



April 11, 2011

Joint ASHE & APIC Statement on Recently Presented Electronic Faucet Research

The American Society for Healthcare Engineering (ASHE) and the Association for Professionals in Infection Control & Epidemiology (APIC) support and celebrate the presentation of new scientific evidence from professional organizations. On April 2, 2011, Dr. Sydnor and her colleagues at Johns Hopkins Health System presented an abstract, titled *Electronic-eye Faucets: Help or Hindrance to Infection Control and Prevention*, at the Society for Healthcare Epidemiology of America (SHEA) 2011 Annual Scientific Meeting in Dallas. In brief, this investigation found that 50 percent of cultures of water from 20 electronic, infrared-activated faucets revealed the presence of *Legionella* spp., compared with 15 percent of the cultures from 20 manual faucets. Water from the electronic fixtures also had a higher proportion of other bacteria, 26 percent as compared to 13 percent for the manual fixtures, but this is not a statistically significant difference.

Previous investigations of electronic controlled faucets have raised the issue of infection control and prevention. ASHE and APIC felt it would be helpful to offer health professionals some perspective on this latest study, especially as members of both organizations begin work in the second week of April 2011 on revision and updates to the Facility Guidelines Institute's *Guidelines for Design and Construction of Health Care Facilities*, moving toward a 2014 edition.

- 1) APIC and ASHE endorse and support the use of the Infection Control Risk Assessment (ICRA)—a multidisciplinary, documented assessment process intended to proactively identify and mitigate risks from infection that could occur during design and construction activities. A key element of an ICRA is identifying the design and location of hand-washing stations. Excerpts of the 2010 *Guidelines* that address this element are provided below. The *Guidelines* document has been adopted by authorities having jurisdiction (AHJs) that approve plans for design and construction of health care facilities in many states and is used as a reference standard in other states. The 2010 edition does permit electronic (sensor-activated) faucets as this design is consistent with “hands-free” operation. It is recommended that health care facilities implement an ICRA early in the planning phase of a construction or renovation project, when it serves as the forum for assessing risks and implementing design elements aimed at preventing of infection.
- 2) Several studies have found that manual, handle-operated faucets were the source of bacterial infections in patients, including *Legionella*.¹⁻⁵ This demonstrates there is no single design feature that can mitigate all risk of cross transmission. In fact, the findings from one of these studies were incorporated into the 2010 *Guidelines* (see excerpts below).³
- 3) Another study of electronic faucets did not find these fixtures to be a source of bacteria. In fact, a sample from a manual, handle-operated faucet was the only one that detected bacteria.⁶ Electronic faucets do help with water conservation, which is important as hospitals are an industry noted for high use of water.⁷ The hands-free feature of electronic faucets also lessens risk of recontamination of hands after washing as there is no need to manually turn off the water supply after use.
- 4) Why do some studies find a higher likelihood of recovery of bacteria from electronic faucets? This is a complex question, but some feel this is due to the reduced water flow in electronic faucets which makes the flushing effect less pronounced than in a manual, handle-operated faucet. One strategy to minimize risk of contaminants inside the faucet is to ensure the length of the pipes connecting the valve and water outlet is as short as possible. Also, the frequency of use is important. Faucets,

whether electronic or manual, that are not used on a regular basis will have stagnant water and low levels of bacteria will increase over time. There may also be some unique aspects to electronic faucets as they have more parts, including a magnetic valve made of rubber, plastic, and polyvinylchloride. These materials are more likely to develop a biofilm, which protects bacteria in the film from disinfectants that have been added to the water.

5) Sydnor ERM, et al. Abstract, SHEA 2011 Scientific Meeting:

- a) This study was presented in an oral session at a scientific meeting. It has not been published in a peer-reviewed, scientific journal. As such it is an interesting study, but any major changes in policy or actions by others should await publication. More details will be revealed in the published article, and peer review always improves the context and significance of findings. This study also needs to be considered in the context of other published studies and evidence-based guidelines.
- b) This was an in vitro investigation, in which cultures of water were obtained and studied. There were no infections seen in patients with the same bacteria, including *Legionella* spp., identified at the institution where this study took place. Tap water is not sterile and in most facilities contains low levels of bacteria; these bacteria are a possible source of infection to patients, but actual infections from this source are relatively infrequent in most facilities. Findings similar to those of this study are present in the literature; however, many of these are in vitro investigations that were not associated with infections in patients.⁷⁻¹²
- c) The trigger for this investigation was a disruption of the water supply from the municipal system that supplies this facility. Disruptions frequently result in disturbance of bacteria present in the pipes, often in a biofilm, that deliver water throughout a facility. This is usually a temporary situation. Restoration and dynamic flow of water will bring levels of bacteria back down to normal background concentration.
- d) Cultures of water in this study were “first draw,” meaning samples were obtained at the point when the sink water flow was initially activated. The concentration of microorganisms in these samples often is higher as the samples are pulled from water that has been stagnant in the neck of the faucet. Other studies have found that electronic faucets can be programmed to flush this water out each day and the levels of bacteria drop significantly with this step (personal communication, A. Streifel).
- e) The state in which this facility is located has published recommendations for control of *Legionella* spp. for water systems in health care facilities through routine cultures of water and periodic disinfection if the bacteria is identified. Other states do not have such guidance, nor does the Centers for Disease Control & Prevention (CDC) recommend routine testing of water for *Legionella* spp.

