

Infection Control Hospital Epidemiology

Volume 42. No 6



JUNE 2021







877.255.9472

CSAD 0023 200825

www.teeclean.com

Volume 42 2021 Number 6

CONTENTS

Original Articles

Navigating hospitals safely through the COVID-19 epidemic tide: Predicting case load for adjusting bed capacity

Tjibbe Donker, Fabian M. Bürkin, Martin Wolkewitz, Christian Haverkamp, Dominic Christoffel,

Oliver Kappert, Thorsten Hammer, Hans-Jörg Busch, Paul Biever, Johannes Kalbhenn, Hartmut Bürkle, Winfried V. Kern, Frederik Wenz and Hajo Grundmann

- 659 Understanding viral shedding of severe acute respiratory coronavirus virus 2 (SARS-CoV-2): Review of current literature
 Lauren M. Fontana, Angela Holly Villamagna, Monica K. Sikka and Jessina C. McGregor
- 669 Environmental contamination in a coronavirus disease 2019 (COVID-19) intensive care unit—What is the risk?

 Sean Wei Xiang Ong, Pei Hua Lee, Yian Kim Tan, Li Min Ling, Benjamin Choon Heng Ho, Ching Ging Ng, Dong Ling Wang, Boon Huan Tan, Yee-Sin Leo, Oon-Tek Ng, Michelle Su Yen Wong and Kalisvar Marimuthu
- 678 Scalable in-hospital decontamination of N95 filtering face-piece respirator with a peracetic acid room disinfection system

 Amrita R. John, Shine Raju, Jennifer L. Cadnum, Kipum Lee, Phillip McClellan, Ozan Akkus, Sharon K. Miller, Wayne D. Jennings, Joy A. Buehler, Daniel F. Li, Sarah N. Redmond, Melissa Braskie, Claudia K. Hoyen and Curtis J. Donskey
- 688 Novel method of calculating adjusted antibiotic use by microbiological burden Hana R. Winders, Majdi N. Al-Hasan, Bruce M. Jones, Darrell T. Childress, Kayla R. Stover, Benjamin B. Britt, Elias B. Chahine, Suetping Lau, Pamela D. Andrews, Shauna Jacobson Junco, Rebekah H. Wrenn, Brad J. Crane, Jordan R. Wong, Megan M. Seddon, Christopher M. Bland, Shawn H. MacVane, Geneen M. Gibson, P. Brandon Bookstaver on behalf of SERGE-45 investigators
- Evaluation of antibiotic prescribing in emergency departments and urgent care centers across the Veterans' Health Administration

 James L. Lowery, Bruce Alexander, Rajeshwari Nair, Brett H. Heintz and Daniel J. Livorsi
- 702 Perioperative antimicrobial prophylaxis in adult patients: The first multicenter clinical practice audit with intervention in Greek surgical departments

 Elisavet Chorafa, Elias Iosifidis, Sotirios Tsiodras, Athanasios Skoutelis, Eleni Kourkouni, Ioannis Kopsidas, Grammatiki-Christina Tsopela, Evangelia Chorianopoulou, Christos Triantafyllou, Georgia Kourlaba, Theoklis Zaoutis and Emmanuel Roilides for the Preventing Hospital-Acquired Infections in Greece (PHiG) investigators
- 710 Investigating the impact of a β-lactam allergy label on preoperative antibiotic prophylaxis administration *Cynthia T. Nguyen, Kerilyn Petrucci, Ellen Daily, Amanda M. Brown, Natasha N. Pettit and Jennifer Pisano*

Outcomes of an ambulatory care pharmacist-led antimicrobial stewardship program within a family medicine resident clinic

Lindsey R. Westerhof, Lisa E. Dumkow, Tarajo L. Hanrahan, Samantha V. McPharlin and Nnaemeka E. Egwuatu

- 722 Colonization of carbapenem-resistant *Klebsiella pneumoniae* in a sink-drain model biofilm system *Maria Burgos-Garay, Christine Ganim, Tom J.B. de Man, Terri Davy, Amy J. Mathers, Shireen Kotay, Jonathan Daniels, K. Allison Perry, Erin Breaker and Rodney M. Donlan*
- 731 Degree of concordance of *Clostridioides difficile* strains in adults with community-associated *C. difficile* infection and infants with *C. difficile* colonization

 Jason A. Clayton, Jennifer L. Cadnum, Shelly Senders, Chetan Jinadatha, Piyali Chatterjee,

 Hosoon Choi, Yonhui Allton, Curtis J. Donskey and Philip Toltzis

Commentaries

- 737 Asymptomatic bacterisputia: Rethinking diagnostic stewardship in pneumonia Owen R. Albin, Jason M. Pogue, Lindsay A. Petty and Keith S. Kaye
- 740 Stethoscope hygiene: A call to action. Recommendations to update the CDC guidelines Sarathi Kalra, Alpesh Amin, Nancy Albert, Cindy Cadwell, Cole Edmonson, Robert Gaynes, Mary Hand, Mark Marinella, Colleen Morely, Sandra Sieck and Rajiv S. Vasudevan

