

Infection Control Hospital Epidemiology





AUGUST 2021

Cambridge Core

Access leading journals in your subject

Explore today at cambridge.org/core





Cover image: The Wu Lien Teh Memorial Museum in Harbin, China (https://wulienteh.com/1453/

Volume 42

2021

CONTENTS

Original Articles

- COVID-19 symptoms, duration, and prevalence among healthcare workers in the New York 917 metropolitan area Fran A. Ganz-Lord, Kathryn R. Segal and Michael L. Rinke
- 924 Epidemiological and clinical characteristics of severe acute respiratory coronavirus virus 2 (SARS-CoV-2) infection among healthcare workers in Hubei Province, China Mingyang Wu, Cong Xie, Ran Wu, Yanling Shu, Lulin Wang, Mingyan Li and Youjie Wang
- 931 The effect of type of ventilation used in the operating room and surgical site infection: A meta-analysis Jian Bao and Jianhua Li
- The impact of a multimodel approach to designing a new orthopedic department 937 Elad Keren, Abraham Borer, Lior Nesher, Tali Shafat, Rivka Yosipovich, Ronit Nativ, Orly Shimoni, Orli Sagi, Lilia Greenshpoon and Lisa Saidel-Odes
- 943 Antibiotic utilization variability among training services at an academic medical center: An observational study Katherine A. Cinnamon, Lucas T Schulz, Ann M. Sheehy, Sean M. O'Neill, Edward Lalik III and Barry C. Fox
- 948 Hospital-acquired *Clostridioides difficile* infection among patients at an urban safety-net hospital in Philadelphia: Demographics, neighborhood deprivation, and the transferability of national statistics Daniel T. Vader, Chelsea Weldie, Seth L. Welles, Michele A. Kutzler and Neal D. Goldstein
- 955 Comorbidity and severity-of-illness risk adjustment for hospital-onset *Clostridioides difficile* infection using data from the electronic medical record Stephanie M. Cabral, Katherine E. Goodman, Natalia Blanco, Surbhi Leekha, Larry S. Magder, Gita Nadimpalli, Lisa Pineles, Kerri A. Thom and Anthony D. Harris
- 962 Carbapenem-resistant Enterobacterales bacteriuria and subsequent bacteremia: A population-based study Jessica R. Howard-Anderson, Chris W. Bower, Gillian Smith, Mary Elizabeth Sexton, Monica M. Farley, Sarah W. Satola and Jesse T. Jacob
- 968 Risk factors for carbapenemase-producing organisms among inpatients in Scotland: A national matched case-control study

Number 8

978 Clinical consequences of contaminated blood cultures in adult hospitalized patients at an institution utilizing a rapid blood-culture identification system *Sidra Liaquat, Lorena Baccaglini, Gleb Haynatzki, Sharon J. Medcalf and Mark E. Rupp*

Commentaries

985 SHEA Pediatric Leadership Council commentary: Supporting well child care during the coronavirus disease 2019 (COVID-19) pandemic with personal protective equipment in the ambulatory setting *Joshua K. Schaffzin, Allison H. Bartlett, Latania K. Logan, Judith A. Guzman-Cottrill, Carolyn Caughell, Karen A. Ravin, Lorry G. Rubin, Larry K. Kociolek, Martha L. Muller, Jason Lake, and Lynn Ramirez-Avila for the SHEA Pediatric Leadership Council*

- **989** Caution, not causality: The limitations of risk factor and outcome research on ventilator-associated events *Kelly A. Cawcutt and Trevor C. Van Schooneveld*
- **991** Nonventilator hospital-acquired pneumonia: A call to action Shannon C. Munro, Dian Baker, Karen K. Giuliano, Sheila C. Sullivan, Judith Haber, Barbara E. Jones, Matthew B. Crist, Richard E. Nelson, Evan Carey, Olivia Lounsbury, Michelle Lucatorto, Ryan Miller, Brian Pauley and Michael Klompas

Concise Communications

997 The impact of coronavirus disease 2019 (COVID-19) response on central-line–associated bloodstream infections and blood culture contamination rates at a tertiary-care center in the Greater Detroit area *Jennifer LeRose, Avnish Sandhu, Jordan Polistico, Joe Ellsworth, Mara Cranis, Lavina Jabbo, Lori Cullen, Judy Moshos, Lobelia Samavati and Teena Chopra*

