DENT-1410: CURRENT CONCEPTS IN DENTAL MATERIALS

Cuyahoga Community College

Viewing: DENT-1410 : Current Concepts in Dental Materials

Board of Trustees:
May 2024

Academic Term:
Fall 2024

Subject Code
DENT - Dental Hygiene

Course Number:
1410

Title:
Current Concepts in Dental Materials

Catalog Description:
Physical properties of dental materials and basic principles of their preparation. Application of principles of dental materials by manipulating gypsum, cements, bases, liners, resin, composite, impression materials, sutures, periodontal dressings and pit and fissure sealant materials in the laboratory and/or clinical setting.

Credit Hour(s):
2

Lecture Hour(s):
1

Lab Hour(s):
3

Other Hour(s):
0

Requisites

Prerequisite and Corequisite
DENT-1300 Preventive Oral Health Services I.

Outcomes

Course Outcome(s):
Utilize Safe Operating Procedures when working with dental equipment, materials, and instruments.

Objective(s):
1. Identify governmental organizations and existing regulations for dental materials.
2. Review Tri-C Dental Hygiene Safe Operating Procedures for dental equipment, materials, and instruments.
3. Review the information included in a Safety Data Sheet.
4. Safely utilize dental equipment and instruments.
5. Practice an acceptable infection control protocol when utilizing dental equipment, materials, and instruments.

Course Outcome(s):
Demonstrate the proper technique of manipulating and handling various dental materials.

Essential Learning Outcome Mapping:
Oral Communication: Demonstrate effective verbal and nonverbal communication for an intended audience that is clear, organized, and delivered effectively following the standard conventions of that language.

Objective(s):

1. Discuss the classification, characteristics, purpose, chemical composition and physical, mechanical and biological properties of various categories of dental materials.
2. Demonstrate the mixing and handling of various dental materials under instructor supervision.
3. Apply a dental rubber dam to one quadrant of the dental arch.
4. Apply and remove a periodontal dressing.
5. Remove sutures previously placed in cotton rolls.
6. Cement a temporary crown onto a typodont tooth.

Course Outcome(s):

Take maxillary and mandibular impressions, pour with gypsum and trim the models (casts).

Objective(s):

1. Discuss the indications and contraindications for a dental impression.
2. Identify types and properties of impression materials.
3. Mix and pour gypsum material into rubber, dentulous, arch molds.
4. Mix alginate impression material, take a maxillary (MX) and mandibular (MN) impression of a typodont and pour both impressions with gypsum.
5. Take a MX and MN impression on student partners and pour with gypsum.
6. Trim a poured cast utilizing a model trimmer.

Course Outcome(s):

Apply pit and fissure sealants to appropriate teeth.

Objective(s):

1. Discuss the indications and contraindications for the application of pit and fissure sealants.
2. Identify appropriate teeth for pit and fissure sealants on a student partner.
3. Apply pit and fissure sealants to the teeth of a student partner under instructor observation. The Supervising Dentist will approve and evaluate all applied sealants.
4. Practice four-handed dentistry during the application of pit and fissure sealants.

Course Outcome(s):

Identify and evaluate the condition of and provide appropriate care for various fixed and removable dental restorations and appliances.

Objective(s):

1. Identify and evaluate the integrity of various dental restorations both clinically and on dental images.
2. Utilize acceptable instrumentation techniques for debridement of restored and approximate tooth surfaces.
3. Discuss dental hygiene care of removable appliances.
4. Discuss methods of identifying residual orthodontic resin bonding material and discuss appropriate methods of debonding the resin.

Course Outcome(s):

Assess a patient's dentition for tooth whitening.

Objective(s):

1. Discuss the indications and contraindications for tooth whitening procedures.
2. Explain various methods of whitening vital and non-vital teeth.
3. Utilize a shade guide to determine tooth shade prior to whitening.
4. Create a custom bleaching tray utilizing block-out resin, resin sheet, a vacuum former, trimming scissors and a rotary tool, when required.
5. Identify professional and patient-applied methods of treating tooth sensitivity related to whitening procedures.

