Western Technical College

10508103 Dental Radiography

Course Outcome Summary

Course Information

Description: Prepares dental auxiliary students to operate x-ray units and expose bitewing, periapical, extra oral, and occlusal images. Emphasis is placed on protection against x-ray hazards. Students also process, mount, and evaluate dental images for diagnostic value. In this course students demonstrate competency on a manikin. In addition, students expose bitewing images on a peer, role-play patient. Students gain further experience in exposing images on patients in the clinical portion of their program. This course also provides the background in radiographic theory required for students to make informed decisions and adjustments.

Career Cluster: Health Science

Instructional Level: Associate Degree Courses

Total Credits: 2

Total Hours: 72

Textbooks


508-103 Dental Radiography Course Manual. Western. Publisher: Western. Required.

Learner Supplies

Uniform: Black lab jacket - $22, black pants - $22, white shoes - $20-35, and safety glasses - $5.50. Vendor: To be discussed in class. Required.

Latex free exam gloves. Vendor: To be discussed in class. Required if clinic does not supply.

Success Abilities

1. Apply mathematical concepts.
2. Demonstrate ability to think critically.
3. Demonstrate ability to value self and work ethically with others in a diverse population.
4. Make decisions that incorporate the importance of sustainability.
5. Transfer social and natural science theories into practical applications.
6. Use effective communication skills.
7. Use technology effectively.

Program Outcomes
1. DA-1 year: Manage infection and hazard control.
2. DA-1 year: Produce diagnostic intraoral and extraoral radiographs on a variety of patients.
3. DA-1 year: Demonstrate professional behaviors, ethics, and appearance.

Course Competencies
1. Illustrate how dental imaging technology has progressed since its first use to the ways in which it is used in providing dental health care today.
   Assessment Strategies
   1.1. by assembling a timeline identifying highlights of history of dental imaging
   Criteria
   You will know you are successful when
   1.1. you include uses, discovery, pioneers, and history of equipment and techniques.
   1.2. you ensure timeline is accurate.
   1.3. you exhibit correct use of terminology.
   1.4. you create a timeline that is neat, well organized, legible, and reflects correct use of Standard English.
   1.5. you prepare a timeline using a computer/word processor.
   Learning Objectives
   1.a. Define the key words.
   1.b. Summarize the importance of dental radiographs.
   1.c. List the uses of the dental radiographs.
   1.d. Summarize the discovery of x-radiation.
   1.e. List the highlights in the history of x-ray equipment and film.
   1.f. List the highlights in the history of dental radiographic techniques.

2. Explain how the process of exposing dental images works.
   Assessment Strategies
   2.1. by labeling a diagram of a x-ray tube using proper terminology
   2.2. by presenting a written, oral, or graphic explanation of how the process of exposing images works
   2.3. by responding to scenarios presenting clinical decisions related to the process of exposing images
   2.4. by answering questions that require you to apply knowledge about this competency (Your instructor may require several written exams as a part of this course. You will be notified in advance.)
   Criteria
   You will know you are successful when
   2.1. your diagram is labeled accurately.
   2.2. your explanation includes an accurate representation of the characteristics of x-rays.
   2.3. your explanation includes an accurate representation of the basic physics of dental imaging.
   2.4. your explanation includes an accurate representation of the biological effects of radiation that occurs during the process of exposing images in the dental healthcare environment.
   2.5. your responses to questions about the process of exposing images are accurate and complete.
   Learning Objectives
   2.a. Define key terms.
   2.b. Describe the general concepts and physical properties of radiation.
   2.c. Describe the biological effects of radiation exposure.
   2.d. Identify the component parts of the x-ray machine.
   2.e. Describe the effect of kilovoltage on the quality of the x-ray beam.
2.f. Describe how the milliamperage affects the quality of the x-ray beam.
2.g. Explain how x-rays are produced.

