

# D H 322: LOCAL ANESTHESIA

## Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2021
Units:	2.5
Hours:	2 lecture, 1.5 laboratory per week (42 total per quarter)
Advisory:	Not open to students with credit in D H 65.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	CSU
Grade Type:	Letter Grade Only
Repeatability:	Not Repeatable

## Student Learning Outcomes

- Students will be able to analyze the pharmacology of local anesthetic drugs used for dental hygiene care and state the rationale applied in choosing anesthetic agents for patient care.
- Students will be able to apply principles of correct local anesthesia technique for the Inferior Alveolar and Posterior Superior Alveolar nerve blocks as outlined on the grading rubric on a patient.

## Description

The study of local anesthesia administration in dental procedures, including the pharmacology, anatomy, physiology, patient management and emergency procedures associated with local anesthetic procedures. Laboratory and clinical experience in administration techniques for local infiltration, field block and nerve block. Intended for students in the Dental Hygiene Baccalaureate Degree Program; enrollment is limited to students accepted in the program.

## Course Objectives

The student will be able to:

- Describe the anatomy and physiology of the nervous system, with emphasis on the structures related to dental anesthesia.
- Classify local anesthetic agents, vasoconstrictive agents and topical anesthetics by chemical class and describe the local and systemic reactions produced by each.
- Determine the relative risk presented by a patient prior to administering local anesthesia by review of the health history.
- Describe and assemble all armamentarium necessary to deliver local anesthesia.
- Describe and clinically demonstrate the steps to providing a successful injection for all the required types of injections.
- Discuss the potential risk factor of local anesthetic administration and the appropriate management and prevention of complications.
- Assess the ethical and legal responsibilities of the dental hygienist in the administration of local anesthesia.

## Course Content

- Neurophysiology for local anesthesia (Lec)
  - Organization of the nervous system
    - Central and peripheral nervous system
    - Afferent and efferent divisions

- Somatic and autonomic nervous systems
- Neuroanatomy
  - Structure of neurons
  - Classification of neurons
  - Classification of nerve fibers
- Neurophysiology
  - Ions in nerve transmission
  - Depolarization
  - Repolarization
- Generation and conduction of nerve impulses
- Local anesthetic agents, vasoconstrictive agents and topical anesthetics (Lec)
  - Local anesthetic agents
    - Pharmacology
    - Mechanism of action
    - Esters
      - Procaine
      - Amides
        - Lidocaine
        - Mepivacaine
        - Prilocaine
        - Articaine
        - Bupivacaine
    - Induction time
    - Duration
    - Absorption and metabolism
    - Excretion
    - Systemic effects
  - Vasoconstrictive agents
    - Pharmacology
    - Mechanism of action
    - Epinephrine dilutions
    - Sodium bisulfite preservative
    - Actions on specific tissues
    - Termination of action
    - Maximum recommended dose
    - Side effects and overdose of vasoconstrictors
  - Topical anesthetic agents
    - Pharmacology
    - Mechanism of action
    - Common topical agents
      - Benzocaine
      - Lidocaine
      - Dyclonine hydrochloride
      - Tetracaine hydrochloride
      - Combination topical drugs
    - Sodium bisulfite preservative
    - Actions on specific tissues
- Patient assessment prior to anesthesia administration
  - Review health and dental history
  - Vitals signs
  - Weight to dose ratio
  - Evaluate anxiety, need for stress control
  - Assess risk
    - Contraindications
    - Allergy, sensitivity
    - Local anesthetic drug to drug interactions
    - Local anesthetic drug to systemic disease interactions
  - Informed consent
  - Pre and post operative instructions
- Armamentarium for administration of local anesthetics (Lec)
  - Armamentarium options

- a. Manual delivery device
- b. Computer controlled delivery device
- 2. Anatomic considerations
- 3. Injection techniques
  - a. Any infiltration site
  - b. Provide the for local infiltration, field block and nerve block:
    - 1) Anterior superior alveolar (ASA) nerve block (infraorbital)
    - 2) Middle superior alveolar nerve block (MSA)
    - 3) Anterior middle superior alveolar nerve block (AMSA)
    - 4) Posterior superior alveolar nerve block (PSA)
    - 5) Greater palatine nerve block
    - 6) Nasopalatine (P-ASA) nerve block
    - 7) Supraperiosteal
    - 8) Inferior alveolar nerve block (to include Gow-Gates technique)
    - 9) Lingual nerve block
    - 10) Buccal nerve block
    - 11) Mental nerve block
    - 12) Incisive nerve block
    - 13) Intraseptal injections
- 4. Recapping technique
- 5. Sharps management
- E. Clinical demonstration of local anesthetic administration (Lab)
  - 1. Armamentarium
  - 2. Anatomic considerations
  - 3. Injection techniques
    - a. Any infiltration site
    - b. Provide the for supraperiosteal, field block and nerve block injections:
      - 1) Anterior superior alveolar (ASA)
      - 2) Middle superior alveolar nerve block (MSA)
      - 3) Anterior middle superior alveolar nerve block (AMSA)
      - 4) Posterior superior alveolar nerve block (PSA)
      - 5) Greater palatine nerve block
      - 6) Nasopalatine (P-ASA) nerve block
      - 7) Supraperiosteal
      - 8) Inferior alveolar nerve block (to include Gow-Gates technique)
      - 9) Lingual nerve block
      - 10) Long buccal nerve block
      - 11) Mental nerve block
      - 12) Incisive nerve block
      - 13) Intraseptal injections
  - 4. Recapping technique
  - 5. Sharps management
  - 6. Needlestick protocol
- F. Complications
  - 1. Local complications
    - a. Needle breakage
    - b. Pain during injection
    - c. Burning sensation during injection
    - d. Hematoma
    - e. Facial nerve paralysis
    - f. Paresthesia
    - g. Trismus
    - h. Infection
    - i. Edema
    - j. Soft tissue trauma
    - k. Post injection lesions
  - 2. Systemic complications
    - a. Local anesthesia overdose
    - b. Epinephrine overdose
    - c. Allergic manifestations
  - 3. Management of medical emergencies
    - a. Signs and symptoms

