



## INTRODUCTION TO THE SUPPLEMENT

# GLOBAL CLINICAL NETWORKING TO OPTIMIZE THE CLINICAL MANAGEMENT OF HIGH-CONSEQUENCE INFECTIOUS DISEASES

Jocelyn J. Herstein, Jake Dunning, Poh Lian Lim, Christian Herzog, and Lauren M. Sauer

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**I**N RECENT YEARS, THE world has seen an increase in the incidence and scale of high-consequence infectious disease (HCID) outbreaks, with serious impact on health, economies, communities, and the healthcare workforce. HCID definitions may vary, but typically HCLDs are characterized by their high case-fatality rates, lack of effective prophylaxis and treatment options, and transmission risks within communities and healthcare settings.<sup>1</sup> To address the risks posed during HCID care and management, many countries have established high-level isolation units (HLIUs), also called biocontainment units and HCID treatment centers. Equipped with advanced physical infrastructure features, highly trained teams, and well-established and exercised standard operating procedures, HLIUs support optimal HCID patient care while mitigating risks to the healthcare teams caring for these individuals.<sup>2,3</sup> For example, during the

2014-2016 West Africa Ebola virus disease epidemic, nosocomial transmission was sharply reduced when patients were managed in dedicated HLIUs, and mortality rates among patients treated in HLIUs in Europe and the United States during the outbreak were significantly lower (18.5%) than mortality rates for patients treated in West Africa (ranging from 37% to 74%).<sup>4</sup>

The contributions of HLIUs have extended far beyond the care of individual HCID patients. HLIUs played a role in treating some of the first patients in their respective countries with COVID-19 when SARS-CoV-2 emerged as a novel virus, they have supported the design of innovative systems for HCID isolation and transport, and, for many countries, HLIUs serve as centers of HCID expertise that can support regional HCID preparedness.<sup>5,6</sup> Therefore, HLIUs are a crucial resource to manage outbreaks of novel

Jocelyn J. Herstein, PhD, MPH, is an Assistant Professor, Department of Environmental, Agricultural and Occupational Health, College of Public Health, and Director, National Emerging Special Pathogens Training and Education Center (NETEC) International Partnerships and Programs; and Lauren M. Sauer, MSc, is Associate Director of Research, Global Center for Health Security, Director, Special Pathogens Research Network, and Associate Professor, Department of Environmental, Agricultural and Occupational Health, College of Public Health; both at the University of Nebraska Medical Center, Omaha, NE. Jake Dunning, MBBS, PhD, is a Consultant in Infectious Diseases, Department of Infectious Diseases, Royal Free Hospital, Royal Free London NHS Foundation Trust, London; an Honorary Clinical Associate Professor, Division of Infection and Immunity, University College London, London; and a Senior Research Fellow, Pandemic Sciences Institute, University of Oxford, Oxford, United Kingdom. Poh Lian Lim, MD, MPH, is Director of the High Level Isolation Unit and Senior Consultant, National Centre for Infectious Diseases, and Head, Traveller's Health and Vaccination Clinic, Tan Tock Seng Hospital; both in Singapore. Christian Herzog, PhD, is Head, Strategy and Incidence Response, Centre for Biological Threats and Special Pathogens, Robert Koch Institute, Berlin, Germany.

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pathogens—not only because of the physical biocontainment facility but also the highly trained workforce members who are mentally prepared to handle unusual diseases.

Despite these successes, HLIUs face ongoing challenges. The exodus of trained personnel from the healthcare workforce during the COVID-19 pandemic has adversely affected health systems; for HLIUs, this trend has exacerbated the difficulties in recruiting and retaining highly trained staff, particularly for units that rely on staffing on a voluntary basis. Another significant challenge is sustaining the funding necessary to maintain operational readiness, particularly for a capability that may rarely, if ever, be used. Funding challenges, as well as the infrequent nature of HCID incidents and HLIU activations, creates limited opportunities to advance the field of high-level isolation. Furthermore, tabletop exercises have shown that existing HLIU capacities in many countries would be insufficient in the event of an HCID outbreak requiring surge capacities.