1001 Sensitivity of midturbinate versus nasopharyngeal swabs for the detection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)
 Alainna J. Jamal, Mohammad Mozafarihashjin, Eric Coomes, Sofia Anceva-Sami, Shiva Barati, Gloria Crowl, Amna Faheem, Lubna Farooqi, Christopher E.Kandel, Saman Khan, Angel X. Li, Henna Mistry, Aimee Paterson, Simon Plenderleith, Karren Prost, Susan Poutanen, Jeff Powis, Renée Schryer, Maureen Taylor, Lily Yip, Xi Zoe Zhong, Allison J. McGeer, Samira Mubareka and for the Toronto Invasive Bacterial Diseases Network COVID-19 Investigators

1004 Impact of on-site compared to off-site testing for severe acute respiratory coronavirus virus 2 (SARS-CoV-2) on duration of isolation and resource utilization Andrew T. Roberts, Gabriella Wong, Despina Kotsanas, Michelle J. Francis, Rhonda L. Stuart, Maryza Graham and Benjamin A. Rogers

1007 The impact of coronavirus disease 2019 (COVID-19) on provider use of electronic hand hygiene monitoring technology
 Olivia C. R. Hess, Jo Dee Armstrong-Novak, Michelle Doll, Kaila Cooper, Pamela Bailey,
 Emily Godbout, Michael P. Stevens and Gonzalo Bearman

1010 Diagnostic and antimicrobial stewardship with molecular respiratory testing across the SHEA Research Network *Kimberly C. Claeys, Daniel J. Morgan, Surbhi Leekha and Kaede V. Sullivan*

Research Brief

- **1014** Removal of SARS-CoV-2 bioaerosols using ultraviolet air filtration *Roy E. Barnewall and Werner E. Bischoff*
- 1016 Pseudo-outbreak of adenovirus in bronchoscopy suite Jessica L. Seidelman, Ibukunoluwa C. Akinboyo, Bonnie Taylor, Nancy G. Henshaw, Anfal Abdelgadir, Gregory C. Gray, Becky A. Smith and Sarah S. Lewis
- 1018 Long-term care facility residents with methicillin-resistant *Staphylococcus aureus* (MRSA) carriage disseminate MRSA and viral surrogate markers to surfaces outside their rooms *Daniel F. Li, Natalia C. Pinto-Herrera, Heba Alhmidi, Jennifer L. Cadnum, Sandra Y. Silva and Curtis J. Donskey*

Letters to the Editor

1020 "It's like fighting a war with rocks": Nursing home healthcare workers' experiences during the COVID-19 pandemic Sandhya Seshadri, Cathleen Concannon, Jane A. Woods, Kathryn M. McCullough and Ghinwa K. Dumyati

- 1022 When should a patient with prior COVID-19 infection be placed in isolation precautions if readmitted months later? Leonard A. Mermel
- 1023 Retesting for severe acute respiratory coronavirus virus 2 (SARS-CoV-2): Patterns of testing from a large US healthcare system
 Amy J. Kennedy, Mary K. Hilmes, Linda Waddell, Alexandrea B. Bartow, Carla M. Baxter,
 Christiane M. Hadi, Graham M. Snyder and Jessica S. Merlin
- 1025 Lack of nosocomial transmission to exposed inpatients and coworkers in an investigation of five SARS-CoV-2–infected healthcare workers *Kwadwo Mponponsuo, Geneviève Kerkerian, Ranjani Somayaji, Bayan Missaghi, Joseph V. Vayalumkal, Oscar E. Larios, Byron M. Berenger, Matt Lauzon, Nicole McDonnell and John Conly*
- 1027 Practice and exploration of 24-hour supervision model in personal protection supervision in a COVID-19 isolation ward
 Shaxi Li, Yinsheng Guo, Yanqun Zheng, Lin Lei, Xianhu Zeng, Jing Cao, Min Wen, Yingxia Liu and Ting Huang
- **1028** Frequency of facial touching in patients with suspected COVID-19 during their time in the waiting room *Eduardo Perez-Alba, Laura Nuzzolo-Shihadeh, Alejandro Fonseca-Ruiz, Gloria Mayela Aguirre-García, Marco Antonio Hernández-Guedea, Edelmiro Perez-Rodriguez and Adrián Camacho-Ortiz*

INFECTION CONTROL & HOSPITAL EPIDEMIOLOGY

An Official Publication of the Society for Healthcare Epidemiology of America

EDITOR

Suzanne F. Bradley, MD • Ann Arbor, MI

DEPUTY EDITOR Carol Chenoweth, MD • Ann Arbor, MI

ASSOCIATE EDITORS

David P. Calfee, MD, MS • New York, NY Lindsay E. Nicolle, MD • Winnipeg, Manitoba Trevor C. Van Schooneveld, MD • Omaha, NE David Weber, MD, MPH • Chapel Hill, NC