- b. Prevention
- c. Emergency procedures
- G. Legal and ethical considerations
  - 1. Communication
  - 2. Informed consent
  - 3. Documentation
  - 4. Allowable duties under Dental Practice Act
  - 5. Risk reduction protocols
  - 6. Post exposure management

## Lab Content

- A. Clinical lab experiences on student partners of all injections presented in lecture.
- B. Final practical examination on a student partner of selected injections.

## Special Facilities and/or Equipment

Multimedia classroom, dental hygiene clinic, dental supplies and equipment, student instrument kit, models of skulls, personal protective barriers, expendable supplies kit, sterilization lab oxygen, and specific items and instruments such as anesthetic syringes, carpules of anesthetic agents, and needles.

## Method(s) of Evaluation

Written examination: student must achieve a grade of 80% or better on a written exam that reflects the objectives

Clinical proficiency criteria:

1. 100% of the time the student will review the medical/dental history, general assessment and oral inspection prior to treatment at each appointment checking for information which contra indicates the procedure, requires alteration in the treatment plan of further investigation and/or treatment. This information will be noted either in writing or verbally and will be acted upon appropriately (e.g., dentist consulted, treatment altered, etc.)
2. 100% of the time the student will assemble the armamentarium required for this procedure
  - a. Topical anesthetic
  - b. Local anesthetic
  - c. Correct needle length and gauge for procedure and according to operator's preference
  - d. Aspirating syringe
  - e. Disposable supplies
  - f. Mirror
3. 100% of the time the student will use sterile/aseptic technique according to the following criteria:
  - a. Use proper handwashing technique prior to and during each appointment at the appropriate times
  - b. Protect self from cross-infection by wearing gloves and face mask
  - c. Protect patient from cross-infection by wearing gloves and face mask
  - d. Use only sterile disinfected or sanitized armamentarium and equipment
  - e. Recognize and correct accidental breaks in aseptic chain to restore asepsis promptly for each occurrence
4. 100% of the time the student will seat and position the patient comfortably, place protective drapes, remove and safely store such items as dentures, glasses, etc., explain the procedure and provide psychological support as needed
5. 100% of the time the student will maintain the operating field by positioning the light for maximum illumination isolating the injection site when required to provide adequate vision and patient safety

6. 100% of the time the student will administer local anesthetic, with direct supervision, as indicated below:
  - a. Based on the patient's pre-anesthetic evaluation and treatment plan, identify potential emergency situations, select an appropriate anesthetic solution, identify the maximum safe dosage, determine injection(s) needed and select an appropriate needle, all with consultation of the dentist as needed
  - b. Visually and by palpation, locate landmarks to determine site and pathway of injection
  - c. Prepare site of injection for cleanliness and comfort by wiping with gauze-wipe and applying topical anesthetic (and pressure anesthetic where useful)
  - d. The needle will be within 1-2 mm of the target site, with the use of a stable fulcrum
  - e. Aspirate at depth of injection prior to depositing solution or prior to injecting if needle has been repositioned
  - f. Whenever necessary, adapt and modify technique to each patient's anatomical structures to ensure likelihood of achieving anesthesia and minimizing physical trauma
  - g. Make maximum observable efforts to minimize patient anxiety and discomfort by implementing one or all of the following:
    - 1) Position patient comfortably
    - 2) Explain procedure and answer questions in such a way as to ensure patient cooperation
    - 3) Calmly reassure patient throughout procedure
    - 4) Avoid negative verbal stimuli (e.g., hurt, pain, shot, etc.)
    - 5) Inject slowly (approximately 1 cc /45-60 seconds)
    - 6) Avoid undue tissue trauma by not relocating needle unnecessarily through tissue
    - 7) Avoid unnecessary insertions of needle
    - 8) Keep needle out of patient's field of vision
7. 100% of the time the student will make the necessary precautions (e.g., stay with patient following injection to observe for reaction, be alert to sudden movements, etc.)
8. 100% of the time the student will evaluate the procedure and final product to determine that they meet criteria:
  - a. In nine out of ten injections, acceptable anesthesia will be achieved on the first insertion
  - b. In all injections an acceptable amount of anesthetic will cover the procedure to be performed
  - c. All principles of acceptable technique have been observed; ways to improve (e.g., when anesthesia is not achieved, will be able to re-evaluate technique and change appropriately; if patient is anxious will be able to suggest ways to improve patient comfort and reduce anxiety, etc.) are suggested
9. 100% of the time the student will explain the procedure and provide pertinent, individualized education to the patient, including pre and post operative instructions
10. 100% of the time the student will meet ethical and legal requirement for this procedure
11. 100% of the time the student will make complete, accurate chart entries for this procedure (e.g., type of injection, name, strength and amount of anesthetic solution, any unusual reaction experienced, etc.)
12. 100% of the time the student will disinfect treatment area and sterilize armamentarium

## Method(s) of Instruction

Lecture  
 Discussion  
 Oral presentations  
 Laboratory

Demonstration

## Representative Text(s) and Other Materials

Logothetis, Demetra. Local Anesthesia for the Dental Hygienist. 2017.

## Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

A. Weekly required readings from chapters in the textbook, 25-50 pages.

## Discipline(s)

Dental Technology