



Backflow Prevention and the Dental Operative Unit

The Centers for Disease Control and Prevention (CDC) has been asked by the American Dental Association (ADA), state and local health departments, and local water regulators to provide guidance and scientific information regarding the risk of contamination from cross-connections from the dental operative unit. The dental operative unit is a medical device at each dental chair through which water and compressed air flow during dental procedures. Cross-connections are the links through which contaminated materials may enter a potable water supply system when the pressure of the polluted source exceeds the pressure of the potable source (e.g., during a water main break).

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Backflow Prevention Devices

Backflow prevention devices can be used to prevent back-siphonage of contaminated fluids into the public water supply and are regulated by the health authority or the plumbing-code enforcement agencies having jurisdiction. (Note: Anti-retraction valves, used to prevent aspiration of patient materials into some dental handpieces and waterlines, are regulated by the Food and Drug Administration (FDA) and are not considered backflow prevention devices.)

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Public Water Supplies

In some locations water regulators have required dental offices to install backflow prevention devices at the service connection or on individual dental operative units. Many of these requirements appear to be based on two assumptions. First, if a sudden drop in water pressure occurs, oral fluids may be aspirated from a patient's mouth into cross-connected water systems. Second, if aspiration does occur, it may result in a significant risk of transmission of blood-borne viruses from an infected patient to other patients or to persons who are using the same water

system. Regulatory interventions requiring the installation of complex backflow prevention devices in certain dental offices are based on the conclusion that a high degree of hazard of contamination exists. Available science suggests, however, that there is an extremely low risk of such contamination of public water supplies from cross-connections in dental operative units.

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Cross-connections in Dental Operative Units

Possible sites for cross-connection in the dental operative unit are the cuspidor, high-speed handpiece, and air/water syringe. Today, most dental offices do not use cuspidors and those that are currently manufactured include an air-gap, which prevents backflow. Although a cross-connection is inherent in the design of the high-speed handpiece and air and water syringe, this cross-connection should be considered as very low risk. Both of these devices must have water to operate properly and, when in use, are observed continually by the dentist or hygienist. If water flow is disrupted for any reason, the dental worker would discontinue use of the device. Furthermore, in the unlikely event that a sudden drop in water pressure caused backflow to occur, the volume of aspirated fluid would be minuscule.



Bloodborne Viruses (e.g., HIV, hepatitis B)

One concern expressed during meetings with local water regulators is the possibility of contamination of public water supplies with blood-borne viruses such as human immunodeficiency virus (HIV)—the virus that causes acquired immune deficiency syndrome (AIDS). Scientific evidence indicates, however, that the route of transmission of blood-borne viruses is through intimate contact with blood or other potentially infectious body fluids. Transmission of bloodborne diseases has not been reported through the use of any type of water source and is considered highly unlikely. Unlike bacteria or fungi, viruses are unable to reproduce outside a living host, and any virus introduced into a water source would be greatly diluted and would probably become noninfectious. Because the hepatitis B virus (HBV), another blood-borne virus, is found in much higher concentrations in blood than is HIV, HBV is considered a more infectious agent. Studies show that the risk of transmission of HBV in sewage and other water is very low, thus, the risk of HIV transmission would be even less.

For a bloodborne infection to be transmitted, four conditions, known as the "chain of infection," must be present:

- a susceptible host, or a person who is not immune
- an opening through which the microorganism may enter the host
- a microorganism that causes disease
- sufficient numbers of the organism to cause infection.

The chance of all of these events happening in sequence represents the "risk of infection." Any break in one or more of these "links" in the chain would effectively prevent infection. This information strongly suggests that the risk of transmission of a bloodborne disease through contaminated water supplies is very low.

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Risk of Contamination from Cross-connections

Although a theoretical possibility of contamination from cross-connections from dental operative units does exist, available scientific evidence strongly implies that this risk is nearly zero. Installation of backflow prevention devices, when required, should be consistent with this very low degree of hazard. These suggestions are based on the following:

- HIV is not transmitted by water.
- Published evidence of a public health risk due to cross-connections in the dental operative unit does not currently exist.

- The American Water Works Association (AWWA) statement of policy recommends that the installation of backflow prevention devices be consistent with the degree of hazard resulting from cross-connections.
- Increasingly, dentists are using self-contained dental operative unit water systems that are not connected to the public water supply.

In addition, the manufacturers' current infection control recommendations and directions for maintenance of each dental operative unit should be followed. The CDC's Division of Oral Health will continue to assess scientific information related to the quality of dental operative unit water and the safety of patient care delivery.

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Selected References and Additional Resources

American Dental Association Statement on Backflow Prevention and the Dental Office.*

CDC. **HIV and Its Transmission**. **View PDF**  (PDF-45K). **En español**.

CDC. **Viral Hepatitis B**.

Environmental Protection Agency. **Cross-Connection Control Manual** (PDFs )



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<http://www.cdc.gov/OralHealth/infectioncontrol/factsheets/backflow.htm>

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