

Infection Control & Hospital Epidemiology

Volume 43, No 1
Jan 2022

ICHE



Artist: Lona Mody


SHEA
The Society for Healthcare
Epidemiology of America



CAMBRIDGE
UNIVERSITY PRESS



SHEA SPRING



SCIENCE GUIDING PREVENTION

April 12-14, 2022



SHEA
The Society for Healthcare
Epidemiology of America

[SHEASpring.org](https://www.sheaspring.org) | [#SHEASpring2022](https://twitter.com/SHEASpring2022)

CONTENTS

Commentary

- 1 Reflecting on the past and looking toward the future
David P. Calfee

SHEA White Paper

- 3 Multisociety statement on coronavirus disease 2019 (COVID-19) vaccination as a condition of employment for healthcare personnel
David J. Weber, Jaffar A. Al-Tawfiq, Hilary M. Babcock, Kristina Bryant, Marci Drees, Ramy Elshaboury, Katharine Essick, Mohamad Fakh, David K. Henderson, Waleed Javaid, Diane Juffras, Robin L.P. Jump, Francesca Lee, Anurag N. Malani, Trini A. Mathew, Rekha K. Murthy, David Nace, Tara O'Shea, Erica Pettigrew, Ann Marie Pettis, Joshua K. Schaffzin, Erica S. Shenoy, Julie Vaishampayan, Zanthia Wiley, Sharon B. Wright, Deborah Yokoe and Heather Young

Original Articles

- 12 The impact of coronavirus disease 2019 (COVID-19) on healthcare-associated infections in 2020: A summary of data reported to the National Healthcare Safety Network
Lindsey M. Weiner-Lastinger, Vaishnavi Pattabiraman, Rebecca Y. Konnor, Prachi R. Patel, Emily Wong, Sunny Y. Xu, Brittany Smith, Jonathan R. Edwards and Margaret A. Dudeck
- 26 Coronavirus disease 2019 (COVID-19) pandemic, central-line-associated bloodstream infection (CLABSI), and catheter-associated urinary tract infection (CAUTI): The urgent need to refocus on hardwiring prevention efforts
Mohamad G. Fakh, Angelo Bufalino, Lisa Sturm, Ren-Huai Huang, Allison Ottenbacher, Karl Saake, Angela Winegar, Richard Fogel and Joseph Cacchione
- 32 Impact of coronavirus disease 2019 (COVID-19) on US Hospitals and Patients, April–July 2020
Mathew R. P. Sapiano, Margaret A. Dudeck, Minn Soe, Jonathan R. Edwards, Erin N. O'Leary, Hsiu Wu, Katherine Allen-Bridson, Agasha Amor, Rashad Arcement, Sheri Chernetsky Tejedor, Ray Dantes, Cindy Gross, Kathryn Haass, Rebecca Konnor, Seth R. Kroop, Denise Leaptrot, Kent Lemoine, Allan Nkwata, Kelly Peterson, Lauren Wattenmaker, Lindsey M. Weiner-Lastinger, Daniel Pollock, Andrea L. Benin and the NHSN Hospital COVID-19 Team
- 40 Rationale and process for N95 respirator sanitation and reuse in the coronavirus disease 2019 (COVID-19) pandemic
Gregory J. Golladay, Kevin A. Leslie, Wilhelm A. Zuelzer, Anthony D. Cassano, Joshua J. Plauny, Frank E. Daniels, Gonzalo Bearman and Stephen L. Kates
- 45 Hydrogen peroxide vapor decontamination of N95 respirators for reuse
Patrick A. Kenney, Benjamin K. Chan, Kaitlyn E. Kortright, Margaret Cintron, Mark Russi, Jacqueline Epright, Lorraine Lee, Thomas J. Balczak, Nancy L. Havill and Richard A. Martinello

