Lesson Plan #2: Dental Waterline Safety

Course: Dental Office #101

Topic: Dental Unit Waterline Safety

Audience: Dental Staff

Time: 50 minutes total

- Anticipatory set= 10 minutes
- Lesson content= 35 minutes
- Summary = 5 minutes

Materials: Computer, PowerPoint slides, case study hand-outs

Instructional Objectives:

Upon completion of the lecture, the student should be able to:

1. Define dental unit waterlines (DUWLs) and sources of contamination.
2. Explain how biofilm forms in dental waterlines and why it poses a risk.
3. Demonstrate appropriate DUWL standards and daily maintenance procedures.
4. Differentiate between compliant and non-compliant DUWL practices.
5. Advocate for strict adherence to DUWL safety.

References:

1. American Dental Association. (2024). Dental unit waterlines. https://www.ada.org/resources/ada-library/oral-health-topics/dental-unit-waterline
2. Bayani, M., Raisolvaezin, K., Almasi-Hashiani, A., & Mirhoseini, S. H. (2023). Bacterial biofilm prevalence in dental unit waterlines: A systematic review and meta-analysis. *BMC Oral Health, 23(158*). https://doi.org/10.1186/s12903-023-02885-4
3. Buitrago, J. M., Kolbe, R. J., & Siqueira, M. F. (2023). Dental unit waterline testing practices: An 11-year retrospective study. *BMC Oral Health, 23(867)*. https://doi.org/10.1186/s12903-023-03590-y
4. CBS Mornings. (2016, October 11). Was Calif. dentist tied to bacterial infections not following protocol? [Video]. YouTube. http://www.youtube.com/watch?v=WYAa4m
5. Centers for Disease Control and Prevention. (2024). Dental unit water quality. https://www.cdc.gov/dental-infection-control/hcp/summary/dental-unit-water-quality.html
6. Chen, P., Zeng, J., Hong, F., Li, C., Wang, H., & Yu, X. (2024). The importance of biofilm contamination control for dental unit waterlines: A

multicenter assessment. *Journal of Oral Microbiology*, *16(1)*. https://doi.org/10.1080/20002297.2023.2299496
7. U.S. Food and Drug Administration. (2025). Dental unit waterlines. https://www.fda.gov/medical-devices/dental-devices/dental-unit-waterlines

LESSON CONTENT	NOTES – MEDIA - Q/A
I. ANTICIPATORY SET A. Introduction Watch Video	PP Slide #1: Title slide: Dental Waterline Safety Introduce & Thank PP Slide #2: Was Calif. dentist tied to bacterial infections not following protocol? Media#1: video Discussion
B. Gain Knowledge/Motivate Would any of you drink water from the dental unit?	PP Slide #3: Waterlines/bacteria, spores
C. Activate Prior Knowledge Why or why not? Discuss dental waterline units Based on what you know (or may not know) about bacterial growth, and pathogens, do you think a small diameter tube would be the perfect breeding ground for bacteria?	PP Slide #4: Introduction
D. Establish Rationale Today, we will learn about the safety of dental waterline units because DUWL contamination is a direct patient safety issue. We have a professional, legal, and ethical responsibility to maintain standards of care and prevent harm to our patients.	Note: Remind staff of the possibility of opportunistic infections and how much worse if pt is immuno-compromised
E. Present Instructional Objectives 1. Define dental unit waterlines (DUWLs) and sources of contamination. 2. Explain how biofilm forms in dental waterlines and why it poses a risk. 3. Demonstrate appropriate DUWL standards and daily maintenance procedures. 4. Differentiate between compliant and non-compliant DUWL practices. 5. Advocate for strict adherence to DUWL safety.	PP Slide #5: Objectives

LESSON CONTENT/BODY	NOTES- MEDIA – Q/A
I. What are Dental Unit Waterlines? A. Definition: Dental Waterline Unit Narrow plastic tubes that deliver water to handpieces, air/water syringes, and ultrasonics. 1. Sources of Contamination a. municipal i. city water b. patient backflow i. suck back c. stagnation i. water that sits overnight/weekends 2. Cause a. biofilm	PP Slide #6: Definition & photo of dental unit Q: Which source do you think is the hardest to control? A: Discussion on patient backflow. PP Slide #7: Sources of Contamination PP Slide #8: Causes Note: show backflow valves and explain the action.
II. Biofilm, Microbial Risks A. Biofilm Formation Process Bacteria attach to the inner tube walls, secreting a slime layer that protects them from chemical germicides. B. Key Pathogens 1. Legionella a. causes Legionnaires' Disease 2. Pseudomonas aerugionosa a. common in healthcare settings 3. Nontuberculous Mycobacteria a. highly resistant to heat and chemicals	PP Slide #9: Biofilm Formation Q: Does anyone have an example of biofilm formation? A: Discuss various examples Dog's bowl PP Slide #10: Key Pathogens
III. DUWL Standards and Maintenance A. CDC Standard 1. CDC/ADA require water to have less than or equal to 500 colony forming units per milliliter B. Maintenance Protocol 1. Daily flushing a. 20-30 seconds between patients 2. Chemical treatments b. use of tablet like ICX, shock treatments 3. Routine monitoring/testing a. documentation 4. Use of sterile water for surgical procedures	PP Slide #11: CDC Standard Note: Stress that the accepted standard is <, =500 CFU/mL PP Slide #12: Maintenance Q: How often is water monitored in your office? A: survey for answers Note: have assistant explain procedure for shocking chair.

