There are always bacteria lurking in dental equipment, suggests research

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Bacteria lurking in the water lines at the dentist's office are tougher than we thought, according to a new paper published in *Water Research*. The study reveals that the disinfectants recommended by companies that manufacture the water lines don't actually shift all the bacteria in the lines, which means they're never completely clean.

Dental equipment is particularly prone to contamination with bacteria, yeasts and other microbes because it comes into contact with people's mouths. Dentists use dental unit water lines to keep their electrical equipment cool.

In the new study, researchers from Université de Poitiers in France analyzed three disinfectants used by some European dentists to control biofilms in dental water lines: Calbenium, Oxygenal 6 and Sterispray. The team tested how well the disinfectants removed biofilms from dental water lines and found that none of them were completely effective on a polymicrobial biofilm.

"During dental procedures, patients and dentists can be exposed to microorganisms present in the water circulating inside dental units," said Dr. Damien Costa, lead author of the study from Université de Poitiers. "Infections may occur if this potentially microbiologically contaminated water is inhaled or splashed. We wanted to determine the best way to keep dental lines clean and avoid infection."

There has long been concern about how clean dental lines are, and there

have been some - albeit rare - documented cases of them causing infections in people. In 2011, an 82-year-old woman was admitted to hospital with trouble breathing and was diagnosed with Legionnaire's disease, which she had contracted via a contaminated dental water line. She died two days later.

One challenge associated with keeping dental water lines clean is that bacteria can grow in communities with protective layers over themselves, called biofilms. Biofilms can be particularly difficult to prevent and remove even using disinfectants.

Dr. Costa and his colleagues grew biofilms in the laboratory in conditions similar to dental water lines. The biofilms contained several different microbes, to mimic the complex biofilms that form in real lines: the bacterium Pseudomonas aeruginosa, which can cause pneumonia and septic shock, the fungus Candida albicans, which can also cause superficial and severe infections, and free living amoebae Vermamoeba vermiformis. These amoebae can be dangerous - they're known as "Trojan horses" because they carry some bacteria that can infect humans, like Legionella pneumophila, which causes Legionnaire's disease.

All three disinfectants were especially active against the fungus, but none of them were completely effective at clearing the entire biofilm. Calbenium was most effective at clearing biofilms and stopping new ones from forming, even at concentrations below what the manufacturers recommend. However, it did not kill the free living amoebae.

"Unfortunately, our results showed that none of the three disinfectants commonly used are completely effective," said Dr. Costa. "What is most worrying is that none of the disinfectants could kill the amoebae, which means they are still dangerous to patients and dentists even after water

lines have been sterilized."

The researchers say preventing the formation of biofilms as long as possible is key to keeping the lines clean, as once they have formed, they can't be killed using disinfectant. It's difficult to stop biofilms from forming, since microbes naturally cling on to surfaces. However, the research highlighted three approaches to prevention: use good quality water that isn't contaminated with microbes, use a disinfectant for prevention, rather than to remove biofilms that have already formed, and avoid letting water stagnate.

More information: Damien Costa et al. Efficacy of dental unit waterlines disinfectants on a polymicrobial biofilm, *Water Research* (2016). DOI: 10.1016/j.watres.2015.12.053

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