Methods of Evaluation:

1. Objective examinations/quizzes covering major topics in lecture, laboratory and other required readings
2. Written evaluation and oral presentation of a new dental technique or dental material
3. Laboratory projects
4. Written explanation of laboratory objectives
5. Participation (professionalism) in didactic and laboratory sessions

Course Content Outline:

1. Introduction to dental materials
    a. History
    b. Organizations regulating dental materials
    c. Classification of dental materials
    d. Safety and infection control
        i. Occupational Safety and Health Administration (OSHA) regulations
        ii. Hazardous chemical procedures
2. Materials science
    a. Atomic bonding
    b. Atomic bonding of various dental materials
3. Characteristics of dental materials
    a. Physical considerations
    b. Biological considerations
4. Properties of dental materials
    a. Physical
    b. Mechanical
5. Gypsum materials
    a. Terminology
    b. Purpose/uses
    c. Types/classification
    d. Composition
    e. Armamentarium and mixing technique
    f. Mixing and setting times and factors affecting each
    g. Model trimmer
    h. Disinfection
6. Impression materials
    a. Terminology
    b. Purpose/uses
    c. Composition
    d. Inelastic impression materials
    e. Aqueous elastomeric impression materials
    f. Non-aqueous elastomeric impression materials
    g. Armamentarium and mixing technique
    h. Mixing and setting times for each impression material
    i. Factors affecting handling and performance
    j. Disinfection
7. Adhesion and bonding
    a. Terminology
    b. Purposes/uses
    c. Surface factors
    d. Acid etching
    e. Enamel versus dentin bonding systems
    f. Glass ionomers
8. Preventive dental materials
    a. Types
    b. Purpose/uses
    c. Preventive resin restorations
    d. Oral appliances

    e. Pit and fissure sealants
        i. Terminology
        ii. Indications/contraindications
        iii. Types
        iv. Composition
        v. Armamentarium and application technique
        vi. Four-handed dentistry
        vii. Factors affecting handling and performance
9. G. V. Black Classification I -VI
10. Dental cements, bases and liners
    a. Terminology
    b. Purpose/uses
    c. Composition/chemistry of dental cements
    d. Powders and liquids
    e. Varnishes
    f. Zinc oxide and eugenol
    g. Zinc phosphate
    h. Glass ionomer
    i. Polycarboxylate
    j. Composite
    k. Armamentarium, mixing and application technique
    l. Factors affecting handling and performance
    m. Other types and uses of cements
11. Dental amalgam
    a. Terminology
    b. Purpose/uses
    c. Composition
    d. Properties
    e. Setting reaction
    f. Factors affecting handling and performance
    g. Mercury toxicity
    h. Margination technique
12. Direct polymeric restorative materials
    a. Composite
        i. Terminology
        ii. Purpose/uses
        iii. Composition
        iv. Types of composites
        v. Properties
        vi. Filled versus unfilled resins
        vii. Polymerization
        viii. Application technique
        ix. Factors affecting handling and performance
    b. Glass ionomer
    c. Compomers
13. Periodontal dressings & sutures
    a. Purpose/uses
    b. Types
    c. Application and removal of periodontal dressings
    d. Suture removal
14. Materials for indirect, fixed and removable restorations and prostheses
    a. Terminology
    b. Purpose/Uses for each material
    c. Classification
    d. Composition of each material
    e. Properties of each material
    f. Waxes
    g. Temporary/provisional restorations

   h. Gold and alloys
   i. Ceramic materials
   j. Titanium/implant materials
   k. Partial denture frameworks
   l. Acrylic resins
   m. Denture teeth
   n. Construction of complete/removable partial dentures
   o. Denture reline and repair
15. Clinical management of dental restorative materials
   a. Identification of restorative materials
   b. Review care of removable appliances
   c. Instrumentation techniques
   d. Abrasives
   e. Review of polishing technique
   f. Debonding orthodontic resins
16. Tooth whitening
   a. Terminology
   b. Whitening agents
   c. Indications and contraindications
   d. Vital and non-vital whitening procedures
   e. Identification of tooth shade
   f. Tooth sensitivity and other concerns
17. Specialty materials
   a. Orthodontic materials
   b. Endodontic materials
   c. Pediatric materials

Resources

Bird, Doni L, and Debbie S. Robinson. (2023) *Modern Dental Assisting*, St. Louis: Elsevier.

Boyd, Linda D., Mallonee, Lisa F. & Wyche, Charlotte J. (2023) *Wilkin's Clinical Practice of the Dental Hygienist*, Burlington, MA: Jones and Bartlett Learning.

Gladwin, Marcia and Michael Bagby. (2018) *Clinical Aspects of Dental Materials. Theory, Practice and Cases*, Riverwoods: Wolters Kluwer Health.

Powers, J. M. & Wataha, J. (2017) *Dental Materials*, St. Louis: Elsevier.

Miller, Chris H. (2023) *Infection Control and Management of Hazardous Materials for the Dental Team*, St. Louis: Elsevier Inc.

Resources Other

Tri-C Dental Hygiene Safe Operating Procedures

Typodonts and dental instruments for 22 students

The following audio-visual presentations are available on the course Blackboard site:

1. Videos: 32 videos created during summer of 2017 by faculty for demonstration purposes of laboratory activities

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