ILLINOIS VALLEY COMMUNITY COLLEGE

COURSE OUTLINE

DIVISION: Health Professions

COURSE: DLH 1207 Pain Management

Date: Spring 2024

Credit Hours: 1

Complete all that apply or mark "None" where appropriate:
Prerequisite(s): Successful completion of all first-year, spring semester courses listed in the Dental Hygiene A.A.S. Degree; copy of current CPR

Enrollment by assessment or other measure? ☐ Yes ☒ No
If yes, please describe:

Corequisite(s): None

Pre- or Corequiste(s): None

Consent of Instructor: ☐ Yes ☒ No

Delivery Method:		
☒ **Lecture**	**.5 Contact Hours**	**(1 contact = 1 credit hour)**
☐ **Seminar**	**0 Contact Hours**	**(1 contact = 1 credit hour)**
☒ **Lab**	**.5 Contact Hours**	**(2-3 contact = 1 credit hour)**
☐ **Clinical**	**0 Contact Hours**	**(3 contact = 1 credit hour)**

Offered: ☐ **Fall** ☒ **Spring** ☐ **Summer**

CATALOG DESCRIPTION and IAI NUMBER (if applicable):
This course is designed to provide the dental hygiene student with the skills to manage patient discomfort. This includes topical anesthesia, local anesthesia, and nitrous oxide analgesia during dental hygiene services. This course complies with the Illinois Dental Practice Act.

ACCREDITATION STATEMENTS AND COURSE NOTES:

- Standard 2: Educational Program:
  - Curriculum content:
    - Biomedical science content must include content in anatomy, physiology, chemistry, biochemistry, microbiology, immunology, general pathology and/or pathophysiology, nutrition and pharmacology. (2-8.b)
      - Dental sciences content must include tooth morphology, head, neck and oral anatomy, oral embryology and histology, oral pathology, radiography, periodontology, pain management, and dental materials. (2-8.c)
      - Dental hygiene science content must include oral health education and preventive counseling, health promotion, patient management, clinical dental hygiene, provision of services for and management of patients with special needs, community dental/oral health, medical and dental emergencies, legal and ethical aspects of dental hygiene practice, infection and hazard control management, and the provision of oral health care services to patients with bloodborne infectious diseases. (2-8.d)
- Patient Care Competencies:
  - Graduates must be competent in providing the dental hygiene process of care which includes:
    - Comprehensive collection of patient data to identify the physical and oral health status (2-13.a)
  - Graduates must be competent in interpersonal and communication skills to effectively interact with diverse population groups and other members of the health care team. (2-15)
- Critical Thinking:
  - Graduates must be competent in problem solving strategies related to comprehensive patient care and management of patients. (2-23)

COURSE TOPICS AND CONTENT REQUIREMENTS:

I. Local anesthesia in the dental hygiene practice
   a. History of pain control in dental hygiene.
   b. How anesthesia is practiced
   c. State requirements for local anesthesia
   d. Patients' perception of anesthesia and pain control.
   e. Human needs paradigm as it relates to pain control.

II. Neurophysiology
   a. Organization of the nervous system.
   b. Mode of action of local anesthetic agents on nerves.

III. Preanesthetic assessment
   a. Patient's medical history
   b. Dental history
   c. Patients' role on selection of local anesthetics
      i. Emotional status
      ii. Blood pressure
      iii. Pulse
      iv. Respiration
      v. Weight

d. Dental fear
e. Relative risk presented by a patient
f. Contraindications
    i. Relative
    ii. Absolute
g. Drug-to-drug interactions
    i. Vasoconstrictor
    ii. Other drugs.
h. Vasoconstrictor
    i. Interactions
    ii. Contraindications
i. Patient concerns when selecting anesthetic
    i. Cardiovascular disease
    ii. Hyperthyroidism
    iii. Asthma
    iv. Sickle cell anemia
    v. Allergies
j. Ester derivative
k. Amide local anesthetic drug/drug interactions
    i. Malignant hyperthermia
    ii. Methemoglobinemia
    iii. Liver disease
    iv. Kidney disease
    v. Pregnancy
    vi. Bleeding disorders

