Dental unit waterlines have become a huge problem in dentistry. There have been outbreaks of disease that have caused serious infections, tooth loss, and bone loss that resulted in facial reconstruction.

What is the problem with dental unit waterlines?

Waterlines on the dental unit are small diameter and the water that runs through these lines is not sterile. What happens is that when the water sits in these lines overnight, the bacteria starts to grow. If the growth cycle isn't interrupted, over time, the bacteria will continue to grow so that it will eventually fill the width and length of the line. This slimy bacterial farm is a biofilm, which is basically clusters of microorganisms, which can include bacteria, fungi, and other nastiness. They are sticky and hard to remove, and in this case, the small lines give a lot of surface for the biofilm to cling to. That's why simply turning on the water and running it through the lines doesn't remove it. If you simply flush the lines, chunks of the biofilm will break off and the attached instrument will be either disperse the aerosolized biofilm in the air or it'll spray chunks into the patients' mouths. Either way, that's not what we're shooting for! That can be bad for patients and it can be bad for us since we're breathing that stuff in all day.

What kind of organisms grow in dental office waterlines and can they cause disease?

The stuff that grows in our lines is not from patient's mouths, it's from the water sources that we use for our dental office waterlines. Drinking water from our municipal water systems is allowed to have up to 500 CFU/ml, which is 500 colony forming units of bacteria per 1 ml of water. Generally, despite the fact that some of these bacteria can be dangerous, this level of bacteria is no problem for dental patients with healthy immune systems, but it can cause a problem for patients who are compromised.

Some of the common pathogens that are found in dental unit water lines are: fungi, such as candida (yeast), legionella, mycobacterium abscesses, pseudomonas and other bacteria and viruses.

These bacteria can cause severe illnesses. There have been several cases across the country that resulted in serious injuries. Most serious cases in children involved infections with mycobacterium abscessus. These infections occurred after pulpotomies that resulted in tooth loss, jawbone reconstruction, and multiple surgeries. Cases have also occurred after endodontic procedures, third molar extractions, and general dental work. When these outbreaks were investigated, much higher levels of bacteria were noted, and the importance of establishing policies, regular maintenance schedules, and monitoring was stressed.

How can we reduce exposure to waterline bacterias?

There are several methods that can reduce exposure to waterline biofilms.

Antiretraction valves on dental water lines generally prevent organisms from patient's mouths being sucked back into the waterlines. To further ensure that suck back doesn't occur, always flush lines for 20-30 seconds at the beginning and end of the day and between patients. Also, make sure that antiretraction valves are replaced as necessary.

There are systems that can disinfect water as it comes into the office to remove/kill microorganisms. There are also self-contained independent water bottles on the units that contain water that can be treated periodically or continuously to kill stuff in the water.

There are several different products that can be used to treat waterlines. There are tablets and disinfectants that can be added to the bottles to disinfect the water, there are straws and cartridges that can deliver disinfectants continuously, there are shock treatments that can be used periodically to kill whatever is in the lines, and there are centralized systems that treats all of the water in the units. Always check with the manufacturer of your unit to make sure the product you choose is compatible with your system and to ensure that you're testing the lines at correct intervals.

Off-label use of chemical germicides and cleaners are not recommended by OSAP, but FYI, studies have shown that products like listerine, scope, and other similar products have been shown to reduce bacterial levels to acceptable limits.

Dental suppliers will tell you it can screw up your valves and they will start to leak because these products can gum up the switches. It's true, but in our office, it took 5 years to do it and it's much cheaper than some of these other systems and our lines have registered 0 or very low when we used them.

Don't use bleach in the lines on a regular basis, but you can use it to shock lines. If it gets in your handpieces or other instruments it can totally trash them. You have to flush the crud out of lines to make sure none of it stays in the lines.

Because of possible exposure to waterline bacteria, the dental infection control guidelines recommend that all surgical procedures use sterile saline or water as a coolant/irrigant. It would also be a good idea to use sterile water for non-surgical pulpotomies/pulpectomies and other endodontic procedures. You can use syringes, or a bulb syringe to administer sterile water, or there are delivery systems that administer sterile water/saline without having to pass through dental units.

People have asked about using distilled water in the bottles instead of municipal water. That doesn't help either. Commercially distilled water is allowed to have a certain percentage of non-distilled water, so there's still potential for bacterial growth. What if you distill it yourself? Same problem, there may still be some bacteria in the containers that will grow in the bottles.

What if you have individual bottles on each unit and then used sterile water? Unfortunately, even if you use sterile water in independent water bottles, the way that dental units work, you can't guarantee that the water will still be sterile by the time it goes into the patient's mouth because the pathway within the unit can't be reliably sterilized/disinfected.

How do you test your lines and how often?

To determine the best system for testing and maintenance, you have to call the manufacturer of your unit and ask them. I know that sounds totally lame, but you have to in order to make sure you're doing things you have to do.

Having individual bottles on each unit is the best way to be able to test and treat waterlines. If your current units won't support adding an individual water reservoir, you can mount them on the wall, or on the pole, depending on your setup. It's not expensive and it makes your life easier when it comes to testing and treating waterlines.

Generally, OSAP, the infection control gurus of the universe recommend testing monthly until the units pass for two consecutive months, then test quarterly.

If you test your water and the number is above 500 CFUs, then you need to treat your lines according to the manufacturer's guidelines and then retest your lines. If you follow the guidelines and the numbers are still too high, you may need to replace some lines.

You can get water samples or you can test them in the office. Make sure you select a kit that is designed to test drinking water that correlates with AWWA Method 9215 or heterotrophic plate count (HPC) methods.

Also test under the following circumstances:

- If new equipment such as water reservoirs or water treatment devices are installed;
- If waterline disinfection protocols are changed;
- After extended periods of disuse or lack of maintenance;
- If the manufacturer changes testing protocols;
- If units are repaired or replaced .

Follow instructions in the testing kit. When you test waterlines, make sure you collect water at the “point of use”, which is the point where the patient actually receives the water. In other words, don’t test the water in the bathroom sink, use the water that comes out of the line that’s hooked to the handpiece.

When you first test the waterlines, test each individual waterline. In other words, test the air/water syringe line, the handpiece line, the ultrasonic scaler line, etc. Address any problems in the individual waterlines and retest as necessary.

Once the lines are in good shape and you are getting good results, you may want to think about changing your procedures when you move to quarterly testing. For our quarterly testing, because the tests have become pretty expensive, we now test each operatory instead of each individual waterline. So, we go to an operatory and combine samples from each waterline into one bottle and then test that bottle. If we have a positive test on an operatory, we then perform individual tests to determine which line is the problem. That way, you’re still checking each line in each operatory and addressing any problems that arise.

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