IV. Case Study A. Case Study #1 Scenario: Alex, a dental assistant, is tasked with the monthly waterline testing for the clinic. Because the office was backed up, Alex took the water sample from Operatory 3 immediately after a procedure without performing the required 30-second flush. The lab results returned a count of 1,200 CFU/mL, which is significantly higher than the CDC-recommended limit of <= 500 CFU/mL. Action Taken: Alex realizes the high count is likely due to improper sampling and accumulated biofilm. He immediately "shocks" the chair using the office's antimicrobial protocol to strip the biofilm from the lines. Critical Thinking: Once the physical "shock" treatment is complete, what is the essential administrative step Alex must take to ensure the office remains in legal and clinical compliance? Answer*:* Documentation. He must log the failed test, the specific corrective action taken, and the date of the shock treatment in the office safety manual.	PP Slide #14: Case Study #1 Q: What was the CDC standard for CFU/mL again? A: 500
B. Case Study #2 Scenario: After a 4-day holiday weekend, the dental team returns to the office. During the morning setup, the lead hygienist notices that the water from the air/water syringe in one operatory has a slight odor and looks faintly cloudy for the first few seconds of discharge. Discuss: Why did the water quality degrade so quickly? Answer: Small-bore tubing, stagnation, rapid biofilm proliferation and detachment What is the risk to the first patient of the day, particularly if they are an older adult or immunocompromised? Answer: Exposure to high levels of Legionella or Pseudomonas What should the team do before seating the first patient? Answer: Perform a 2-minute flush of all lines and, if the odor persists, a chemical shock treatment	PP Slide #15 Case Study #2 Note: Remember how the waterline looks. Q: Would you drink this water? A: If no, why is it safe for patients?

V. Summary You have learned how biofilm forms in dental unit waterlines and the risk that it poses to patients. We have stressed the importance of infection control regarding dental unit waterlines. This is done by running waterlines, shocking lines if needed, and routine waterline testing to ensure CDC compliance. It is everyone's responsibility to ensure the safety of the patient entrusted to your care.	PP Slide #16: Summary PP Slide #16: References PP Slide #17: Thank everyone for their time

Test Items

Objective #1: 1. Define dental unit waterlines (DUWLs) and sources of contamination.

Test Item #1: Which of the following best defines dental unit waterlines (DUWLs)?

a. narrow tubing that delivers water to dental units

b. saliva evacuation systems

c. sterilization units

d. large water storage units in dental offices

Objective #2: Explain how biofilm forms in dental waterlines and why it poses a risk.

Test Item #2: Why are dental unit waterlines prone to biofilm formation?

a. high water pressure

b. large tubing diameter

c. frequent sterilization

d. low flow and water stagnation

Objective #3: Demonstrate appropriate DUWL standards and daily maintenance procedures.

Test Item #3: What is the CDC-recommended bacterial limit for DUWL water?

a. 150 CFU/mL

b. 250 CFU/mL

c. 500 CFU/mL

d. 1000 CFU/mL

Objective #4: Differentiate between compliant and non-compliant DUWL practices..

Test Item #4: In case study #2, if an office receives a test result of 1,200 CFU/mL, what are the two immediate next steps they must take? Explain in 2-3 sentences.

Objective #5. Advocate for strict adherence to DUWL safety.

Test Item #5: Explain why maintaining dental unit waterlines is important within your office.

Correct Answer Key:

1. A

2. D

3. C

4. chemical shock treatment, follow-up test, documentation

5. Any of the following, or like

Prevents exposure to harmful microorganisms

Reduces risk of infection

Reduces risk of aerosol contamination

Ensures compliance with CDC guidelines

Upholds ethical and professional standards

Keeps our patients safe

Standard of care