IV. Determining drug does
a. Maximum recommended dose (MRD)
    i. Steps to calculate.
b. Maximum number of cartridges based on MRD
c. Calculating milligrams of anesthetic administered
d. Calculating additional dosages of the same drug
e. Calculating additional dosages of different drugs
f. Calculating MRDs
    i. Vasoconstrictors for medically compromised and elderly patients
g. Vasoconstrictors
    i. Dose of local anesthetic drug
    ii. Dose of the accompanying vasoconstritor
    iii. Dilutions
    iv. MRD
    v. Calculating drug doses
    vi. Calculate milligrams
h. Determine the limiting drug

V. Armamentarium and syringe preparation
a. Three main components
    i. Aspirating syringe
    ii. Disposable hypodermic needle

iii. Single-dose anesthetic cartridge

b. Criteria for acceptance of local anesthetic syringes
c. Components of the anesthetic syringe
    i. Needle adaptor
    ii. Syringe barrel
    iii. Piston and harpoon
    iv. Finger grip
    v. Thumb ring
d. Maintenance of reusable syringes.
e. Components of the needle
    i. Bevel
    ii. Shaft
    iii. Hub
    iv. Cartridge-penetrating end
    v. Needle shields
    vi. Gauge
        1. Clear hub s= 25-guage
        2. Yellow hubs = 27-guage
        3. Blue hubs = 30-guage
    vii. Length
    viii. Problems
        1. Pain on insertion
        2. Pain on withdrawal
        3. Needlestick exposure to clinician
        4. Needle breakage
f. Anesthetic cartridge
    i. Components
        1. Glass cylinder
        2. Cartridge labeling
        3. Silicone rubber stopper
        4. Diaphragm
        5. Aluminum cap
        6. ADA color coding of local anesthetic cartridges
    ii. Proper care and handling
    iii. Cartridge problems
g. Supplemental equipment
    i. Topical antiseptic
    ii. Topical anesthetic
    iii. Applicator sticks
    iv. Gauze
    v. Hemostat or cotton pliers
h. Steps necessary to prepare the breech-loading aspirating syringe
i. Steps necessary to unload the breech-loading aspirating syringe

VI. Anatomic considerations

a. Orofacial skill bones
    i. Maxillae

ii. Palatine bones
iii. Mandible

b. Trigeminal nerve
    i. Ophthalmic nerve
    ii. Maxillary nerves
        1. Zygomatic nerve
        2. Infraorbital nerve
        3. Anterior superior alveolar nerve
        4. Middle superior alveolar nerve
        5. Posterior superior alveolar nerve
        6. Greater and lesser palatine nerves
        7. Nasopalatine nerve
    iii. Mandibular nerves
        1. Buccal nerve
        2. Muscular Branches and Auriculotemporal Nerve
        3. Lingual nerve
        4. Inferior alveolar nerve
        5. Mental nerve
        6. Incisive nerve
        7. Mylohyoid nerve

c. Facial nerve
    i. Parotid salivary gland

d. Vascular and glandular structures
    i. External carotid artery orofacial branches
    ii. Pterygoid plexus of veins
    iii. Maxillary vein

VII. Basic injection techniques

a. Surface anesthesia
b. Local infiltration
c. Supraperiosteal injection
d. Nerve block
e. Successful injection
    i. Preanesthetic assessment and consultation
    ii. Confirm care plan
    iii. Informed consent
    iv. Selection of injection
    v. Preparation of equipment
    vi. Check the anesthetic equipment
    vii. Patient position
    viii. Tissue preparation and patient communication
    ix. Dry tissue and visualize or palpate the penetration site
    x. Establish a fulcrum
    xi. Make tissue taut
    xii. Keep syringe out of patients' sight
    xiii. Gently insert the needle, watch, communicate
    xiv. Aspiration

xv. Slowly deposit the local anesthetic agent
xvi. Slowly withdraw the syringe and safely cap the needle
xvii. Observe the patient for possible reaction to anesthetic
xviii. Document procedure

f. Basic injection techniques for computer controlled local anesthetic delivery.