STATISTICS CONSULTANTS

Jon P. Furuno, PhD • Portland, OR Jessina C. McGregor, PhD • Portland, OR

MANAGING EDITOR

Lindsay MacMurray • New York, NY

PAST EDITORS

Infection Control • Portland, OR Richard P. Wenzel, MD, 1980-1987 (vols. 1-8) Infection Control & Hospital Epidemiology Richard P. Wenzel, MD, 1988-1992 (vols. 9-13) Michael D. Decker, MD. 1993-2001 (vols. 14-22) Barry M. Farr, MD, 2002-2004 (vols. 23-25) William R. Jarvis, MD, 2005-2006 (vols. 26 and 27)

EDITORIAL ADVISORY BOARD

Deverick Anderson, MD, MPH • Durham, NC Anucha Apisarnthanarak, MD • Pratumthani, Thailand-Lennox Archibald, MD, FRCP • Alachua, FL Shailen Banerjee, PhD • Atlanta, GA

Elise M. Beltrami, MD, MPH • Atlanta, GA Jo Anne Bennett, RN, PhD • New York, NY David Birnbaum, PhD, MPH • Sidney, BC Marc Bonten, MD • Utrecht, Netherlands Christian Brun-Buisson, MD • Creteil, France John P. Burke, MD • Salt Lake City, UT Yehuda Carmeli, MD, MPH • Tel Aviv, Israel Donald E. Craven, MD • Burlington, MA Christopher Crnich, MD, MS • Madison, WI Erika D'Agata, MD, MPH • Boston, MA Daniel Diekema, MD • Iowa City, IA Erik Dubberke, MD, MSPH • St. Louis, MO Charles E. Edmiston, Jr., PhD • Milwaukee, WI Mohamad Fakih, MD, MPH • Grosse Pointe Woods, MI Petra Gastmeier, MD • Berlin, Germany Jeffrey Gerber, MD, PhD • Philadelphia, PA Dale N. Gerding, MD • Hines, IL Donald A. Goldmann, MD • Boston, MA Nicholas Graves, PhD • Brisbane, Australia Donna Haiduven, RN, PhD, CIC • Tampa, FL Anthony D. Harris, MD, MPH • Baltimore, MD Elizabeth Henderson. PhD • Calgary, AB David K. Henderson, MD • Bethesda, MD Loreen A. Herwaldt, MD • Iowa City, IA Peter N. R. Heseltine, MD • Brea, CA John A. Jernigan, MD, MS • Atlanta, GA Mini Kamboj, MD • New York, NY Carol A. Kauffman, MD • Ann Arbor, MI James T. Lee, MD, PhD • St. Paul, MN

L. Clifford McDonald, MD • Atlanta, GA Allison McGeer, MD • Toronto. ON Leonard A. Mermel, DO, ScM • Providence, RI Robert R. Muder, MD • Pittsburgh, PA Linda Mundy, MD • Collegeville, PA Joseph M. Mylotte, MD, CIC • Buffalo, NY Jan Evans Patterson, MD • San Antonio, TX David A. Pegues, MD • Philadelphia, PA Didier Pittet, MD, MS • Geneva, Switzerland Isaam Raad, MD • Houston, TX Manfred L. Rotter, MD, DipBact • Vienna, Austria William A. Rutala, PhD, MPH • Chapel Hill, NC Lisa Saiman, MD, MPH • New York, NY Sanjay Saint, MD, MPH • Ann Arbor, MI Sorana Segal-Maurer, MD • Flushing, NY Lynne M. Sehulster, PhD • Atlanta, GA John A. Sellick, DO • Amherst, NY Andrew E. Simor, MD • Toronto, ON Philip W. Smith, MD • Omaha, NE Kurt Stevenson, MD, MPH • Columbus, OH Nimalie Stone, MD • Atlanta, GA Thomas Talbot, MD, MPH • Nashville, TN Paul Tambyah, MBBS • Singapore William Trick, MD • Chicago, IL Antoni Trilla, MD. PhD • Barcelona, Spain Robert A. Weinstein, MD • Chicago, IL Andreas Widmer, MD, MS • Basel, Switzerland Marcus Zervos, MD • Detroit, MI

Infection Control & Hospital Epidemiology (ISSN 0899-823X) is published monthly by Cambridge University Press, One Liberty Plaza, New York, NY 10006, USA.

Editorial Office

Communications should be addressed to the Editor, *Infection Control & Hospital Epidemiology*, One Liberty Plaza, New York, NY 10006 (email: iche.managingeditor@cambridge.org. Contributors should consult the Instructions for Contributors, which is available at the journal's Web site.