- 48** Clinical outcomes and risk factors for mortality from ventilator-associated events: A registry-based cohort study among 30,830 intensive care unit patients
Shichao Zhu, Wen Wang, Yan Kang, Qiao He, Hui Zhang, Yuhua Deng, Lin Cai, Rui Zhang, Xin Sun and Zhiyong Zong
- 56** Development and validation of antibiotic stewardship metrics for outpatient respiratory tract diagnoses and association of provider characteristics with inappropriate prescribing
Kathleen O. Degnan, Valerie Cluzet, Michael Z. David, Lauren Dutcher, Leigh Cressman, Ebbing Lautenbach, Keith W. Hamilton and for the CDC Prevention Epicenters Program
- 64** Incidence and burden of *Staphylococcus aureus* infection after orthopedic surgeries
Jill G. Dreyfus, Holly Yu, Elizabeth Begier, Julie Gayle and Margaret A. Olsen
- 72** Can multidrug-resistant organisms become resistant to ultraviolet (UV) light following serial exposures? Characterization of post-UV genomic changes using whole-genome sequencing
Hosoon Choi, Piyali Chatterjee, Munok Hwang, Eileen M. Stock, Janell S. Lukey, John E. Zeber and Chetan Jinadatha
- 79** Antimicrobial efficacy and durability of copper formulations over one year of hospital use
Elizabeth Ann Bryce, Billie Velapatino, Tysha Donnelly-Pierce, Hamed Akbari Khorami, Titus Wong, Richard Dixon, Edouard Asselin, Allison McGeer, Jocelyn A. Srigley and Kevin Katz

Concise Communications

- 88** Multifaceted intervention for improving antimicrobial prescription at discharge in the emergency department
Yasuaki Tagashira, Manaka Goto, Reiko Kondo and Hitoshi Honda
- 92** Real-world implementation and impact of a rapid carbapenemase detection test in an area endemic for carbapenem-resistant Enterobacterales
Alex M. Trzebucki, Lars F. Westblade, Angela Loo, Shawn Mazur, Stephen G. Jenkins, David P. Calfee, Michael J. Satlin and Matthew S. Simon
- 96** Evaluation of an initiative to improve prophylactic antimicrobial prescribing in patients on extracorporeal membrane oxygenation (ECMO) through the application of three antimicrobial-spectrum scores
Aditya Shah, Ryan W. Stevens, John C. O'Horo, Ross A. Dierkhising, Lynn L. Estes, Elie F. Barbari and Aaron J. Tande
- 99** Performance of the BinaxNOW coronavirus disease 2019 (COVID-19) Antigen Card test relative to the severe acute respiratory coronavirus virus 2 (SARS-CoV-2) real-time reverse transcriptase polymerase chain reaction (rRT-PCR) assay among symptomatic and asymptomatic healthcare employees
Allison E. James, Trent Gulley, Atul Kothari, Kasey Holder, Kelley Garner and Naveen Patil
- 102** Infectivity of healthcare workers diagnosed with coronavirus disease 2019 (COVID-19) approximately 2 weeks after onset of symptoms: A cross-sectional study
Yves Longtin, Hugues Charest, Caroline Quach, Patrice Savard, Mariana Baz, Guy Boivin, Judith Farfard, Jasmin Villeneuve, Michel Roger and Gaston De Serres

- 105** Vacuum exhausted isolation locker (VEIL) to reduce inpatient droplet/aerosol transmission during COVID-19 pandemic
Tilwawala Gopesh, Alex M. Grant, Jessica H. Wen, Teresa H. Wen, Ernesto Criado-Hidalgo, William J. Connacher, James R. Friend and Timothy A. Morris

Research Briefs

- 108** Absence of long-range severe acute respiratory coronavirus virus 2 (SARS-CoV-2) transmission from a highly infectious patient with undiagnosed coronavirus disease 2019 (COVID-19) in a positive-pressure room
Chanu Rhee, Meghan A. Baker, Robert Tucker and Michael Klompas
- 109** Discontinuation of isolation precautions for coronavirus disease 2019 (COVID-19) patients
Laura Anderson, Emily Schmitz, Philip M. Polgreen, Susan E. Beekmann and Nasia Safdar
- 113** Respiratory extracorporeal membrane oxygenation and central-line-associated bloodstream infection: Experience at a tertiary-care center during the coronavirus disease 2019 (COVID-19) pandemic
Shimpei Harita, Jun Hamaguchi, Keiki Shimizu and Hitoshi Honda
- 115** Twenty years of infection prevention: A longitudinal perspective from an academic medical center
John W. Ahern, Cindy D. Noyes, Lindsay M. Smith and W. Alston