VIII. Maxillary anesthesia

a. Anatomy of the maxillary nerve and branches
b. Clinical effectiveness of maxillary nerve blocks
c. Supplemental injection
    i. Maxillary supraperiosteal injection (local infiltration)
        1. Target area
        2. Injection site
        3. Indications of effectiveness
        4. Possible complications
d. Maxillary facial nerve blocks
    i. Posterior superior alveolar (PSA) block
        1. Target area
        2. Injection site
        3. Indications of effectiveness
        4. Possible complications
    ii. Middle superior alveolar (MSA) block
        1. Target area
        2. Injection site
        3. Indications of effectiveness
        4. Possible complications
    iii. Anterior superior alveolar (ASA) block
        1. Target area
        2. Injection site
        3. Indications of effectiveness
        4. Possible complications
    iv. Infraorbital (IO) block
        1. Target area
        2. Injection site
        3. Indications of effectiveness
        4. Possible complications
e. Palatal nerve blocks
    i. Greater palatine block
        1. Target area
        2. Injection site
        3. Indications of effectiveness
        4. Possible complications
    ii. Nasopalatine block
        1. Target area
        2. Injection site
        3. Indications of effectiveness
        4. Possible complications

f. Common technique errors

IX. Mandibular anesthesia
- a. Anatomy of the mandibular nerve and its branches
- b. Clinical effectiveness of mandibular nerve blocks
- c. Mandibular nerve blocks
  - i. Inferior alveolar (IA) block
    1. Target area
    2. Injection site
    3. IA block troubleshooting pradigm
    4. Indications of effectiveness
    5. Possible complications
  - ii. Buccal block
    1. Target area
    2. Injection site
    3. Indications of effectiveness
    4. Possible complications
  - iii. Mental block
    1. Target area
    2. Injection site
    3. Indications of effectiveness
    4. Possible complications
- d. Supplemental injection (local infiltration)
    1. Target area
    2. Injection site
    3. Indications of effectiveness
    4. Possible complications

X. Complications
- a. Local
  - i. Needle breakage
  - ii. Pain during injection
  - iii. Burning during injection
  - iv. Hematoma
  - v. Facial nerve paralysis
  - vi. Paresthesia
  - vii. Trismus
  - viii. Infection
  - ix. Edema
  - x. Soft tissue trauma
  - xi. Sloughing of tissue
- b. Systemic
- c. Allergic
- d. Medical emergencies

XI. Legal considerations and risk management
- a. Patient documentation
- b. Procedures to reduce the risk of accidental needle exposure.
- c. Describe postexposure management

XII. Titration of nitrous oxide and oxygen gases
    a. Definition
    b. Significance
        i. Biovariability.
        ii. Advantages of titration
    c. Adjusting level appropriately
XIII. Nitrous Oxide Sedation
    a. Interaction with the body
    b. Patient assessment and evaluation
    c. Signs and symptoms
        i. Appropriate minimal sedation
        ii. Inappropriate minimal sedation
XIV. Technique for administration and assessment of recovery
    a. Fundamental principles
    b. Review general unit preparation
    c. How to activate
    d. Patient preparation
    e. Technique steps
    f. Principles of recovery.
    g. Psychologic and psychomotor effects
    h. Technique for assessing adequate recovery
    i. Adequate recovery.
    j. Recovery time.
    k. Documentation of procedures
XV. Ethical and legal considerations
    a. Legal requirements
    b. Informed consent
    c. Appropriate educational levels and training requirements for administration
    d. Ethical principles
    e. Ethical responsibilities
    f. Practice guidelines
XVI. Lab Skills under direct supervision of a dentist
    a. Administer nitrous oxide/oxygen within the guidelines of the Illinois Dental Practice Act.
    b. Administer local anesthesia within the guidelines of the Illinois Dental Practice Act.
        i. Administer 4 different maxillary injections safely and with minimal pain.
        ii. Administer 3 different mandibular injections safely and with minimal pain.
        iii. Administer 2 different palatal injections safely and with minimal pain
        iv. Administer local infiltrations with success.

