Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention and Health Promotion

# PRESENTER'S SCRIPT

# Module 9 Dental Unit Water Quality

## SLIDE 1

This slide series was created to complement the Centers for Disease Control and Prevention's (CDC's) publication titled, *Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care*. This publication was developed to help increase adherence with established infection prevention practices.

This slide series provides an overview of the basic principles of infection prevention and control that form the basis for CDC recommendations for dental health care settings. It can be used to educate and train infection prevention coordinators, educators, consultants, and other dental health care personnel (DHCP).

The *Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care* can be found at www.cdc.gov/oralhealth/infectioncontrol/pdf/safe-care2.pdf.

## SLIDE 2

This slide series is divided into 10 modules. The first module provides an introduction to infection prevention for dental settings. It is followed by 9 additional slide modules—one for each element of standard precautions, as well as for dental unit water quality and program evaluation. Module 9 provides information on dental unit water quality.

## SLIDE 3

Studies have demonstrated that dental unit waterlines—narrow-bore plastic tubing that carries water to the high-speed handpiece, air or water syringe, and ultrasonic scaler—can become colonized with microorganisms, including bacteria, fungi, and protozoa. Dental unit waterline factors—such as system design, flow rates, and materials—promote both bacterial growth and development of biofilm.

## SLIDE 4

Studies have shown that colonies of microorganisms, or biofilms, can form on the inside of the narrow-bore plastic tubing that transports water within the dental unit to handpieces and air-water syringes. Once formed, a biofilm serves as a reservoir that may dramatically increase the number of free-floating microorganisms in water used for dental treatment. Most organisms identified in dental water systems originate from the public water supply and do not pose a high risk of disease for healthy persons.

## SLIDE 5

Although most organisms isolated from water systems are harmless, some have been know to cause serious disease, examples of these organisms include *Legionella* species, *Pseudomonas* species, and nontuberculous *Mycobacterium* species.

Health care–associated transmission of *Legionella* species occurs primarily through inhalation of infectious aerosols generated from potable water sources or through use of tap water in respiratory therapy equipment. *Legionella* bacteria can cause a serious type of lung infection called Legionnaires' disease and also a less serious infection called Pontiac Fever.

Infection or colonization caused by *Pseudomonas* species or nontuberculous mycobacteria can occur through direct contact with water or after exposure to contaminated instruments. Nontuberculous Mycobacteria (or NTM) species can also be transmitted by inhalation of tap water aerosols. *Pseudomonas* infections usually occur in a hospital setting or in people with weakened immune systems. The most common type infecting humans

is *Pseudomonas aeruginosa*. Infection can be mild or severe. NTM can cause infection on skin and in soft tissues and organs. NTM has been associated with outbreaks in hospital settings; other outpatient care settings such as allergy clinics, cosmetic surgery centers, and dialysis clinics; and dental settings.

## SLIDE 6

Using water of uncertain microbiological quality is inconsistent with infection prevention and control principles. Levels of contamination in water from untreated systems can exceed 1 million colony forming units (or CFU) per milliliter (or mL) of water. Untreated dental units cannot reliably produce water that meets drinking water standards (which is fewer than 500 CFU/mL of heterotrophic water bacteria). Even using source water containing less than or equal to 500 CFU/mL of bacteria (such as tap, distilled, or sterile water) in a self-contained system will not eliminate bacterial contamination in treatment water if biofilms in the water system are not controlled. Removal or inactivation of dental waterline biofilms requires use of chemical germicides.

## SLIDE 7

In 2011, an 82-year-old woman in Italy was diagnosed with Legionellosis and died 2 days later. The patient's only known risk of exposure for Legionella infection were two dental appointments. Molecular testing was able to identify the dental unit waterlines as the source of the bacteria.

In 2015, an outbreak of *Mycobacterium abscessus* odontogenic infections was reported in children receiving pulpotomy treatment from a pediatric dental clinic in Jonesboro, Georgia. The suspected source of the *Mycobacterium* was contaminated water from dental unit waterlines.