3. Apply principles of radiation safety to patient and operator.

Assessment Strategies
3.1. by preparing to expose images on a manikin in a laboratory setting
3.2. by responding to scenarios presenting clinical decisions related to image exposure
3.3. by answering questions that require you to apply knowledge about this competency (Your instructor may require several written exams as a part of this course. You will be notified in advance.)

Criteria
You will know you are successful when
3.1. you check the integrity of the lead apron.
3.2. you obtain the proper prescription for dental images for patient.
3.3. you select safe exposure factors for the patient.
3.4. you utilize techniques that will protect the patient from excess exposure.
3.5. precautions are implemented for pregnant patients or staff.
3.6. you place PID at safe distance from face.
3.7. you stand at least six feet away from the x-ray unit and perpendicular to the primary ray.
3.8. you incorporate ALARA for radiographic exposures.

Learning Objectives
3.a. Identify the methods of patient radiation protection.
3.b. Identify the methods of operator radiation protection.
3.c. Identify the integrity, handling, and storage of a lead apron.
3.d. Differentiate between a prescription and consent for radiographs.
3.e. State the contraindications for radiographs.

4. Operate the x-ray equipment.

Assessment Strategies
4.1. in the completion of a role-play on the operation of the x-ray unit and assembling various film holders

Criteria
You will know you are successful when
4.1. you identify each step as you perform it as if you are explaining the process to a patient.
4.2. you position yourself and role-play partner correctly.
4.3. you perform all critical steps in the right order.
4.4. you anticipate procedural steps.
4.5. you employ safety precautions.
4.6. you utilize infection control protocol.
4.7. you wear personal protective equipment.

Learning Objectives
4.a. Identify the component parts of the x-ray unit.
4.b. Differentiate between the x-ray machines used for intra-oral and extra-oral films.
4.c. Describe the purpose and the use of film holders and devices.
4.d. Identify commonly used dental x-rays film holders and devices.

5. Select the film/sensor for an image.

Assessment Strategies
5.1. by responding to scenarios that require you to select the appropriate film/sensor for a variety of situations
5.2. by answering questions that require you to apply knowledge about this competency (Your instructor may require several written exams as a part of this course. You will be notified in advance.)

Criteria
You will know you are successful when
5.1. you identify the film/sensor you would select for each of the scenarios.
5.2. you explain why the film/sensor type and size is correct for the given situation.
5.3. you explain the possible consequences of selecting the wrong film/sensor.
Learning Objectives
5.a. Identify the components and function of a film packet.
5.b. Identify the composition of x-ray film.
5.c. Explain how x-ray radiation energy is stored as a latent image.
5.d. Explain the uses and handling techniques for the types of film used in dental radiography.
5.e. Differentiate the need for bitewing, periapical, extra-oral and occlusal radiographs.
5.f. Compare film size for bitewing, periapical, extra-oral and occlusal radiographs
5.g. Explain what determines the film speed.
5.h. Explain the purpose of intensifying screens.


Assessment Strategies
6.1. in a laboratory setting using automatic and/or digital processing equipment process images of diagnostic quality
6.2. by submitting processed images for evaluation

Criteria
You will know you are successful when
6.1. you check that equipment is prepared and ready for use.
6.2. you verbalize the processes you perform; identifying the parts, necessary materials, and functions of the automatic and/or digital processing equipment.
6.3. processing errors are corrected and recorded.
6.4. image meets standards of diagnostic quality.

Learning Objectives
6.a. Describe the characteristics of an ideal darkroom to include location, size, lighting, and equipment.
6.b. Describe the composition of the processing chemicals.
6.c. Discuss the parts of the processing equipment and function.
6.d. Check to ensure that equipment has met quality assurance standards.
6.e. Outline the step by step procedure for manual processing.
6.g. Explain the process of film duplication used in dentistry.
6.h. Describe film processing problems that result from time and temperature errors.
6.i. Describe film processing problems that result from chemical contamination errors.
6.j. Describe the care and maintenance if the process solutions, equipment, and equipment accessories used in film processing.