Excerpts from the FGI *Guidelines for Design and Construction of Health Care Facilities*, 2010 edition (additional details available at: <http://www.fgiguideines.org>):

****2.1-7.2.2.8 Hand-washing stations**

(1) General

- (a) Hand sanitation dispensers shall be provided in addition to hand-washing stations.
- (b) The number and placement of both hand-washing stations and hand sanitation dispensers [A unit that contains alcohol-based hand-washing rub (ABHR) or other FDA-approved solutions used for hand hygiene] shall be determined by the ICRA.

...

(4) Fittings

- (a) General hand-washing stations used by medical and nursing staff, patients, and food handlers shall be trimmed with valves that can be operated without hands.
 - (i) Single-lever or wrist blade devices shall be permitted.
 - (ii) Blade handles used for this purpose shall be at least 4 inches (10.2 centimeters) in length.
 - (iii) Care shall be taken in location and arrangement of fittings to provide the clearance required for operation of blade-type handles.
- (b) Sensor-regulated water fixtures shall meet user need for temperature and length of time the water flows. Electronic faucets shall be capable of functioning during loss of normal power.
- (c) Sensor-regulated faucets with manual temperature control shall be permitted...

***2.1-8.4.3.2 Hand-washing stations**

...

(2) Sinks

- *(a) Sinks in hand-washing stations shall be designed with deep basins to prevent splashing to areas where direct patient care is provided, particularly those surfaces where sterile procedures are performed and medications are prepared.
- (b) The area of the basin shall not be less than 144 square inches (365.76 square millimeters), with a minimum 9-inch (22.86-mm) width or length.
- (c) Hand-washing basins/countertops shall be made of porcelain, stainless steel, or solid surface materials. Basins shall be permitted to be set into plastic laminate countertops if, at a minimum, the substrate is marine-grade plywood (or equivalent) with an impervious seal.
- (d) Sinks shall have well-fitted and sealed basins to prevent water leaks onto or into cabinetry and wall spaces.
- (e) The discharge point of hand-washing sinks shall be at least 10 inches (25.40 centimeters) above the bottom of the basin.
- (f) The water pressure at the fixture shall be regulated.
- (g) Design of sinks shall not permit storage beneath the sink basin.”

References

1. Reuter S, et al. Analysis of transmission pathways of *Pseudomonas aeruginosa* between patients and tap water outlets. *Crit Care Med* 2002; 30:2222-8
2. Rogues AM, et al. Contribution of tap water to patient colonisation with *Pseudomonas aeruginosa* in a medical intensive care unit. *J Hosp Infect*. 2007 Sep;67(1):72-8
3. Hota S, et al. Outbreak of multidrug-resistant *Pseudomonas aeruginosa* colonization and infection secondary to imperfect intensive care unit room design. *Infect Control Hosp Epidemiol*. 2009 Jan;30(1):25-33.
4. Blanc DS, et al. Faucets as a reservoir of endemic *Pseudomonas aeruginosa* colonization/infections in intensive care units. *Intensive Care Med* (2004) 30:1964–1968
5. Brulet A, et al. Fatal Nosocomial *Legionella pneumophila* Infection Due to Exposure to Contaminated Water From a Washbasin in a Hematology Unit. *Infect Control Hosp Epidemiol* 2008;29:1091-93.
6. Assadian O, et al. Sensor-Operated Faucets: A Possible Source of Nosocomial Infection? *Infect Control Hosp Epidemiol* 2002;23:44-46.
7. Lorenzi N. Flow control. Trends in hospital plumbing fixtures and fittings. *Healthcare Facility Magazine*. Chicago, IL: AHA, January 2011.
8. Halabi M, Wiesholzer-Pittl M, Schoberl J, Mittermayer H. Non-touch fittings in hospitals: a possible source of *Pseudomonas aeruginosa* and *Legionella* spp. *J Hosp Infect* 2001;49:117-121.
9. Hargreaves J, Shireley L, Hansen S, et al. Bacterial contamination associated with electronic faucets: a new risk for healthcare facilities. *Infect Control Hosp Epidemiol* 2001;22:202-205.
10. Lepirat R, Denizot V, Bertrand X, Talon D. Non-touch fittings in hospitals: a possible source of *Pseudomonas aeruginosa* and *Legionella* spp. *J Hosp Infect* 2003;53:77.
11. Chaberny IF, et al. Should Electronic Faucets Be Recommended in Hospitals? *Infect Control Hosp Epidemiol* 2004;25:997-1000
12. Merrer J, et al. Should electronic faucets be used in intensive care and hematology units? *Intensive Care Med* (2005) 31:1715–1718