INSTRUCTIONAL METHODS:

- Lecture
- Slide Presentations

- Class discussion
- Demonstration
- Visual aids - videos, models, slides
- Exams and quizzes
- Lab
- Laboratory practice of skills
- Laboratory practical exams
- Problem solving exercises

EVALUATION OF STUDENT ACHIEVEMENT:

- Lecture: Reading assigned materials, note taking, and participation in classroom discussion, completion of homework and project assignments is expected of students.
- Written tests and quizzes are used to evaluate student progress.
- Lab: Laboratory practical evaluation and exams are used to evaluate student progress.

The following grading scale will be used as a guide in determining the final grade for this course:

A= 92-100
B= 83-91
C= 75-82
D= 68-74
F= 67 and below

INSTRUCTIONAL MATERIALS:

Textbooks

Clark, M. S., & Brunick, A. L. (2020). *Handbook of nitrous oxide and oxygen sedation*. St Louis (Mo.): Elsevier.

Logothetis, D. (2017). *Local Anesthesia for the Dental Hygienist* (2nd ed.) St Louis (Mo.): Elsevier.

Resources

Demonstration models, mannequins, miscellaneous equipment and supplies.

LEARNING OUTCOMES AND GOALS:

Institutional Learning Outcomes

☐ 1) Communication – to communicate effectively.
☒ 2) Inquiry – to apply critical, logical, creative, aesthetic, or quantitative analytical reasoning to formulate a judgement or conclusion.
☐ 3) Social Consciousness – to understand what it means to be a socially conscious person, locally and globally.
☒ 4) Responsibility – to recognize how personal choices affect self and society.

Course Outcomes and Competencies

1. Describe local anesthesia in the dental hygiene practice
    a. Describe the history of pain control in health care and specifically to the practice of dental hygiene.
    b. Describe how anesthesia is practiced by dental hygienists.
    c. List state requirements for local anesthesia provided by dental hygienists.
    d. Discuss patients' perception of anesthesia and pain control.
    e. Describe the human needs paradigm as it relates to pain control.
2. Describe neurophysiology
    a. Review the organization of the nervous system.
    b. Discuss the mode of action of local anesthetic agents on nerves.
3. Explain preanesthetic assessment
    a. Discuss the importance of obtaining a patient's medical history, dental history, and dialogue history.
    b. Discuss the role that emotional status, blood pressure, pulse, respiration, and weight have on selection/utilization of local anesthetics.
    c. Describe dental fear and how dental professionals deal with patient fears through psychological, physical, and chemical parameters.
    d. Determine the relative risk presented by a patient prior to administering local anesthesia by interpretation of the health history.
    e. Differentiate between relative and absolute contraindications.
    f. Describe the drug-to-drug interactions that may occur between the vasoconstrictor and other drugs.
    g. Describe vasoconstrictor and systemic disease interactions and summarize vasoconstrictor contraindications.
    h. List the concerns for patients with cardiovascular disease, hyperthyroidism, asthma, sickle cell anemia, and allergies when selecting local anesthetics and scheduling treatment.
    i. Summarize the ester derivative local anesthetic interactions.
    j. Discuss the importance of amide local anesthetic drug/drug interactions.
    k. List the concerns about other amide local anesthetic interactions for patients with malignant hyperthermia, methemoglobinemia, liver disease, kidney disease, pregnancy, and bleeding disorders
4. Discuss determining drug does in local anesthetic
    a. Define maximum recommended dose (MRD) for a local anesthetic and discuss factors involved.
    b. Name the steps to calculate MRDs for local anesthetics and perform calculations as needed.
    c. Calculate the following: Maximum number of cartridges based on MRD, Milligrams of anesthetic administered, Additional dosages of the same drug, Additional dosages of different drugs
    d. Discuss the factors involved in calculating MRDs for vasoconstrictors for medically compromised and elderly patients and perform calculations as needed.
    e. Name the two potentially limiting drugs in the local anesthetic solution when administering local anesthetics with vasoconstrictors.

f. Discuss vasoconstrictor dilutions and the MRD for vasoconstrictor drugs.
g. Name the steps to calculate vasoconstrictor drug doses and perform calculations as needed.
h. Calculate milligrams of vasoconstrictor administered and additional doses of the same vasoconstrictor.
i. Determine the limiting drug when a local anesthetic agent and a vasoconstrictor are combined in an anesthetic cartridge.

