

useful while researchers continue to evaluate methods for reducing the risk of endoscope-related infection.

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**Kavel H. Visrodia, MD;¹ Cori L. Ofstead, MSPH,^{2,3}
Hannah L. Yellin, BA;² Harry P. Wetzler, MD, MSPH;²
Pritish K. Tosh, MD;³ Todd H. Baron, MD⁴**

Affiliations: 1. Department of Internal Medicine, Mayo Clinic, Rochester, Minnesota; 2. Ofstead and Associates, Saint Paul, Minnesota; 3. Division of Infectious Diseases, Mayo Clinic, Rochester, Minnesota; 4. Division of Gastroenterology and Hepatology, University of North Carolina School of Medicine, Chapel Hill, North Carolina.

Address correspondence to Cori L. Ofstead, MSPH, Ofstead and Associates, 400 Selby Avenue, Suite V, Blair Arcade West, Saint Paul, MN 55102 (cori@ofsteadinsights.com).

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Failure of a Hazard Analysis and Critical Control Point–Based Legionnaires' Disease Prevention Program: 2 Definite Nosocomial Cases Tell the Story

To the Editor—In a recent article by Krageschmidt et al,¹ it is surprising to read the authors' conclusion that the hazard analysis and critical control point (HACCP) method was an "effective" program for controlling Legionnaires' disease even though 2 confirmed nosocomial cases of Legionnaires' disease occurred during the study period while the HACCP approach was being followed. Irrespective of what number of cases might have been occurring before implementation of the HACCP approach (data not reported), the occurrence of 2 nosocomial cases in 2 years in the 2 study hospitals while the HACCP approach was used documents a failure to recognize source amplification and to stop subsequent disease transmission.

The inability to detect the etiologic source for 2 nosocomial cases raises questions about the validity of the environmental testing methods used to assess the overall success of the HACCP program. In particular, the environmental testing approach used by the authors may have been inadequately sensitive to detect the source of *Legionella* for these 2 cases. The testing methods as written in this study (only listed as previously described) are not detailed enough to determine

whether the proprietary rapid dip stick/slide test was relied on as the gold standard (as per reference 17 in the McCoy et al. article^{2,3}). The authors too easily explain away the occurrence of the nosocomial cases as being possibly attributed to viable but nonculturable *Legionella* and provide little to no discussion on study limitations and alternative explanations that are more plausible.

Given the alternate interpretation of the observations reported in this article, a more objective and critical review of the HACCP method (a process control system approach most commonly used in food production and processing settings) is warranted before it is recommended as a Legionnaires' disease prevention approach in nonprocess control settings, such as building water systems.

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Brian G. Shelton, MPH¹

Affiliation: 1. PathCon Laboratories, Norcross, Georgia.

Address correspondence to Brian G. Shelton, MPH, PathCon Laboratories, 270 Scientific Drive, Suite 3, Norcross, GA 30092 (bshelton@pathcon.com). *Infect Control Hosp Epidemiol* 2014;35(10):1310-1311

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Reply to Shelton

To the Editor—We disagree with Mr Shelton¹ that our water management program (WMP) failed and that use of the hazard analysis and critical control point (HACCP) method is inappropriate.

The 2 legionellosis cases discussed in our article² occurred while we were developing our WMP. The Minnesota Department of Health performed extensive independent envi-

ronmental sampling and analyses using the spread plate culture method; no *Legionella* were recovered in any of its tests from the facilities associated with these cases. This confirms that mandating actions in response to “trigger levels” or to arbitrary “percent positivity” scores, which are so often recommended by those who sell culture tests for profit, are to be not recommended. The precision and accuracy of results is not sufficient to support such specifications. In other words, taking action—or not—only on the basis of results from culturing building water samples is not scientifically defensible.

Our water management team (WMT) was in place, as is required by the HACCP system, and could therefore respond systematically to coordinate prevention efforts and use the data from clinical disease surveillance to further develop specifications in the WMP. Through this effort and within the context of developing the HACCP plan, we found *Legionella* in certain locations (eg, electronic “auto” faucets and within thermal expansion tanks) and identified insufficient disinfectant (chlorine) concentrations within the facility. The WMT used this hazard analysis to establish critical control points and control limits, monitoring, corrective actions, verification, and validation of the program.

No nosocomial disease cases have occurred since implementation of our WMP. However, if a nosocomial disease case associated with our facility water systems should occur, then in that hypothetical case, the WMT will be in place to coordinate prevention efforts, reassess the plan, and, if necessary, upgrade critical control limits. The HACCP system is a structured process to assess and respond to results from clinical disease surveillance and environmental sampling (validation). This aspect of HACCP is an important reason why the system has been so successful in the prevention of environmental-source disease and injury.

An aspect of HACCP that accounts for success in this application is that it is a practical, simple, and highly effective process management methodology. Typically, high-quality treated water enters the healthcare facility water system, where it is then processed. Water processing steps in buildings may include conditioning, filtering, heating, cooling, storing, pressure regulation, distributing, and recirculating the water. Processing water can affect its quality. Water quality can become degraded and potentially hazardous. Prevention of injury and disease depends on management of building water system processes. Although often similar, every building water system is unique in its water-processing configuration. HACCP adapted to building water system management is an ideal framework in this aspect.

With regard to the microbiological methods used in our article, the ISO 11731 spread plate method for *Legionella* was used, and results were reported for every sample. In addition, field culture “dipslide” samplers were used on site, and *Legionella*-specific polymerase chain reaction was performed on every sample. The field culturing sampler provided a reliable means to obtain *Legionella* results and total heterotrophic