

Dental unit water quality revisited

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THE QUALITY OF WATER delivered through a dental unit for treatment has been the subject of much research and discussion over the years. The ability of biofilms to form in dental unit water lines and the microbial contamination of water in the dental unit has been well documented.¹⁻³ This research and the potential for causing bacterial infections in patients during the delivery of dental care led to the establishment of a dental unit water quality standard by the Centers for Disease Control and Prevention (CDC).⁴

Since this standard was published in 2003, many dental practices have modified equipment and adopted practices to ensure that the water from their dental units contains no more than 500 colony-forming units (CFUs) of heterotrophic bacteria per milliliter of water (<500 CFU/ml). It is important to note here that although CDC guidelines do not have the force of law—as do Occupational Safety and Health Administration rules—they are the prevailing standards of care for patient safety, as recognized by state dental boards, state and local health departments, and the American Dental Association (ADA).

Until recently, there have been only sporadic reports of disease transmission in dental patients due to contaminated dental unit water. In 2011, a woman in Italy died from a *Legionella* infection that was traced to the dental practice

where she had been treated.⁵ In 2015, a hospital in Georgia reported a cluster of cases of children with *Mycobacterium abscessus* infections treated at the hospital, which were traced to a dental practice where the patients had been treated.⁶ The patients had received pulpotomies, and contaminated dental unit water had been used for irrigation during those procedures.

Even more recently, another report of pediatric patients receiving pulpotomies and developing *M. abscessus* infections is under investigation by the Orange County Health Care Agency and the California Dental Board. It has been reported that more than 60 children were hospitalized to treat their infections, and one young girl reportedly lost part of her mandible due to the infection.⁷

In the 1990s, the ADA issued a statement on dental unit water line contamination, which included a recommendation for dental practices to purge or flush their water lines for at least two minutes at the beginning of each day, to decrease the microbial contamination by removing stagnant water in the lines. In addition, the ADA issued a challenge to dental manufacturers to develop products and technology that would reduce dental water line contamination. The manufacturers responded, resulting in the development of numerous products and technologies that have been cleared

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by the Food and Drug Administration and implemented in dental practices to increase patient safety.

It appears, however, that some dental practices still have not addressed the issue of water line contamination, resulting in serious health consequences for patients. In light of these recent developments, a review of water line protocols is an essential component of patient safety, as well as that of the dental team.

First, it is important to note that dental unit water should never be used for irrigation during a surgical procedure. Only sterile water or saline should be used for these procedures. The sterile water or saline must be delivered through separate sterile tubing or with a bulb syringe.

Determining which water quality system is best for nonsurgical procedures may be dependent on the age of the facility and/or its equipment. The first option is to install a point-of-entry filter system that filters all of the water as it enters the facility. These filters typically use ultraviolet light to decrease the numbers of microorganisms in the water that is supplied to the dental units. These systems are most effective in newly constructed facilities, where there is no microbial contamination existing in the water lines. In older facilities, the lines may need to be replaced or purged to remove microbial contamination that has colonized in the lines.

Another option is a point-of-use filter that is installed on the water line that supplies each handpiece, air/water syringe, ultrasonic scaler, or other attachment. These filters contain membranes that trap the microbial contamina-

tion before the water enters the handpiece, etc. The filters must be changed regularly and can be rather costly.

The third option is a self-contained water delivery system in which water from the unit is delivered from a separate water bottle, rather than directly from the municipal water supply. In some systems, the water bottle contains a cartridge that releases an antimicrobial agent into the water to help to control microbial growth. Antimicrobial products are added each time the water bottle is refilled to control growth of microorganisms in the lines. Periodically, a water line cleaner or "shock treatment" is used in the dental unit to purge the biofilm or microbial contamination that accumulates in the water lines. This type of system is likely to be most cost-effective, and it is simple to maintain.

There are added benefits of using a self-contained water system. In areas where there are high levels of minerals in the municipal water—referred to as hard water—a self-contained water reservoir on the unit allows the use of distilled or demineralized water. This can help prevent buildup of deposits in the water lines, which may block the flow of water. In addition, a dental unit with a separate water reservoir can be used in the event of a boil-water alert, since bottled or distilled water can be added to the water bottle rather than the potentially toxic tap water. This can allow a practice to continue to treat patients if an event such as a power outage occurs, which can result in contamination of the municipal water supply. Dental units without separate water reservoirs typically can be retrofitted with these devices.

CDC Guidelines recommend that dental unit water quality be monitored periodically to ensure that the water quality standard is being maintained and that the system the dental practice is using is working.⁸ Water test kits are readily available from dental suppliers to perform in-office testing, as are services that provide mail-in testing of water quality. Patient safety should never be taken for granted. Ask yourself, what's in your water? **DE**

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