5. Describe armamentarium and syringe preparation
   a. Review the three main components to the armamentarium of anesthetic equipment and supplies.
   b. Discuss the criteria for acceptance of local anesthetic syringes.
   c. Name and discuss the components of the anesthetic syringe.
   d. Discuss routine maintenance of reusable syringes.
   e. Name and discuss the components of the needle, as well as recognize manufacturer color codes for needle gauge.
   f. Discuss problems relative to the needle, which may occur during anesthetic procedures.
   g. Name and discuss the components of an anesthetic cartridge, as well as recognize the American Dental Association standard color codes for anesthetic cartridges.
   h. Discuss the proper care and handling of the cartridge.
   i. Discuss problems relative to the cartridge, which are rare but can occur.
   j. List and describe necessary supplemental equipment.
   k. List and discuss the steps necessary to prepare, as well as unload, the breech-loading aspirating syringe.
6. Explain anatomic considerations for local administration
   a. Indicate and describe in detail the various landmarks of the maxillae, palatine bones, and mandible that are relevant to the administration of local anesthesia on a diagram, skull, peer, and patient.
   b. Discuss the importance of the trigeminal nerve in relation to administration of local anesthesia and name the three divisions of the sensory root.
   c. Identify and trace the branches of the trigeminal nerve that are relevant to the administration of local anesthesia on a diagram, skull, peer, or patient.
   d. Discuss the importance of the facial nerve and the surrounding parotid salivary gland when administering local anesthetics.
   e. Identify and trace the routes of the blood vessels of the head and neck that are relevant to the administration of local anesthesia on a diagram, skull, peer, and patient.
7. Discuss basic injection techniques
   a. Describe the four anesthetic administration techniques.
   b. List the steps to providing a successful injection, describe the importance of each, and discuss various rapport strategies to reduce stress in the patient.
   c. Discuss basic injection techniques for computer controlled local anesthetic delivery.
8. Discuss maxillary anesthesia
   a. Discuss the importance of understanding the anatomy of the maxillary nerve and its branches when it comes to the utilization of local anesthesia within the maxillary arch.

b. Discuss the clinical effectiveness of maxillary nerve blocks in relationship to anatomy and compare them to similar mandibular nerve blocks.
c. List and describe the supplemental injection, Identify the target location, and Demonstrate the correct placement of the local anesthetic for the injection within the maxillary arch on a skull, peer, and a patient.
d. List and describe the four types of maxillary facial nerve blocks, Identify the correct tissue inserted into by the local anesthetic needle for each maxillary facial injection, Identify the target location for the maxillary facial nerve blocks and demonstrate correct administration of local anesthesia during dental hygiene clinical practice and Discuss the indications of clinically effective injections as well as possible complications.
e. List and describe the two types of palatal nerve blocks, Identify the correct tissue inserted into by the local anesthetic needle for each palatal injection, Identify the target location for the palatal nerve blocks and demonstrate correct administration of local anesthesia during dental hygiene clinical practice and Discuss the indications of clinically effective injections as well as possible complications.
f. Discuss common technique errors associated with maxillary injections.