Concise Communications

- 743 Feasibility and impact of inverted classroom methodology for coronavirus disease 2019 (COVID-19) pandemic preparedness at an urban community hospital Alfredo J. Mena Lora, Mirza Ali, Candice Krill, Scott A. Borgetti, Sherrie Spencer, Romeen Lavani, Eden Takhsh and Susan C. Bleasdale
- 746 A survey of preparedness against coronavirus disease 2019 (COVID-19) in hospitals in Tokyo, Japan, with healthcare personnel with COVID-19 and in-facility transmission *Yasuaki Tagashira, Akane Takamatsu, Shinya Hasegawa, Yuki Uenoyama and Hitoshi Honda*
- 751 Inpatient antibiotic utilization in the Veterans' Health Administration during the coronavirus disease 2019 (COVID-19) pandemic

 Thomas D. Dieringer, Daisuke Furukawa, Christopher J. Graber, Vanessa W. Stevens, Makoto M. Jones,

 Michael A. Rubin and Matthew Bidwell Goetz
- 754 The epidemiology of carbapenem resistant *Enterobacter* spp: A case–case–control matched analysis *Leore Cohen Mendel, Keren Amity, David E. Katz, Tsilia Lazarovitch, Ronit Zaidenstein and Dror Marchaim*
- 760 Association between level of care and colonization with resistant gram-negative bacteria among nursing-home residents

 Timileyin Y Adediran, Kinjal N Sethuraman, Surbhi Leekha and Mary-Claire Roghmann

- 763 Risk factors for the development of infections associated with carbapenemase-producing *Enterobacteriaceae* among previously colonized patients: A retrospective cohort study

 Adriana Jimenez, Kristopher Fennie, L. Silvia Munoz-Price, Boubakari Ibrahimou, Lilian M. Abbo,

 Octavio Martinez, Kathleen Sposato, Yohei Doi and Mary Jo Trepka
- 767 Clinical implications of restrictions in criteria for defining surgical site infections after mastectomy *Antoinette A. A. Bediako-Bowan, David K. Warren, Katelin B. Nickel, Victoria J. Fraser and Margaret A. Olsen*

Research Briefs

- 770 Elevated secondary infection rates in patients with coronavirus disease 2019 (COVID-19) requiring extracorporeal membrane oxygenation *Joseph E. Marcus, Valerie G. Sams and Alice E. Barsoumian*
- 772 Predictors for in-hospital mortality from coronavirus disease 2019 (COVID-19) infection among adults aged 18–65 years

 Ashish Bhargava, Mamta Sharma, Elisa Akagi, Susanna M. Szpunar and Louis Saravolatz
- 775 Coronavirus disease 2019 vaccine hesitancy among children's hospital staff: A single-center survey *Larry K. Kociolek, Jenny Elhadary, Ravi Jhaveri, Ami B. Patel, Brian Stahulak and Jenifer Cartland*

Letters to the Editor

- 778 Identifying community spread of COVID-19 via a free drive-through screening event *Marci L. Drees, Mia A. Papas, Terri E. Corbo, Kimberly D. Williams and Sharon T. Kurfuerst*
- 780 The role of multidisciplinary infection prevention teams in identifying community transmission of SARS-CoV-2 in the United States

 Scott J. Crabtree and Stuart H. Cohen
- 781 Surveillance for probable COVID-19 using structured data in the electronic medical record Patrick C. Burke, Rachel Benish Shirley, Matthew Faiman, Eric W. Boose, Robert W. Jones Jr, Amy Merlino, Steven M. Gordon and Thomas G. Fraser
- 783 Coordinated outreach for veterans in long-term care facilities by an integrated Veterans Affairs healthcare system during the COVID-19 pandemic

 *Alexander Winnett, Lauren P. Jatt, Linda Sohn, Marcia Lysaght, Thomas Yoshikawa, Steven R. Simon, Christopher J. Graber and Matthew Bidwell Goetz
- 784 Are we forgetting the "universal" in universal masking? Current challenges and future solutions Sonali D. Advani, Michael E. Yarrington, Becky A. Smith, Deverick J. Anderson and Daniel J. Sexton
- 786 Personal protective equipment: Shortage or waste?

 Dayana Souza Fram, Daniela Vieira da Silva Escudero, Luciana de Oliveira Matias, Wanderson Eduardo Gomes de Souza Coelho, Thaysa Sobral Antonelli, Diogo Boldim Ferreira and Eduardo Alexandrino Medeiros

- 787 Impact of COVID-19 second wave on healthcare worker staffing levels *Ala Abuown, Catharine Taube and Louis J. Koizia*
- 788 Novel transportation capsule technology could reduce the exposure risk to SARS-CoV-2 infection among healthcare workers: A feasibility study

 Basel Almuabbadi, Huda Mhawish, Bobby Marasigan, Alva Alcazar, Zahraa Alfrdan, Nasir Nasim,

 Abdulrahman Alharthy, Ziad A. Memish and Dimitrios Karakitsos
- **789** COVID-19 and ophthalmology: An underappreciated occupational hazard *Anadi Khatri, Muna Kharel, Babu Dhanendra Chaurasiya, Ashma K.C. and Bal Kumar Khatri*
- **790** Timing of surgery after recovery from coronavirus disease 2019 (COVID-19) infection *Rama Thyagarajan and Kristin Mondy*
- 791 Forewarned but not forearmed: The risk of science driven by immediacy *Daniel Moreno Soto and Walter D. Cardona Maya*
- 793 Occupational exposure to varicella zoster in a tertiary-care healthcare setting Zachary A. Yetmar, Debra K. Apenhorst, Melanie D. Swift, Priya Sampathkumar and Elena Beam

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/).