according to checklist criteria, for Nasopalatine (NP) injection.
- ◆ By showing local anesthesia techniques on peer and clinical patients, to minimal competency, according to checklist criteria, for Supraperiosteal Infiltration (SI) injection.
- ◆ By showing local anesthesia techniques on peer and clinical patients, to minimal competency according to checklist criteria, for Inferior Alveolar/Lingual Block Injection (IAL) injection.
- ◆ By showing local anesthesia techniques on peer and clinical patients, to minimal competency according to checklist criteria, for Mental/Incisive Block (M) injection.
- ◆ By showing local anesthesia techniques on peer and clinical patients, to minimal competency according to checklist criteria, for Buccal Nerve Block (B) injection.
- ◆ By showing local anesthesia techniques on peer and clinical patients, to minimal competency according to checklist criteria, for Periodontal Ligament (PDL) injection.
- ◆ By showing local anesthesia techniques on peer and clinical patients, to minimal competency according to checklist criteria, for Intraseptal (IS) injection.
- ◆ When peer and clinical patients are thoroughly devoid of sensation.

### **Learning Objectives**

- a. Describe how a sterilized needle assists in an atraumatic insertion. (Page 133)
- b. Describe the procedure for checking the flow of anesthetic solution. (Page 133)
- c. Determine if there is a need to warm the anesthetic cartridge/syringe. (Page 133)
- d. Practice proper patient positioning prior to and during anesthetic injection. (Page 133)
- e. Apply proper procedure for drying tissues prior to injection. (Page 134)
- f. Apply topical anesthetic to tissue as necessary for patient comfort. (Page 134)
- g. Demonstrate appropriate communication skills with the peer or clinical patient during all procedures. (Page 135)
- h. Explain the necessity of a firm fulcrum point (hand rest). (Page 135)
- i. Describe proper procedures for minimizing tissue resistance during needle insertion. (Page 135)
- j. Discuss the significance of keeping the needle from the patient's line of sight. (Page 135)
- k. Describe needle insertion into the mucosa. (Page 135)
- l. Facilitate discussion in a peer group about the need for observation and communication with the patient during the time of the injection. (Pages 135-136)
- m. Discuss the significance of injecting several drops of solution while slowly advancing the needle toward the target. (Page 136)
- n. Discuss the ramifications of needle contact with the periosteum. (Page 139)
- o. Compare the procedure and importance of aspiration with not aspirating and what could occur. (Page 139-140)
- p. Clarify the importance of patient observation following injection. (Page 141)
- q. Apply proper record keeping procedures. (Page 142)
- r. Demonstrate landmark sites for all maxillary and mandibular injection sites. (Pages 160-218)
- s. Construct a chart describing the following: injection; injection sites; areas anesthetized; potential complications; probable causes of failures to achieve anesthesia; prevention of complications; changes to techniques to correct failures. (Pages 160-218)
- t. Demonstrate actual administration of local anesthetic for all maxillary and mandibular injection sites and procedures necessary to correct any potential errors.



**Method of Instruction**

Classroom presentation 10 hours, on-campus lab and clinical 18 hours, for a total of 28 hours.

**Method of Evaluation and Course Requirements**

This course requires passage at the minimal competence stated below for completion. Participants must stay for the ENTIRE laboratory time to complete this course. The 11 required injection processes are:

Anterior Superior Alveolar  
Middle Superior Alveolar  
Posterior Superior Alveolar  
Nasopalatine  
Greater Palatine  
Supraperiosteal  
Inferior Alveolar/Lingual  
Long Buccal  
Mental/Incisive  
Intraseptal  
Periodontal Ligament (PDL)

**Grading Scale**

Grade	Requirement
A	Completion of written evaluation at 75%; passage of ALL injection processes at 90%.
F	Not completing written evaluation at 75%; not completing ALL injection processes at 90%.

**Assignment Policy**

N/A

**Test Policy**

One hour exam must achieve a minimum 75%.

**Attendance Policy**

Attendance at all lectures and laboratory experiences is expected to complete this course.

**Academic Integrity**

Colby Community College defines academic integrity as learning that leads to the development of knowledge and/or skills without any form of cheating or plagiarism. This learning requires respect for Colby's institutional values of quality, service and integrity. All Colby Community College students, faculty, staff, and administrators are responsible for upholding academic integrity.

**Cheating** is giving, receiving, or using unauthorized help on individual and group academic exercises such as papers, quizzes, tests, and presentations through any delivery system in any learning environment. This includes impersonating another student, sharing content without authorization, fabricating data, and altering academic documents, including records, with or without the use of personal and college electronic devices.

**Plagiarism** is representing or turning in someone else's work without proper citation of the source. This includes unacknowledged paraphrase, quotation, or complete use of someone else's work in any form. It also includes citing work that is not used and taking credit for a group project without contributing to it.

The following procedure will be used for students who violate the policy:

- First Offense – Student will receive a zero for the assignment and the student will be reported to the Dean of Academic Affairs.
- Second Offense – The student will be reported to the Dean of Academic Affairs and removed from the class.
- Third Offense – The student will be reported to the Dean of Academic Affairs and dismissed from the college.

Any questions about this policy may be referred to the Dean of Academic Affairs.

**Equipment and Supplies**

- ITV “elmo” camera and computer; oral anatomy skulls; cotter tip applicators; local anesthetic armamentarium; clinical supplies.
- Peer patients
- Clinical patients

**Bibliography**

NTC Wausau, Wisconsin Pain Management Course Manual.

**Recommended Resources**

Malamed's DVD Local Anesthetic Administration

Tastak. *Local Anesthetic of the Oral Cavity*.

Herring. *Illustrated Anatomy of the Head & Neck*.