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CDC HEALTH ADVISORY

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Outbreaks of Nontuberculous *Mycobacteria* Infections Highlight Importance of Maintaining and Monitoring Dental Waterlines

Summary

The Centers for Disease Control and Prevention (CDC) is issuing this Health Alert Network (HAN) Health Advisory to emphasize the importance of following existing recommendations for maintaining and monitoring dental waterlines. Multiple outbreaks of nontuberculous *Mycobacteria* (NTM) infections have occurred in children who received pulpotomies in pediatric dental clinics where the dental treatment water contained high levels of bacteria. CDC provides guidelines on infection control in dental settings which contain recommendations to treat dental unit waterlines and monitor water quality. Dental providers should be familiar with these recommendations on how to properly maintain and monitor their dental equipment to ensure that dental treatment water is safe for patient care.

Background

While rare, there have been multiple documented cases of disease transmission from dental unit waterlines (narrow-bore plastic tubing that carry water to the high-speed handpiece, air/water syringe, and ultrasonic scaler).¹⁻⁵ Dental units have unique characteristics that make them prone to biofilm formation.⁶ Biofilms occur in dental unit waterlines due to the long, small-diameter tubing and low flow rates used in dentistry and the frequent periods of stagnation. As a result, high numbers of common waterborne bacteria can be found in untreated dental unit water systems. Disease-causing microorganisms found in untreated dental unit water can include *Legionella*, *Pseudomonas aeruginosa*, and nontuberculous *Mycobacteria* (NTM).

Dental providers and patients could be placed at risk of adverse health effects if dental unit water is not appropriately treated. In March 2022, CDC was notified of a new cluster of suspected NTM infections in children following dental procedures at a pediatric dental clinic. Investigation into this cluster is currently ongoing, and preliminary site visit data report that dental unit waterline testing results showed microbial counts much higher than the level recommended by CDC.

In 2016, an outbreak occurred at a pediatric dental clinic in Orange County, California, with 71 patients identified as having odontogenic NTM infections following pulpotomy procedures.¹ Municipal water stored in a pressurized bladder holding tank was used to fill the dental unit water bottles. The clinic was not using disinfectants on their dental unit waterlines or regularly monitoring water quality. All water samples tested from the dental units showed microbial counts higher than the level recommended by CDC and multiple species of NTM were identified in syringe water samples from five of the six treatment rooms.

In 2015, 24 cases of odontogenic NTM infections were reported in children receiving pulpotomy treatment from a pediatric dental clinic in Georgia.² Investigators from the Georgia Department of Public Health found that municipal water was used during dental procedures, the clinic was not using a disinfectant in their dental unit waterlines, and the clinic was not regularly monitoring the water quality as [recommended by CDC](#). Microbial testing of the water samples taken from the dental units showed very high microbial counts of *Mycobacterium abscessus*. The *M. abscessus* isolates recovered from the water were found to be identical to eight isolates from tissue samples from seven of the patients, suggesting that water was the source of the infections.

The outbreaks in California and Georgia involved young children, with ages ranging from 4 to 8 years. Many of the children developed severe infections with clinical diagnoses such as cervical lymphadenitis and mandibular or maxillary osteomyelitis, and required hospitalization, treatments such as intravenous antibiotics, and surgical procedures. Complications from their infections included permanent tooth loss, hearing loss, facial nerve palsy, and incision fibrosis.

Because of the potential to form biofilm, CDC recommends that all dental unit waterlines be treated regularly with disinfectants to meet the Environmental Protection Agency (EPA) regulatory standards for drinking water (i.e., ≤ 500 colony forming units (CFU)/mL of heterotrophic water bacteria).⁷ There are many commercial products and devices available to disinfect and maintain dental unit waterlines. Dental unit water quality must also be monitored routinely as recommended by the equipment manufacturer to ensure that treatments are working effectively and that the water used in dental procedures meets safety standards.⁶ Dental providers should consult with the dental equipment manufacturer for appropriate methods and equipment to both [maintain and monitor the quality of dental water](#).