Letters to the Editor

- 118** Healthcare-associated COVID-19: The experience of an academic medical center
Rachel J. Pryor, Michelle Doll, Michael P. Stevens, Kaila Cooper, Emily J. Godbout, Oliva Hess and Gonzalo Bearman
- 120** Severe acute respiratory coronavirus virus 2 (SARS-CoV-2) seroprevalence among healthcare workers in a low prevalence region
Emily J. Godbout, Rachel Pryor, Mary Harmon, Alison Montpetit, Joan Greer, Lorin M. Bachmann, Michelle Doll, Michael P. Stevens and Gonzalo Bearman
- 123** Comparison of symptomatic and asymptomatic infections due to severe acute respiratory coronavirus virus 2 (SARS-CoV-2) in San Francisco long-term care facilities
Janice K. Louie, Juliet E. Stoltey, Hyman M. Scott, Stephanie Trammell, Ejoywoke Ememu, Michael C. Samuel, Tomas J. Aragon and Godfred Masinde
- 125** How relevant is the basic reproductive number computed during the coronavirus disease 2019 (COVID-19) pandemic, especially during lockdowns?
Arni S.R. Srinivasa Rao, Steven G. Krantz, Michael B. Bonsall, Thomas Kurien, Siddappa N. Byrareddy, David A. Swanson, Ramesh Bhat and Kurapati Sudhakar
- 127** Prevention and management of coronavirus disease 2019 (COVID-19) in prison: Feedback from an experience in a French remand center
Jérémy Picard, Gwenaél Cornec, Elisabeth Gravrand, Séverine Ansart, Eric Stindel, Raoul Baron and Philippe Saliou

- 129** Elastomeric respirators: Expanding the “E” in PPE
Michael P. Koster and Leonard A. Mermel
- 130** An overview of research on air and environmental contamination with severe acute respiratory coronavirus virus 2 (SARS-CoV-2) in healthcare settings
Hajime Kanamori
- 133** Big data–driven personal protective equipment stockpiling framework under a universal healthcare system for disease control and prevention in the COVID-19 era
Kevin Sheng-Kai Ma and Alice Shin-Yi Tsai
- 134** Impact of early carbapenemase notification on infection control management and antimicrobial stewardship
Leandro Reus Rodrigues Perez, Gabriel Narvaez and Cícero Dias

Addendum

- 137** The impact of coronavirus disease 2019 (COVID-19) on healthcare-associated infections in 2020: A summary of data reported to the National Healthcare Safety Network – ADDENDUM
Lindsey M. Weiner-Lastinger, Vaishnavi Pattabiraman, Rebecca Y. Konnor, Prachi R. Patel, Emily Wong, Sunny Y. Xu, Brittany Smith, Jonathan R. Edwards and Margaret A. Dudeck

An Official Publication of the Society for Healthcare Epidemiology of America

EDITOR-IN-CHIEF

David P. Calfee, MD, MS • New York, NY, USA

DEPUTY EDITOR

David Weber, MD, MPH • Chapel Hill, NC, USA

ASSOCIATE EDITORS

Westyn Branch-Elliman, MD, MMSc • Boston, MA, USA

Carol Chenoweth, MD • Ann Arbor, MI, USA

Silvia Munoz-Price, MD, PhD • Richmond, VA, USA

Trevor C. Van Schooneveld, MD • Omaha, NE, USA

STATISTICS CONSULTANTS

Jon P. Furuno, PhD • Portland, OR, USA

Jessina C. McGregor, PhD • Portland, OR, USA

MANAGING EDITOR

iche.managingeditor@shea-online.org

Lindsay MacMurray • Brooklyn, NY, USA

PAST EDITORS, INFECTION CONTROL

Richard P. Wenzel, MD, Infection Control 1980-1987
(vols. 1-8)

