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An update of dental unit waterlines disinfection



Patients and dental staffs are exposed to bioaerosol transmission and microbial contamination from dental unit waterlines (DUWLs).¹ DUWLs are the network of interconnected narrow-bore plastic tubes which carry water to all parts of dental equipment such as hand pieces, air–water syringe, and ultrasonic scaling machines. DUWLs are susceptible to microbial biofilm contamination in dental units from the municipal or self-contained water systems.² In addition, DUWLs may be contaminated by different species of microbes from patient's oral cavity to accumulate dental biofilm. Opportunistic pathogens in DUWLs are the potential risk factors for medically compromised or immunocompromised patients during dental treatment procedures. Therefore, the American Dental Association (ADA) has set a limit of ≤ 200 CFU/mL on the heterotrophic bacterial load in water from DUWLs.³ The quaternary ammonium salt cetylpyridinium chloride-containing nanoemulsion has found to effectively disinfect DUWL output water.² Recently, nanometer silver was reported to have excellent bacteriostatic rate in preventing DUWL contamination.⁴

In Taiwan, Centers for Disease Control first announced the guidelines for dental infection control in 2016. The surveillance on microbial water quality management of dental unit waterlines was initiated by “dental clinic intensive infection control implementation plan”, National Health Insurance Administration, Ministry of Health and Welfare (<https://ws.nhi.gov.tw>, the latest version in 2021). Briefly, DUWLs of dental units are necessary to flush for 3 min before the daily starting. Water flushing of DUWLs needs to be performed at least 30 s between of each inter-patient treatment. At the end of the working day, DUWLs are disinfected with 0.005–0.02% NaOCl, 2.0% glutaraldehyde, 10% iodophors, or other qualified DUWL reagents such as 2% quaternary ammonium salts for 3 min and then purged with air. This standard operating procedure can effectively disinfect DUWL to consistently meet the ADA recommendation.

Moreover, a recent study demonstrated that two commonly used DUWL disinfectants containing with sodium percarbonate/silver nitrate (ICX, A-dec Inc., Newberg, OR, USA) and chloramine-T/polyhexanide biguanide (Alpron, Alpro Medical, St. Georgen, Germany) could reduce the dispersion of viable viruses Escherichia phage MS2, a non-enveloped single-stranded RNA virus, in dental bioaerosols during simulated dental procedures.⁵ Thus, the use of DUWL disinfectants may not only decontaminate the DUWL water, but also retard the amount of bacteriophages within the generated bioaerosols.

Taken together, the microbial contamination can be detected in DUWLs with the potential risk of infection. Bioaerosols from these pathogens could be dispersed in the air which may lead to affiliate transmission diseases. Therefore, the microbial quality of DUWLs in daily infection control and prevention is important for the occupational health and patient health, especially during the current COVID-19 pandemic.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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