

## shots

### TREATMENTS

# Infection Outbreak Shines Light On Water Risks At Dentists Offices

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Mimi Morales recovers in Children's Hospital of Orange County in late September after surgery for a dental infection she contracted at Children's Dental Group in Anaheim, Calif. She had three permanent teeth, one baby tooth and part of her jawbone removed.

*Mindy Schauer/Courtesy of The Orange County Register*

When people go to the dentist, they generally expect to leave in better health than when they walked in.

But the water that dentists use to rinse teeth sometimes carries infectious bacteria.

The Orange County Health Care Agency in California says that nearly two dozen children who received so-called baby root canals, or pulpotomies, are thought to have developed dangerous bacterial infections. Dentists perform pulpotomies to remove infected pulp inside a baby tooth so the rest of the tooth can be spared.

The infections were caused by *Mycobacterium abscessus*, which the health department traced back to the water at Children's Dental Clinic of Anaheim.

"The reason we're so concerned is this infection is very hard to treat with antibiotics," says Dr. Eric Handler, health officer with the Orange County Health Authority. Instead, the tissue is surgically removed. "Treatment can be very traumatic and deforming."

As of Sept. 27, three confirmed and 19 probable infections have been linked to the clinic. In each case, the children had to be hospitalized. In an email to Shots, Children's Dental Group CEO Sam Gruenbaum said, "I am currently devoting all of my time and energy to making certain our patients are taken care of."

In a Sept. 23 letter to patients, Gruenbaum asked the families of patients who had received pulpotomies since April 1 at the Anaheim clinic to come in and be examined for signs of infection. The letter said that the Orange County Health Care Agency had found abnormal levels of microbes in the water, and the clinic is no longer using office water for patient procedures.

Deepa Bharath and Courtney Perks at *The Orange County Register* report that several children have had surgery to treat infections, including a 7-year-old girl who had "three permanent teeth, a baby tooth, and a part of her jaw bone" removed.

Although infections like these are rare, this isn't the first time *Mycobacterium abscessus* has been traced to a dental office. In Georgia in 2015, more than 20 children who had pulpotomies were later hospitalized with confirmed or suspected mycobacterium infections.

Still, according to the federal Centers for Disease Control and Prevention, the Georgia outbreak of dental mycobacterium infections is the only other one on record. The

investigation into Georgia cases found that 1,386 children received pulpotomies and were potentially exposed to the bacteria. But only about 1 percent of them got sick.

"Infections from mycobacterium are very rare," said Dr. Melissa Tobin-D'Angelo, a medical epidemiologist with the Georgia Department of Public Health who investigated the 2015 outbreak. "We don't want to discourage parents from having their children see their dentists two times a year as recommended. The reason children had to have this procedure is because they had decay to begin with."

Investigators learned that the water supply to the building wasn't contaminated. Ultimately, they traced the infection to the dental unit waterlines — the flexible plastic tubes that carry water to the hoses that rinse your mouth.

The researchers weren't surprised that the tubes turned out to be the source of the problem. Keeping waterlines clean can be a challenge for dentists.

### **A bacterial incubator**

Dental unit waterlines are very good at growing bacteria, says Dr. Nuala Porteous, an associate professor of dentistry at University of Texas Health Science Center Dental School in San Antonio. In her research, she looks at how to control infection risks in dental offices, including the microbes that live in waterlines.



Mimi Morales says she's "flabbergasted" that her granddaughter, Mimi, 7, ended up in the hospital with an infection following a pulpotomy in July.

*Mindy Schauer/Courtesy of The Orange Country Register*

"If you think about the last time you went to the dentist, they only use the water sometimes," Porteous says. "It's very start and stop. They work and then they rinse, so there's a lot of stagnant water."

And bacteria love to grow in stagnant water. How prevalent they are is hard to say. A study of dental waterlines in the U.S. found harmful bacteria 68 percent of the time. Still, another study was reassuring, barely finding any contamination in dental offices in London and Northern Ireland.

Mycobacterium isn't the only kind of germ that can thrive in waterlines. Pseudomonas and legionella can, too. Both types of bacteria can cause pneumonia-like illnesses. Despite studies showing that dentists are more likely to have antibodies for legionella than the general population, very few actual illnesses have been directly linked to dentistry.

"These are organisms that are typically found in water and groundwater, things like that," says John Molinari, a microbiologist and professor emeritus at the University of Detroit Mercy School of Dentistry. "They wouldn't normally get you sick. It's when you have high concentrations in a certain person that illness happens." The elderly and people with an underlying illness are most at risk.

"With legionella, you're more likely to get sick when there's a lot of bacteria, like when you get biofilms," says Molinari.

## **Fighting biofilms**

A biofilm is a group of microorganisms — typically bacteria, fungi or a mixture of microbes — that live in a colony. These microbes communicate with each other and even feed and protect each other. And that can make them very hard to remove.

"Think of the plaque that grows on your teeth," says Molinari, "That plaque is a biofilm. At first you can wash it off with water, but after 24 hours you need to brush your teeth and use chemicals to remove it. Even mouthwash alone isn't enough."

The biofilms in waterlines do the same thing. The outer layers might die as cleaning chemicals rush through the pipes, but the inner layers can survive.

A paper published online Sept. 13 in the journal *Pathogens and Disease* looked at dental practices using industry-standard sterilization techniques. "We found fungi, bacteria, viruses, and protozoa in dental unit waterlines. In our study, decontamination procedures worked but not completely," Damien Costa, at the University of Poitiers in France and the lead investigator on the study, told Shots in an email.

Costa says there aren't any set procedures for sterilizing waterline units in France, where his research was conducted. He hopes his study will provide data that will help the government create guidelines.

In the United States, the CDC says dentists should "consult with the dental unit manufacturer for appropriate methods and equipment to maintain the recommended

quality of dental water." Waterlines vary depending on the dental equipment, so a one-size-fits-all approach wouldn't be effective, a CDC spokesman told Shots.

Generally, dental offices use a combination of chemicals. Some are added continuously to the water in low concentrations, while other, stronger disinfectants are used intermittently. Filters and disinfectant cartridges can be added to the ends of lines, and the ADA recommends occasionally draining and purging the waterlines with air.

Dentists should be able to tell if the bacteria-killing maintenance for their equipment is working. Porteous says chairside kits that check for bacteria are available. Dentists can also send water samples to testing companies to make sure bacterial counts fall within CDC guidelines.

The CDC says that the water dentists use should meet the same quality standards as drinking water. But the CDC and the American Dental Association don't say how often dentists should test their water.

"Without water testing, it's impossible to tell if your treatment works," says Mark Frampton, owner of ProEdge Dental Products, a manufacturer of disinfectants for dental lines. Frampton's company also analyzes water quality for dentists. "In our experience, about a third of the time people that have maintenance programs will still fail our tests because they don't always follow the treatment instructions. People don't always do everything perfectly."

Frampton recommends that dentists check their water quality at least quarterly, or more often depending on the treatment product they use.

University of Texas Health Science Center's Porteous recommends dentists check the water coming out of dental lines at least weekly. "I would hope that all dentists take note of these cases that have been occurring recently in Georgia and under investigation in LA," she says. "It's very sad, and I hope that it makes all dental institutions sit up and take note."

Back in California, the dental clinic linked to the mycobacterium infections isn't taking any chances. It will replace its entire water system.