

# **Guidelines for Environmental Infection Control in Health-Care Facilities**

**Recommendations of CDC and the Healthcare Infection Control  
Practices Advisory Committee (HICPAC)**

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Centers for Disease Control and Prevention (CDC)  
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Reservoir	Associated pathogens	Transmission	Strength of evidence+	Prevention and control	References
Dental unit water lines	<i>Pseudomonas</i> , <i>Legionella</i> , <i>Sphingomonas</i> , <i>Acinetobacter</i>	Contact	Low	Clean water systems according to system manufacturer's instructions.	636, 694–696
Ice baths for thermodilution catheters	<i>Ewingella</i> , <i>Staphylococcus</i>	Contact	Low	Use sterile water.	697, 698
Decorative fountains	<i>Legionella</i>	Aerosol inhalation	Low	Perform regular maintenance, including water disinfection; avoid use in or near high-risk patient-care areas.	664
Eyewash stations	<i>Pseudomonas</i> , amoebae, <i>Legionella</i>	Contact	Low Minimum	Flush eyewash stations weekly; have sterile water available for eye flushes.	518, 699, 700
Toilets	Gram-negative bacteria	–	Minimum	Clean regularly; use good hand hygiene.	662
Flowers	Gram-negative bacteria, <i>Aspergillus</i>	–	Minimum	Avoid use in intensive care units and in immunocompromised patient-care settings.	515, 701, 702

\* Modified from reference 654 and used with permission of the publisher (Slack, Inc.)

+ **Moderate:** occasional well-described outbreaks. **Low:** few well-described outbreaks. **Minimal:** actual infections not demonstrated.

### b. Water Temperature and Pressure

Hot water temperature is usually measured at the point of use or at the point at which the water line enters equipment requiring hot water for proper operation.<sup>120</sup> Generally, the hot water temperature in hospital patient-care areas is no greater than a temperature within the range of 105°F–120°F (40.6°C–49°C), depending on the AIA guidance issued at the year in which the facility was built.<sup>120</sup> Hot water temperature in patient-care areas of skilled nursing-care facilities is set within a slightly lower range of 95°F–110°F (35°C–43.3°C) depending on the AIA guidance at the time of facility construction.<sup>120</sup> Many states have adopted a temperature setting in these ranges into their health-care regulations and building codes. ASHRAE, however, has recommended higher settings.<sup>661</sup> Steam jets or booster heaters are usually needed to meet the hot water temperature requirements in certain service areas of the hospital (e.g., the kitchen [120°F (49°C)] or the laundry [160°F (71°C)]).<sup>120</sup> Additionally, water lines may need to be heated to a particular temperature specified by manufacturers of specific hospital equipment. Hot-water distribution systems serving patient-care areas are generally operated under constant recirculation to provide continuous hot water at each hot-water outlet.<sup>120</sup> If a facility is or has a hemodialysis unit, then continuously circulated, cold treated water is provided to that unit.<sup>120</sup>

To minimize the growth and persistence of gram-negative waterborne bacteria (e.g., thermophilic NTM and *Legionella* spp.),<sup>627, 703–709</sup> cold water in health-care facilities should be stored and distributed at temperatures below 68°F (20°C); hot water should be stored above 140°F (60°C) and circulated with a minimum return temperature of 124°F (51°C),<sup>661</sup> or the highest temperature specified in state regulations and building codes. If the return temperature setting of 124°F (51°C) is permitted, then installation of preset thermostatic mixing valves near the point-of-use can help to prevent scalding. Valve maintenance is especially important in preventing valve failure, which can result in scalding. New shower systems in large buildings, hospitals, and nursing homes should be designed to permit mixing of hot and cold water near the shower head. The warm water section of pipe between the control valve and shower head should be self-draining. Where buildings can not be retrofitted, other