Innovative approaches to addressing these and other challenges are emerging through global collaboration and research. Advancements in technology and scientific research are generating new tools and methods for improving high-level isolation practices, and increased experiences of treating patients in HLIUs prompts lessons learned with each case. International partnerships between HLIUs fills a critical gap by facilitating the sharing of best practices, expertise, and experiences.

In 2018, the National Emerging Special Pathogens Training and Education Center (NETEC), in conjunction with the Johns Hopkins Center for Health Security and the US National Institute of Allergy and Infectious Diseases, hosted an international workshop on high-level isolation with representatives from more than 20 HLIUs in Washington, DC, to share experiences, best practices, and foster relationship building.<sup>7,8</sup> That workshop underscored the importance of global collaborative efforts; when funding was allocated by the US Administration for Strategic Preparedness and Response that allowed for engagement with international partners, NETEC established its International Partnerships and Programs to strengthen networking and facilitate collaboration with global HLIU teams. This special issue, which includes experiences and lessons learned from HLIUs in 11 countries across 5 continents, marks a significant milestone in those efforts.

This supplement is truly unique because it compiles in a single volume descriptions of approaches taken by different countries and regions to achieve optimal clinical preparedness for and response to HCID cases and incidents. It focuses on the current global landscape of high-level isolation and highlights the contributions of global HLIUs in responding to HCID events. It describes the ongoing challenges HLIUs face and innovative approaches to address those challenges through national and global HLIU research and collaboration. Additionally, it provides a

vision for a future network of HLIUs that can be leveraged to strengthen national, regional, and global health security. This collection explores the current state and prospects of HLIUs in managing HCIDs, emphasizing the national, regional, and global importance of these unique facilities and the expertise inherent to them. These papers underscore the opportunities and significance of sharing experiences, best practices, and establishing relationships with other teams in this specialized field to improve individual HLIU practices, as well as the broader field of HCID management.

It is our hope that this issue will create opportunities for broader collaboration, expanded reach and impact of HLIUs, and enhanced awareness of the essential value that HLIUs bring to health systems across the globe.

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## REFERENCES

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1. UK Health Security Agency. High-consequence infectious disease (HCID). Published October 22, 2018. Updated January

- 25, 2023. Accessed June 30, 2024. <https://www.gov.uk/guidance/high-consequence-infectious-diseases-hcid>
2. Bannister B, Puro V, Fusco FM, Heptonstall J, Ippolito G; EUNID Working Group. Framework for the design and operation of high-level isolation units: consensus of the European Network of Infectious Diseases. *Lancet Infect Dis.* 2009;9(1):45-56.
3. Smith PW, Anderson AO, Christopher GW, et al. Designing a biocontainment unit to care for patients with serious communicable diseases: a consensus statement. *Biosecur Bioterror.* 2006;4(4):351-365.
4. Uyeki TM, Mehta AK, Davey RT Jr, et al; Working Group of the US–European Clinical Network on Clinical Management of Ebola Virus Disease Patients in the U.S. and Europe. Clinical management of Ebola virus disease in the United States and Europe. *N Engl J Med.* 2016;374(7):636-646.
5. Grein JD, Garland JA, Arguinchona C, et al. Contributions of the Regional Emerging Special Pathogen Treatment Centers to the US COVID-19 pandemic response. *Health Secur.* 2022;20(suppl 1):S4-S12.
6. Herstein JJ, Lowe JJ, Wolf T, et al. Leveraging a preexisting global infectious disease network for local decision making during a pandemic. *Clin Infect Dis.* 2022;74(4):729-733.
7. Shearer MP, Toner ES. Special feature: progress in high-level isolation for the care of patients with high-consequence infectious diseases. *Health Secur.* 2019;17(1):1-2.
8. Herstein JJ, Wolf T, Nicastri E, et al. Capabilities of global high-level isolation units: a pre-workshop survey. *Infect Control Hosp Epidemiol.* 2022;43(11):1679-1685.

Address correspondence to:  
Jocelyn J. Herstein, PhD, MPH  
984388 Nebraska Medical Center  
Omaha, NE, 68198

Email: [jocelyn.herstein@unmc.edu](mailto:jocelyn.herstein@unmc.edu)