In 2016, an outbreak of *Mycobacterium abscessus* odontogenic infections was reported in children receiving treatment from a dental clinic in Anaheim, California.

## SLIDE 8

CDC recommends that water used for routine dental treatment meet regulatory standards for drinking water, which is fewer than 500 CFU/mL of heterotrophic water bacteria. DHCP should consult with the dental unit manufacturer for appropriate methods and equipment to maintain the recommended quality of dental water and follow recommendations for monitoring water quality provided by the manufacturer of the unit or waterline treatment product.

## SLIDE 9

CDC recommends that DHCP discharge water and air for a minimum of 20 to 30 seconds after each patient, from any device connected to the dental water system that enters the patient's mouth—such as handpieces, ultrasonic scalers, and air or water syringes. CDC also recommends that DHCP consult with the dental unit manufacturer on the need for periodic maintenance of antiretraction mechanisms.

## SLIDE 10

Commercial devices and procedures designed to improve the quality of water used in dental treatment are widely available. Examples of effective water treatment methods include:

- Independent reservoirs.
- Chemical treatment.
- Filtration.
- Combinations of technologies.
- Sterile water delivery.

DHCP should always consult with the dental unit manufacturer for appropriate methods to maintain the recommended dental unit water quality.

## SLIDE 11

Dental unit water quality monitoring may be performed using commercial water-testing laboratories or in-office using self-contained kits.

DHCP should consult with the manufacturer of their dental unit and the water delivery system to determine the best method for maintaining acceptable water quality (which is less than or equal to 500 CFU/mL) and the recommended frequency of monitoring.

## SLIDE 12

Oral surgical procedures involve the incision, excision, or reflection of tissue that exposes the normally sterile areas of the oral cavity. Examples include biopsy, periodontal surgery, apical surgery, implant surgery, and surgical extractions of teeth, such as removal of an erupted or nonerupted tooth requiring elevation of a mucoperiosteal flap, removal of bone or section of tooth, and suturing if needed.

When performing oral surgical procedures, DHCP should use sterile irrigating solutions, which can include delivery systems that bypass the dental unit, such as sterile bulb syringes or sterile injection syringes.

## SLIDE 13

During oral surgical procedures, microorganisms may enter the bloodstream and other normally sterile areas of the oral cavity, such as bone or subcutaneous tissue. For this reason, sterile solutions like sterile saline or sterile water should be used as a coolant/irrigator when performing surgical procedures.

Because the tubing cannot be reliably sterilized, conventional dental units cannot reliably deliver sterile water even when equipped with independent water reservoirs. Sterile water delivery devices—such as sterile irrigating syringes, as shown here, or bulb syringes—should be used to deliver sterile water. Sterile water systems, such as those used with surgical handpieces, bypass the dental unit and use sterile disposable or autoclavable tubing.

## SLIDE 14

For more information on dental unit water quality, see:


- CDC. *Guidelines for Infection Control in Dental Health-Care Settings —2003* at www.cdc.gov/mmwr/PDF/rr/rr5217.pdf.
- CDC. Dental Unit Water Quality website at www.cdc.gov/oralhealth/infectioncontrol/questions/dental-unit-water-quality.html.
- CDC. *Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care* at www.cdc.gov/oralhealth/infectioncontrol/pdf/safe-care2.pdf.
- Montana State University Center for Biofilm Engineering website at www.biofilm.montana.edu.
- Organization for Safety, Asepsis and Prevention. Safe Water, Safe Dentistry, Safe Kids webinar at www.osap.org/link.asp?ymlink=91293439.
- Peralta G, Tobin-D'Angelo M, Parham A, et.al. *Mycobacterium abscessus* infections among patients of a pediatric dentistry practice — Georgia, 2015. *MMWR Morb Mortal Wkly Rep*. 2016;65:355–356.