- B. Eliminate contaminated water or fluid environmental reservoirs (e.g., in equipment or solutions) wherever possible.<sup>464, 465</sup> **Category IB**
- C. Clean and disinfect sinks and wash basins on a regular basis by using an EPA-registered product as set by facility policies. **Category II**
- D. Evaluate for possible environmental sources (e.g., potable water) of specimen contamination when waterborne microorganisms (e.g., NTM) of unlikely clinical importance are isolated from clinical cultures (e.g., specimens collected aseptically from sterile sites or, if post-procedural, colonization occurs after use of tap water in patient care).<sup>607, 610–612</sup> **Category IB**
- E. Avoid placing decorative fountains and fish tanks in patient-care areas; ensure disinfection and fountain maintenance if decorative fountains are used in the public areas of the health-care facility.<sup>664</sup> **Category IB**

## II. Routine Prevention of Waterborne Microbial Contamination Within the Distribution System

- A. Maintain hot water temperature at the return at the highest temperature allowable by state regulations or codes, preferably  $\geq 124^{\circ}\text{F}$  ( $\geq 51^{\circ}\text{C}$ ), and maintain cold water temperature at  $< 68^{\circ}\text{F}$  ( $< 20^{\circ}\text{C}$ ).<sup>3, 661</sup> **Category IC** (States; ASHRAE: 12:2000)
- B. If the hot water temperature can be maintained at  $\geq 124^{\circ}\text{F}$  ( $\geq 51^{\circ}\text{C}$ ), explore engineering options (e.g., install preset thermostatic valves in point-of-use fixtures) to help minimize the risk of scalding.<sup>661</sup> **Category II**
- C. When state regulations or codes do not allow hot water temperatures above the range of  $105^{\circ}\text{F}$ – $120^{\circ}\text{F}$  ( $40.6^{\circ}\text{C}$ – $49^{\circ}\text{C}$ ) for hospitals or  $95^{\circ}\text{F}$ – $110^{\circ}\text{F}$  ( $35^{\circ}\text{C}$ – $43.3^{\circ}\text{C}$ ) for nursing care facilities or when buildings cannot be retrofitted for thermostatic mixing valves, follow either of these alternative preventive measures to minimize the growth of *Legionella* spp. in water systems. **Category II**
  - 1. Periodically increase the hot water temperature to  $\geq 150^{\circ}\text{F}$  ( $\geq 66^{\circ}\text{C}$ ) at the point of use.<sup>661</sup> **Category II**
  - 2. Alternatively, chlorinate the water and then flush it through the system.<sup>661, 710, 711</sup> **Category II**
- D. Maintain constant recirculation in hot-water distribution systems serving patient-care areas.<sup>120</sup> **Category IC** (AIA: 7.31.E.3)

## III. Remediation Strategies for Distribution System Repair or Emergencies

- A. Whenever possible, disconnect the ice machine before planned water disruptions. **Category II**
- B. Prepare a contingency plan to estimate water demands for the entire facility in advance of significant water disruptions (i.e., those expected to result in extensive and heavy microbial or chemical contamination of the potable water), sewage intrusion, or flooding.<sup>713, 719</sup> **Category IC** (JCAHO: EC 1.4)
- C. When a significant water disruption or an emergency occurs, adhere to any advisory to boil water issued by the municipal water utility.<sup>642</sup> **Category IB, IC** (Municipal order)
  - 1. Alert patients, families, staff, and visitors not to consume water from drinking fountains, ice, or drinks made from municipal tap water, while the advisory is in effect, unless the water has been disinfected (e.g., by bringing to a rolling boil for  $\geq 1$  minute).<sup>642</sup> **Category IB, IC** (Municipal order)
  - 2. After the advisory is lifted, run faucets and drinking fountains at full flow for  $\geq 5$  minutes, or use high-temperature water flushing or chlorination.<sup>642, 661</sup> **Category IC, II** (Municipal order; ASHRAE 12:2000)
- D. Maintain a high level of surveillance for waterborne disease among patients after a boil water advisory is lifted. **Category II**