

Concise Communication

Seasonality of healthcare-associated *Stenotrophomonas maltophilia*

Dianne B. Auld MT(ASCP), CLS¹, Phinnara Has MS² and Leonard A. Mermel DO, ScM, AM (Hon), FSHEA, FIDSA, FACP^{1,3} 

¹Department of Epidemiology and Infection Control, Lifespan Hospital System, Providence, Rhode Island, ²Biostatistics, Epidemiology and Research Design, Lifespan Hospital System, Providence, Rhode Island and ³Division of Infectious Diseases, Department of Medicine, Warren Alpert Medical School of Brown University, Providence, Rhode Island

Abstract

From April 1, 2016, through March 31, 2022, growth of *Stenotrophomonas maltophilia* from clinical specimens at our academic medical center was significantly more likely during July–September than during other calendar quarters.

(Received 30 June 2022; accepted 27 October 2022; electronically published 23 November 2022)

Gram-negative bacterial infections peak during summer months^{1,2} and a predominance of gram-negative infections is associated with proximity to the equator.³ A Belgian national cohort study of hospital-associated bloodstream infections reported that infections due to *Stenotrophomonas maltophilia* peaked during summer months.² Additionally, hospital-associated bloodstream infections due to *S. maltophilia* demonstrated the greatest seasonal variability compared with other bacteria. Based on these findings, we hypothesized that we would find a summer peak in isolation of *Stenotrophomonas maltophilia* from clinical specimens in our hospital.

Methods

This retrospective study included *S. maltophilia* isolated from clinical specimens at our tertiary-care, level 1 trauma center from April 1, 2016, through March 31, 2022. We defined *S. maltophilia* isolates as healthcare-associated if a clinical specimen was obtained from a patient >48 hours after hospital admission or within 48 hours of hospitalization if a patient had been previously admitted to our hospital over the prior 30 days. Only the first isolate was included in our analysis if a patient had >1 clinical specimens that grew *S. maltophilia*. Statistical methods included Poisson regressions to model the counts of quarterly hospital-acquired infections of *S. maltophilia*. All tests were 2-sided; $P < .05$ was considered statistically significant.

Results

Respiratory specimens accounted for 53 (69%) of 172 *S. maltophilia* isolates (Fig. 1). We detected a significant increase in *S. maltophilia* isolates from July through December (calendar

quarters 3 and 4) compared to January through June (calendar quarters 1 and 2; relative risk [RR], 1.85; 95% confidence interval [CI], 1.10–2.02; $P < .001$). The greatest peak was identified July through September: quarter 3 vs quarter 1: RR, 1.54 (95% CI, 1.01–2.36; $P = .046$); quarter 3 vs quarter 2: RR, 1.80 (95% CI, 1.15–2.81; $P = .01$); quarter 3 vs quarter 4: RR, 1.10 (95% CI, 0.75–1.62; $P = .62$). Otherwise, quarter 4 had a significantly higher peak than quarter 2 (RR, 1.63; 95% CI, 1.04–2.57; $P = .03$).

Discussion

We have demonstrated seasonality of *S. maltophilia* among clinical isolates at our medical center. We can only speculate as to why this is the case. The concentration of bacteria in potable water peaks during summer months, and the greatest degradation of water quality occurs after overnight stagnation of potable water during the summer.⁴ Additionally, a peak in the concentration of coliform bacteria in streams, rivers, and drinking wells has been documented during the summer months.⁵

Nonfermenting gram-negative bacteria such as *S. maltophilia* have been isolated from drinking water, and hospital outbreaks of *S. maltophilia* infections have been traced to tap water dispensed from faucets with aerators.⁶ It is unclear whether nonfermenting gram-negative bacteria such as *S. maltophilia* have a selection advantage based on the temperature, pH, and oxygen content that might be found in water sources during summer months.⁷ Our hospital has a continuous feed of monochloramine into our potable hot water in patient-care buildings to reduce the risk of hospital-acquired *Legionella* infections. Although a nonsignificant increase in the number of faucets and showerheads growing *S. maltophilia*⁸ and other nonfermenting gram-negative bacteria⁹ has been documented in hospitals with monochloramine potable water treatment, we were unable to identify any hospital outbreaks due to *S. maltophilia* associated with monochloramine water treatment. Various infection prevention strategies may be used to reduce risk of nosocomial infections due to *S. maltophilia* and other

Author for correspondence: Dr Leonard A. Mermel, E-mail lmermel@lifespan.org

Cite this article: Auld DB, Has P, and Mermel LA. (2023). Seasonality of healthcare-associated *Stenotrophomonas maltophilia*. *Infection Control & Hospital Epidemiology*, 44, 1500–1501, <https://doi.org/10.1017/ice.2022.280>