PAST EDITORS, 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, 2000-2004 (vols. 23-25)

William R. Jarvis, MD, 2005-2006 (vols. 26 and 27)

Suzanne F. Bradley, MD, MPH (vols. 28-42)

EDITORIAL ADVISORY BOARD

Deverick Anderson, MD, MPH • Durham, NC, USA

Anucha Apisarnthanarak, MD • Pratumthani, Thailand

Lennox Archibald, MD, FRCP • Alachua, FL, USA

Shailen Banerjee, PhD • Atlanta, GA, USA

Jo Anne Bennett, RN, PhD • New York, NY, USA

David Birnbaum, PhD, MPH • Sidney, BC, Canada

John P. Burke, MD • Salt Lake City, UT, USA

Yehuda Carmeli, MD, MPH • Tel Aviv, Israel

Christopher Crnich, MD, MS • Madison, WI, USA

Erika D'Agata, MD, MPH • Providence, RI, USA

Daniel Diekema, MD • Iowa City, IA, USA

Elizabeth Dodds Ashley, PharmD • Durham City, NC, USA

Curtis J. Donskey, MD • Cleveland, OH, USA

Erik Dubberke, MD, MSPH • St. Louis, MO, USA

Charles E. Edmiston, Jr., PhD • Milwaukee, WI, USA

Katherine Ellingson, PhD • Tucson, AZ, USA

Charlesnika T. Evans, PhD • Chicago, IL, USA

Mohamad Fakih, MD, MPH • Grosse Pointe Woods,
MI, USA

Jeffery Gerber, MD, PhD • Philadelphia, PA, USA

Dale N. Gerding, MD • Hines, IL, USA

Donald A. Goldmann, MD • Boston, MA, USA

Nicholas Graves, PhD • Singapore, Singapore

Donna Haiduvan, RN, PhD, CIC • Tampa, FL, USA

Anthony D. Harris, MD, MPH • Baltimore, MD, USA

David K. Henderson, MD • Bethesda, MD, USA

Elizabeth Henderson, PhD • Calgary, AB, Canada

Loreen A. Herwaldt, MD • Iowa City, IA, USA

John A. Jernigan, MD, MS • Atlanta, GA, USA

Robin L.P. Jump, MD, PhD • Cleveland, OH, USA

Mini Kamboj, MD • New York, NY, USA

Carol A. Kauffman, MD • Ann Arbor, MI, USA

Michael Klompas, MD • MPH, Boston, MA, USA

Sarah Krein, RN, PhD • Ann Arbor, MI, USA

Karl Madaras-Kelly, PharmD • MPH, Boise, ID, USA

Allison McGeer, MD • Toronto, ON, Canada

Leonard A. Mermel, MD, ScM • Providence, RI, USA

Linda Mundy, MD • Collegeville, PA, USA

Ann-Christine Nyquist, MD, MSPH • Aurora, CO, USA

Tara Palmore, MD • Washington, DC, USA

Jan Evans Patterson, MD • San Antonio, TX, USA

David A. Pegues, MD • Philadelphia, PA, USA

Didier Pittet, MD, MS • Geneva, Switzerland

Issam Raad, MD • Houston, TX, USA

Anusha Rohit, MD, PhD • Dip RCPATH, Chennai, India

William A. Rutala, PhD, MPH • Chapel Hill, NC, USA

Lisa Saiman, MD, MPH • New York, NY, USA

Sanjay Saint, MD, MPH • Ann Arbor, MI, USA

Joshua K. Schaffzin, MD, PhD • Cincinnati, OH, USA

Sorana Segal-Maurer, MD • Flushing, NY, USA

Lynne M. Schulster, PhD • Atlanta, GA, USA

John A. Sellick, DO • Amherst, NY, USA

Arjun Srinivasan, MD • Atlanta, GA, USA

Kurt Stevenson, MD • MPH, Columbus, OH, USA

Nimalie Stone, MD • Atlanta, GA, USA

Thomas Talbot, MD MPH, • Nashville, TN, USA

Paul Tambyah, MBBS • Singapore

William Trick, MD • Chicago, IL, USA

Antoni Trilla, MD, PhD • Barcelona, Spain

Kavita Trivedi, MD • Alameda County Public Health

Department, San Leandro, CA, USA

Robert A. Weinstein, MD • Chicago, IL, USA

Andreas Widmer, MD, MS • Basel, Switzerland

Marcus Zervos, MD • Detroit, MI, USA

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: mjmrsvica@mrsvica.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:



Title: *Oversized, Overwhelming Impact of COVID-19, 2020*

Beginning with volume 43 (January 2022), the cover of *Infection Control & Hospital Epidemiology* (ICHE) will feature art inspired by or reflective of topics within the scope of the journal and their impact on patients, healthcare personnel and our society. These topics include healthcare-associated infections, antimicrobial resistance, and healthcare epidemiology. The intent is to feature original artwork that has been created by individuals who have a personal connection to one or more of these topics through their clinical work, research, or experience as a patient or an affected patient's family member, friend or advocate. The goal is to provide readers with a visual reminder of the human impact of the topics addressed in the journal and the importance of the work being done by those who read or contribute to ICHE and by all who are trying to make healthcare safer through the elimination of healthcare-associated infections.

For more information about the ICHE cover and how to submit artwork for consideration for a future cover, please visit the ICHE website: <https://www.cambridge.org/core/journals/infection-control-and-hospital-epidemiology>

Artist: Lona Mody, MD, MSc

Medium: Acrylic paints on canvas

Dr. Mody spoke to ICHE about her painting.

What was the inspiration for this artwork? I am drawn towards color and paint art that conveys the happiness that is in my life. However, COVID changed everything. I had to create something that was wholly different to process this unprecedented historic event. Painting this particular piece was extremely cathartic. It allowed me to reflect on the loss experienced by many, its impact on my peers and come to terms with the fact that the worst was yet to come (I started this work in April of 2020 and completed it in May 2020).

This painting depicts an oversized and overwhelming impact of COVID-19 on our healthcare providers and on our healthcare eco-system in general. I was artistically inspired by the lifeless streets in big capital cities, empty tall haunted buildings and incredible havoc created by a virus that was often depicted paradoxically by vivid colors with precise structures and features. Missing in all these early images was the human factor. With this painting, I wanted to show the immediate and devastating consequences on people that work within healthcare and carry the burden of COVID-19. It is now displayed within our departmental offices as a reminder of our collective experiences.

Why is this work appropriate for the cover of *Infection Control & Hospital Epidemiology*? ICHE as a journal is about understanding, preventing and controlling infections. It is a journal that publishes high quality evidence written by experts who were overwhelmingly impacted and continue to be impacted by the COVID-19 pandemic. This painting also captures the frustration and sadness felt by many of us in this field.

What is your personnel connection to the content of ICHE? Epidemiology, patterns, association, causality always attracted me. Since my residency, I knew that I had to go beyond clinical medicine to understand these concepts. ICHE was the perfect journal that served as an outlet for my research pursuits. In fact, my first paper (borne out of my residency project) was published in ICHE. ICHE has been instrumental in my academic success. Its readership is a community I am most connected with.

Dr. Mody is the Amanda Sanford Hickey Professor of Internal Medicine at the University of Michigan and VA Ann Arbor Healthcare System, Ann Arbor, MI, USA. She directs the Center for Research and Innovations in Special Populations (CRIISP) and is the Associate Division Chief of Geriatric & Palliative Care Medicine, Associate Director of Clinical and Translational Research (Geriatrics Center), and Co-Director of the Medical Arts Program. Her research investigates the clinical and molecular epidemiology of antimicrobial-resistant pathogens and develops novel interventions to prevent them. Dr. Mody is a member of SHEA and an ad hoc reviewer for and frequent contributor to ICHE. She has published 34 papers in ICHE.

Cover image: *Oversized, Overwhelming Impact of COVID-19, 2020*