7. Produce images of diagnostic quality.

Assessment Strategies
7.1. in a laboratory setting using automatic and/or digital equipment produce images of diagnostic quality
7.2. by submitting images for evaluation

Criteria
You will know you are successful when
7.1. you check that equipment is prepared and ready for use.
7.2. you verbalize the processes you perform; identifying the parts, necessary materials, and functions of the automatic processing and/or digital equipment.
7.3. errors are corrected and recorded.
7.4. image meets standards of diagnostic quality.

Learning Objectives
7.a. Describe the required standards of a quality diagnostic image.
7.b. Explain the process necessary to produce images of diagnostic quality.
7.c. Produce images of diagnostic quality.

8. Manage patients during the imaging process.

Assessment Strategies
8.1. working with a role play partner in a simulated situation
8.2. using the patient management forms provided in the laboratory/clinical setting
9. **Use proper infection control procedures while producing images.**

**Assessment Strategies**
9.1. by using infection control techniques prior to exposure, during exposure, and following exposure on a manikin or role-play patient in a laboratory setting
9.2. by using infection control techniques processing unexposed images

**Criteria**

*You will know you are successful when*
9.1. you employ proper infection control techniques prior to exposure.
9.2. you employ proper infection control techniques during mock film/sensor exposure.
9.3. you employ proper infection control techniques following exposure.
9.4. you employ proper infection control techniques during processing.
9.5. without use of reference.

**Learning Objectives**
9.a. Detail infection control procedures necessary prior to, during, and following film exposure.
9.b. Detail infection control procedures necessary for film processing.
9.c. Describe the infection control procedure for using a daylight loader of an automatic processor.

10. **Expose bitewing images.**

**Assessment Strategies**
10.1. by exposing images on a manikin or role-play patient in a laboratory setting
10.2. by submitting images
10.3. using the forms provided in the laboratory setting

**Criteria**

*You will know you are successful when*
10.1. you check the prescription before exposure.
10.2. you record exposure accurately.
10.3. you select the correct armamentarium.
10.4. you position yourself and your patient correctly.
10.5. you perform all critical steps in the correct order.
10.6. you employ radiation safety precautions.
10.7. you utilize infection control protocol.
10.8. you wear personal protective equipment.

**Learning Objectives**
10.a. Identify the purposes of exposing a bite-wing radiograph.
10.b. Show how bitewing radiographs are helpful in achieving the goals of preventative dentistry.
10.c. Demonstrate correct patient position and film placement.
10.d. Describe the steps for exposing a bitewing x-ray.
10.e. Compare the bitewing radiograph with the periapical technique.

11. **Expose periapicals using the paralleling technique.**

**Assessment Strategies**
- by exposing images on a manikin or role-play patient in a laboratory setting
- by submitting images
- using the forms provided in the laboratory setting

**Criteria**

*You will know you are successful when*
- you check the prescription before exposure.
- you record exposure accurately.
- you select the correct armamentarium.
- you position yourself and your patient correctly.
- you perform all critical steps in the correct order.
- you employ safety precautions.
- you utilize infection control protocol.
- you wear personal protective equipment.

**Learning Objectives**
- State basic principles of paralleling technique.
- Discuss placement of film.
- Discuss placement of film holders.
- Describe placement of PID and angulation.
- Identify parts of film holding devices.
- Demonstrate proper patient positioning for film exposure.

12. **Expose periapicals and occlusals using the bisecting angle technique.**

**Assessment Strategies**
- by exposing images on a manikin or role-play patient in a laboratory setting
- by exposing an occlusal image on a manikin or role-play patient in a laboratory setting
- by submitting images
- using the forms provided in the laboratory setting

**Criteria**

*You will know you are successful when*
- you check the prescription before exposure.
- you record exposure accurately.
- you select the correct armamentarium.
- you position yourself and your patient correctly.
- you perform all critical steps in the correct order.
- you employ safety precautions.
- you utilize infection control protocol.
- you wear personal protective equipment.