9. Discuss mandibular anesthesia
    a. Discuss the importance of understanding the anatomy of the mandibular nerve and its branches when it comes to the utilization of local anesthesia within the mandibular arch.
    b. Discuss the overall clinical effectiveness of mandibular nerve blocks in relationship to anatomy and compare them to similar maxillary nerve blocks.
    c. Concerning the inferior alveolar block:
        i. Discuss its coverage and common uses.
        ii. Describe what can occur when bilateral blocks are implemented.
        iii. Identify the correct tissue inserted by the local anesthetic needle.
        iv. Demonstrate the correct placement of the needle at the injection site and target area.
        v. Demonstrate correct administration of local anesthesia during dental hygiene clinical practice.
        vi. Discuss the associated troubleshooting paradigm and its implications.
        vii. Discuss the indications of a clinically effective block as well as possible complications.
    d. Concerning the buccal block:
        i. Discuss its coverage and common uses.
        ii. Demonstrate the correct placement of the needle at the injection site and target area.
        iii. Demonstrate correct administration of local anesthesia during dental hygiene clinical practice.
        iv. Discuss the indications of a clinically effective block as well as possible complications.
    e. Concerning the mental block:
        i. Discuss its coverage and common uses.
        ii. Demonstrate the correct placement of the needle at the injection site target area.
        iii. Demonstrate correct administration of local anesthesia during dental hygiene clinical practice.

iv. Discuss the indications of a clinically effective block as well as possible complications.
v. Describe a supplemental injection that can be administered within the mandibular arch as well as the maxillary arch.

10. Discuss Local anesthetic complications
    a. Define local and systemic anesthetic complications and describe the three primary categories for local anesthetic complications.
    b. Discuss the possible complications (as well as management and prevention) of local anesthetic administration, such as needle breakage, pain during injection, burning during injection, hematoma, facial nerve paralysis, paresthesia, trismus, infection, edema, soft tissue trauma, and sloughing of tissue.
11. Discuss legal considerations and risk management
    a. Describe the type of information that should always be included in patient documentation for the administration of local anesthetics.
    b. Describe the procedures to reduce the risk of accidental needle exposure.
    c. Describe postexposure management.
12. Explain titration of nitrous oxide and oxygen gases
    a. Define titration as a method of drug administration.
    b. Understand the significance of titration.
    c. Understand the concept of individual biovariability.
    d. Recognize the advantages of the ability to adjust sedation levels using nitrous oxide sedation.
13. Review of Nitrous Oxide Sedation
    a. Review signs and symptoms of nitrous oxide and oxygen sedation
14. Discuss technique for nitrous oxide and oxygen administration and assessment of recovery
    a. Review the fundamental principles for appropriate nitrous oxide sedation.
    b. Review general unit preparation activities before N2O/O2 administration.
    c. Review how to activate N2O/O2 sedation equipment.
    d. Review measures taken to prepare the patient before N2O/O2 sedation.
    e. Describe the technique steps for the appropriate administration of N2O/O2 sedation.
    f. Understand the principles of recovery.
    g. Describe the psychologic and psychomotor effects of N2O/O2 sedation recovery.
    h. Recognize the appropriate technique for assessing adequate recovery from N2O/O2 sedation.
    i. Recognize the signs and symptoms of adequate N2O/O2 sedation recovery.
    j. Understand how individual biovariability affects N2O/O2 sedation recovery time.
    k. Recognize important documentation procedures associated with N2O/O2 sedation.
15. Discuss ethical and legal considerations regarding nitrous oxide and oxygen administration

a. Understand there are legal requirements for administering nitrous oxide sedation.
b. Recognize appropriate educational levels and training requirements for N2O/O2 administration.
c. Identify the ethical principles associated with N2O/O2 sedation.
d. Identify ethical responsibilities associated with the administration of N2O/O2 sedation.
e. Identify appropriate practice guidelines for the administration of N2O/O2 sedation based on ethical and legal principles.

16. Administer nitrous oxide/oxygen within the guidelines of the Illinois Dental Practice Act.
17. Administer local anesthesia within the guidelines of the Illinois Dental Practice Act.
18. Administer 4 different maxillary injections safely and with minimal pain.
19. Administer 3 different mandibular injections safely and with minimal pain.
20. Administer 2 different palatal injections safely and with minimal paint.
21. Administer local infiltrations with success.