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 (e.g., removal of erupted or nonerupted tooth requiring elevation of mucoperiosteal flap, removal of bone or section of tooth, and suturing if needed). During oral surgical procedures, dental practitioners should use only sterile solutions as a coolant or irrigant using an appropriate delivery device, such as a sterile bulb syringe, sterile tubing that bypasses dental unit waterlines, or sterile single-use devices.

Recommendations for Dental Providers

- For all oral surgical procedures, use sterile saline or sterile water as a coolant or irrigant for surgical procedures.⁶ Appropriate delivery devices can include:
 - bulb syringe,
 - sterile, single-use disposable products, or
 - sterile water delivery systems that bypass the dental unit by using sterile single-use disposable or sterilizable tubing.
- For all non-surgical dental procedures, use water that meets CDC recommendations (i.e., ≤ 500 CFU/mL of heterotrophic water bacteria).
 - For all non-surgical pulpal therapy and endodontic procedures, consider following more conservative recommendations from the following organizations which recommend irrigation with a sterile and/or antimicrobial solution:
 - the American Academy of Pediatric Dentistry (AAPD), [Pulp Therapy for Primary and Immature Permanent Teeth](#)
 - the American Association of Endodontists, [AAE Position Statement on Vital Pulp Therapy](#), and
 - the Organization for Safety, Asepsis and Prevention (OSAP), [Dental Unit Water Quality White Paper and Recommendations](#)
- Consult with the dental unit manufacturer for appropriate methods and equipment to maintain the quality of dental water. Many commercial devices and procedures are available and designed for this purpose.⁶
- Follow recommendations for monitoring water quality provided by the manufacturer of the unit or waterline treatment product.⁶
- Discharge water and air for a minimum of 20–30 seconds after each patient from any device connected to the dental water system that enters the patient's mouth (e.g., handpieces, ultrasonic scalars, and air/water syringes).⁶
- Review the US Food and Drug Administration's (FDA) website on [Dental Unit Waterlines](#) for recommendations for dental practitioners.

Recommendations for Dental Facilities

- Ensure that the dental facility has an infection prevention plan that includes policies and standard operating procedures dedicated to maintaining and monitoring water quality.⁸

- Provide staff training on how to properly maintain and monitor dental water quality. Training should be based on the manufacturer's instructions for use of the products and devices used in the dental facility, provided for all new hires, and provided when new equipment is purchased and then at least annually.⁸
 - Contact the manufacturer of the treatment product or device if you have questions about the instructions for use.
- Document all maintenance records, monitoring results, and employee trainings. Accurate record keeping is an important component of a dental infection prevention program, ensures proper protocols have been met, and establishes accountability. Records should be maintained according to state and federal requirements.⁸
- Report infections suspected to be associated with receiving health care, including dental care, to the appropriate public health authorities. CDC provides [contact information for State Healthcare Associated Infections \(HAI\) Prevention Programs](#).

Recommendations for Medical Providers

- Consider an odontogenic source for cervical lymphadenitis or lymphadenopathy, and assess a history of dental care and procedures in all children presenting with lymphadenitis.

Recommendations for Health Departments

- During a healthcare-associated outbreak investigation of NTM infections of the head and neck region, assess patients for a history of recent dental treatment.
- Collaborate with [State Oral Health Programs](#) on investigations of healthcare-associated infections resulting from dental treatment.

Recommendations for the Public

- Contact your dental provider if you or your child develop an infection following dental treatment. Signs and symptoms of a postoperative dental infection could include a localized oral abscess, fever, or pain and swelling in the mouth or neck.
- Talk to your dental provider about their infection prevention and control practices and the steps their staff take to ensure safe treatment for all patients.

For More Information

- [Guidelines for Infection Control in Dental Healthcare Settings – 2003](#)
- [Dental Unit Waterlines \(FDA\)](#)
- [Policy on Infection Control \(American Academy of Pediatric Dentistry\)](#)
- [Dental Unit Water Quality: Organization for Safety, Asepsis and Prevention White Paper and Recommendations– 2018 \(OSAP\)](#)
- [Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care](#)
- [State-based HAI Prevention Activities](#)
- [Dental Unit Waterlines, Frequently Asked Questions](#)
- [Foundations: Building the Safest Dental Visit](#)

References

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