**Learning Objectives**
- State basic principles of bisecting technique.
- Compare the essential characteristics between paralleling and bisecting techniques.
- Discuss placement of film.
- Discuss placement of film holders.
- Describe placement of PID and angulation.
- Identify parts of film holding devices.
- Demonstrate proper patient positioning for film exposure.

13. **Illustrate how extraoral images integrate with the use of intraoral images in dentistry.**

**Assessment Strategies**
13.1. by creating a chart comparing panoramic, extraoral and digital images
13.2. working with a group of your peers

Criteria
You will know you are successful when
13.1. chart identifies all types of extraoral images.
13.2. chart compares similarities and differences of each type of technique
13.3. chart compares equipment needed for each type of technique
13.4. chart compares the advantages and disadvantages for each technique
13.5. chart neat, well organized, legible, and reflect correct use of Standard English language

Learning Objectives
13.a. Describe the uses and purpose of panoramic radiography.
13.b. Describe the equipment used in panoramic radiography.
13.c. Discuss the advantages and disadvantage panoramic radiography.
13.d. Describe the uses and purpose of extraoral radiography.
13.e. Describe the equipment used of extraoral radiography.
13.f. Describe the uses and purpose of digital radiography.
13.g. List and describe the equipment used in digital radiography.
13.h. List and describe the three types of digital radiography.
13.i. List and discuss the advantages and disadvantage of digital radiography.


Assessment Strategies
14.1. by submitting correctly mounted images
14.2. by demonstrating optimal viewing conditions
14.3. in the lab using given materials and equipment

Criteria
You will know you are successful when
14.2. images are mounted at the appropriate point in the process for films and in the correct sequence for digital.
14.3. images are mounted using the recommended method.
14.4. image integrity is maintained throughout this process.
14.5. images are labeled accurately and according to required standards.
14.6. you demonstrate optimal viewing conditions and explain the importance of these conditions.

Learning Objectives
14.a. List reasons to use a film mount.
14.b. Describe the labeling information used on the film mount.
14.c. Identify the equipment necessary for viewing the mounted x-ray.
14.d. Identify the anatomic landmarks used in film mounting.
14.e. Describe the step by step procedures for film mounting.
14.f. List the methods of film mounting.

15. Evaluate images for diagnostic value.

Assessment Strategies
15.1. by completing a checklist of dental imaging evaluation on a manikin or patient
15.2. in a skill demonstration in a clinical/laboratory setting

Criteria
You will know you are successful when
15.1. checklist includes all critical errors in the information or process.
15.2. checklist includes positioning, exposure errors, processing errors.
15.3. checklist includes recommendations for correcting the identified errors.
15.4. checklist includes an analysis of the effect of the errors on the diagnostic value.

Learning Objectives
15.a. List the visual characteristics of an acceptable radiograph.
15.b.  Define radiographic characteristics of density and contrast.
15.c.  Explain the quality control procedures necessary in dental radiographs.
15.d.  Given a radiograph of poor quality, identify the cause of errors.
15.e.  Recognize radiograph errors and explain how to correct.

16. **Interpret dental imaging findings.**

**Assessment Strategies**
16.1.  by interpreting images using the form provided  
16.2.  without the use of references  

**Criteria**

*You will know you are successful when*

16.1.  you accurately identify normal anatomy.  
16.2.  you accurately identify dental caries.  
16.3.  you accurately identify periodontal disease.  
16.4.  you accurately identify traumatic injuries.  
16.5.  you accurately identify periodontal lesions.  

**Learning Objectives**

16.a.  Explain the differences between interpretation and diagnosis of radiographs and who performs these functions.  
16.d.  Identify specific radiographic finding - i.e. abscess, resorption, fractures.