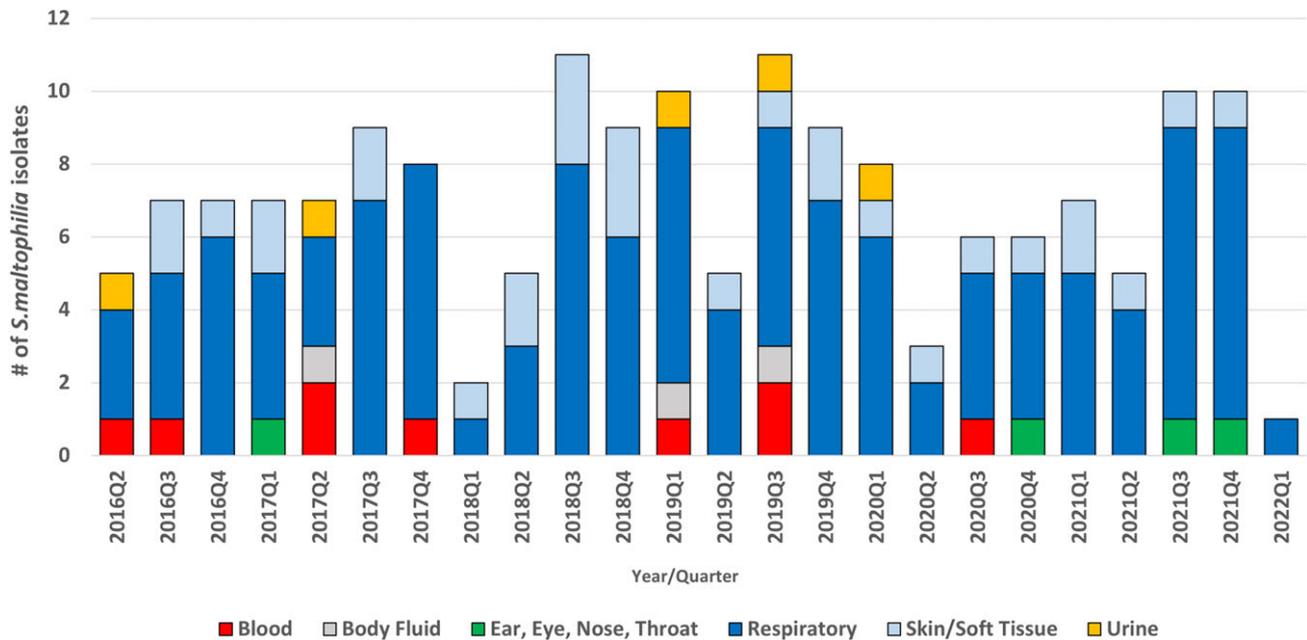


Fig. 1. Healthcare-associated *Stenotrophomonas maltophilia* clinical isolates, April 1, 2016–March 31, 2022.

nonfermenting gram-negative bacteria. These include minimizing tap water use, removing aerators from faucets, use of splash guards around sinks, and placement of point-of-use filters in high-risk areas among other interventions.¹⁰

Our study had several limitations. We included clinical isolates without medical record review, so we cannot be certain whether the isolates represented true infections, colonization, or possible contamination. Additionally, we were limited by a relatively small number of clinical isolates. The study was conducted at a single center, so these results may not be generalizable to other populations or settings. We did not do widespread testing of our hospital potable water to assess for the presence of *S. maltophilia*, which may have been epidemiologically linked to some of the clinical isolates.

In conclusion, we confirmed the seasonality of *S. maltophilia* isolated from clinical isolates with a significant peak observed from July through September. This finding may be due to changes in potable water composition during the summer months. Further research is needed to better understand the determinants driving seasonality of *S. maltophilia* and other nonfermenting gram-negative bacteria that may cause infections in healthcare settings. Additionally, the data presented herein, along with similar publications, should prompt discussion regarding potential seasonal adjustment for surveillance programs involving healthcare-associated infections caused by *S. maltophilia* and other pathogens that clearly display seasonality.

Acknowledgments.

Financial support. No financial support was provided relevant to this article.

Conflicts of interest. All authors report no conflicts of interest relevant to this article.

References

- Perencevich EN, McGregor JC, Shardell M, *et al.* Summer peaks in the incidences of gram-negative bacterial infection among hospitalized patients. *Infect Control Hosp Epidemiol* 2008;29:1124–1131.
- Blot K, Hammami N, Blot S, *et al.* Seasonal variation of hospital-acquired bloodstream infections: a national cohort study. *Infect Control Hosp Epidemiol* 2022;43:205–211.
- Fisman D, Patrozou E, Carmeli Y, *et al.* Geographical variability in the likelihood of bloodstream infections due to gram-negative bacteria: correlation with proximity to the equator and health care expenditure. *PLoS One* 2014;9:e114548.
- Zhang H, Xu L, Huang T, *et al.* Combined effects of seasonality and stagnation on tap water quality: changes in chemical parameters, metabolic activity and coexistence in bacterial community. *J Hazard Mater* 2021;403:124018.
- Atherholt TB, Procopio NA, Goodrow SM. Seasonality of coliform bacteria detection rates in New Jersey domestic wells. *Ground Water* 2017;55:346–361.
- Verweij PE, Meis JFGM, Christmann V, *et al.* Nosocomial outbreak of colonization and infection with *Stenotrophomonas maltophilia* in preterm infants associated with contaminated tap water. *Epidemiol Infect* 1998;120:251–256.
- Bonaventura GD, Stepanovic S, Picciani C, *et al.* Effect of environmental factors on biofilm formation by clinical *Stenotrophomonas maltophilia* isolates. *Folia Microbiol* 2007;1:86–90.
- Duda S, Kandiah S, Stout J, *et al.* Evaluation of a new monochloramine generation system for controlling legionella in building hot water systems. *Infect Control Hosp Epidemiol* 2014;35:1356–1363.
- Baron JL, Vikram A, Duda S, Stout JE, Bibby K. Shift in the microbial ecology of a hospital hot water system following the introduction of an on-site monochloramine disinfection system. *PLoS One* 2014;9:e102679.
- Reduce risk from water: from plumbing to patients. Centers for Disease Control and Prevention website. <https://www.cdc.gov/hai/prevent/environment/water.html>. Published September 11, 2019. Accessed August 23, 2022.