Advertising

Please direct advertising inquiries to M. J. Mrvica Associates, 2 West Taunton Avenue, Berlin, NJ 08009 (e-mail: mjmrvica@mrvica.com; telephone: 856-768-9360, fax: 856-753-0064). Publication of an advertisement in *Infection Control & Hospital Epidemiology* does not imply endorsement of its claims by the Society for Healthcare Epidemiology of America, by the Editor, or by Cambridge University Press.

Permissions

Articles may be copied or otherwise reused without permission only to the extent permitted by Sections 107 and 108 of the US Copyright Law. Permission to copy articles for personal, internal, classroom, or library use may be obtained from the Copyright Clearance Center (http://www.copyright.com, email: info@copyright.com). For all other uses, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale, please contact Cambridge University Press. Full details may be found at: www.cambridge.org/about-us/rights-permissions.

Subscriptions

The individual subscription rate for 2021 is \$296. Individuals have the option to order directly from Cambridge University Press. Institutional print + electronic and e-only subscriptions are available from Cambridge University Press and include unlimited online access; rates are tiered according to an institution's type and research output and may be reviewed at the journal's homepage on Cambridge Core: cambridge.org/ICHE.

Please direct subscription inquiries and requests for back issues to Customer Services at Cambridge University Press, e-mail: subscriptions_newyork@ cambridge.org (USA, Canada, and Mexico) or journals@cambridge.org (outside of USA, Canada, and Mexico).

Postmaster: Send address changes to *Infection Control & Hospital Epidemiology*, Cambridge University Press, One Liberty Plaza, New York, NY 10006 USA.

About the cover:



Starting in 2015, the cover format of each volume of Infection Control and Hospital Epidemiology will be changed in order to honor one of the many professionals throughout history who not only recognized how disease might be spread, but also how those principles could be applied to reduce healthcare associated infections.

Wu Lien-teh, M.D., MPH was born Gnoh Lean Tuck in Malaysia in 1879. His father, who was Chinese, immigrated to Penang to work as a goldsmith. In 1896, Wu won the Queen's Scholarship allowing him to enroll at Emmanuel College in Cambridge University. After training at St. Mary's Hospital in London, Wu pursued research at the Liverpool School of Tropical Medicine, the Pasteur Institute, and the Bacteriological Institute of Halle in the fields of bacteriology, malaria, and tetanus. By the age of 24, Dr. Wu was the first student of Chinese descent to graduate from Cambridge with a medical degree.

Dr. Wu returned to Malaysia in 1903, to find that there were no posts in the Medical Service for non-British specialists. After a brief time studying beri-beri, he returned to Penang to establish

a medical practice. He advocated for the abolition of gambling, spirits and opium which impacted local government coffers. Wu soon found himself to be in possession of an ounce of opium for which he was prosecuted. In 1907, Wu left Malaysia to accept an invitation to serve as the Vice-Director of Imperial Army Medical College in Tientsin, China.

In 1910, an outbreak of a rapidly fatal respiratory disease occurred in the Chinese-Russian town of Harbin in Manchuria. The outbreak began amongst 10,000 hunters who stayed in crowded inns; they sought marmots for their pelts which, when appropriately dyed, could pass for sable. Wu, being conversant in French and German, was dispatched to work with foreign medical officers. No one had seen pneumonic plague in recent memory, but Dr. Wu strongly suspected the diagnosis and had to overcome Chinese prohibitions against performing postmortems to prove it. With his direction, travel was restricted, plague hospitals were built and the symptomatic isolated, their homes were disinfected, and asymptomatic contacts were identified and quarantined in freight cars. Bodies that could not be buried in the frozen soil were cremated contrary to the teachings of Confucianism. Everyone was encouraged to wear anti-plague masks, the forerunner of the N95 mask. One senior physician who notably refused to wear a mask died of the disease. By the Lunar New Year in 1911, the outbreak had ceased; 60,000 inhabitants had died.

Dr. Wu was nominated for the Nobel Prize for his work as a plague fighter; he directed the National Quarantine Service and was the first president of the China Medical Society. He also championed the modernization of Chinese Medical and Public Health Systems. After the Japanese occupation of China in 1937, he returned to Malaysia where he practiced medicine until retirement at the age of 80. Dr. Wu Lien-teh died on January 20, 1960 following a stroke.

Cover image: The Wu Lien Teh Memorial Museum in Harbin, China (https://wulienteh.com/1453/dr-wu-lien-teh-memorial-museum/).