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Letter to the Editor

HOW CAN EMERGENCY DEPARTMENTS BETTER PREPARE FOR EMERGING INFECTIOUS DISEASE THREATS? A RETURNED TRAVELER WITH FEVER WALKS INTO TRIAGE...

To the Editor:

Emerging infectious diseases are a constant threat to the public's health and health care systems around the world. These often extremely pathogenic diseases may not be adequately managed by typical application of infection control practices in the emergency department (ED), and nosocomial spread of highly pathogenic emerging infectious diseases in EDs and other health care settings has been observed—in the 2003 severe acute respiratory syndrome pandemic, outbreaks of Middle East respiratory syndrome (MERS) in South Korea in 2015, and an Ebola Virus Disease (EVD) cluster in a hospital in Dallas in 2014 (1–4). One of the main factors that enabled the spread of these pathogens was the lack of early identification and proper isolation upon patient presentation. As the globe becomes more interconnected, we can only expect to see continued emergence and expansion of these new threats (5).

In the ED, it is often difficult to identify and isolate more common infectious diseases like tuberculosis or influenza in a timely fashion, which makes the identification and isolation of an emergent threat more daunting. However, there have been recent successes. With the increased awareness of EVD during the 2014–2015 outbreak in West Africa, EDs and health care systems did a better job of screening and isolation of persons under investigation (PUI) for EVD, although some perceived challenges persisted (6). In the immediate aftermath of the international attention on EVD preparedness and response, New York City hospitals that underwent mystery patient drills identified and isolated 83% of MERS PUI and 74% of measles PUI. Overall though, 39% of hospitals failed at least one of the drills (7).

In our health care center, we implemented universal patient screening at all entry points, given the fact that our community hosted a large number of returned travelers from EVD-affected countries, and this system has remained in place to address other outbreaks (8). The adoption of the Identify-Isolate-Inform strategy, used first during the 2014 EVD outbreak, has increased vigilance for other communicable diseases like measles (9). As we move away from institutional memory of EVD, we can only expect that this heightened level of awareness will decrease. We need to apply our EVD experience to implement broader screening and patient management strategies.

Because these infections can present with nonspecific symptoms like fever or myalgias, case definitions currently in use to identify PUI of EVD and MERS must be combined with travel history to yield a reasonably sensitive and specific screening tool. Still, these screening tools may generate many PUIs, especially if concomitant with influenza outbreaks or if emerging infectious disease threats occur in countries that also have high malaria burden (8). Our public health and clinical infrastructure is already facing greater challenges, as was recently seen in New York City and Philadelphia when airplanes returning from the Arabian Peninsula became a national news sensation due to concerns about MERS among passengers with febrile respiratory illnesses (10). Because most U.S. health care centers do not actively screen for PUI, increasing the risk that patients who might have a severe communicable infection are missed, we are fortunate to have had no evidence of any nosocomial outbreaks since 2014.

Furthermore, even when PUIs are identified, the risk remains that they receive delayed or inadequate care for more likely diagnoses due to logistical challenges or staff concerns. This was observed in the United States during the 2014–2015 EVD outbreak (11). Delays in care can be deadly for more common infections like malaria or septicemia, and malaria diagnoses were not uncommon among PUIs for EVD (8,11). Conversely, PUIs who screen positive and actually have highly pathogenic infections might get less-than-adequate care due to staff confusion regarding processes or unfamiliarity with recommended personal protective equipment (PPE). The Centers for Disease Control and Prevention (CDC) has PPE recommendations for known threats, however, in our experience,

Dr. Wu discloses the following: Sanofi Pasteur – Primary investigator for Stamaril vaccination clinic site; Takeda Vaccine – Site co-investigator for sponsored research.

development and maintenance of the proficiency to effectively utilize this PPE is challenging. We suspect that very few health care centers are able to maintain a high level of proficiency on any large, system-wide scale.

Few health care centers are proactively addressing the problems inherent in caring for patients in the current era of global travel and emerging infectious diseases. Travel screens might be relaxed or become out of date during periods between highly publicized outbreaks. Although most of us may not see a case of a highly pathogenic emerging infectious disease during our careers, the threat will always remain, and the potential for disastrous misses are real, as seen with EVD in Dallas and MERS in South Korea.

We propose five strategies to be facilitated by public health agencies in conjunction with health care facilities to better prepare frontline facilities such as EDs and ambulatory care settings for all infectious disease threats.

1. Universal screening for symptoms of infection (e.g., fever and cough) and recent travel history (directed toward known current outbreaks and high-consequence infectious disease threats) at first entry into the health care setting, such as ED triage or front desk check-in at clinics and diagnostic centers. Because fever and respiratory complaints are symptoms of common infectious diseases like influenza, early ascertainment of these symptoms even prior to screening for travel would enhance general infection control precautions because anyone with flu-like symptoms should be given a surgical mask. Those with symptoms of infection who also have positive screens for recent travel to areas experiencing notable outbreaks would be isolated for further evaluation. Although case definitions for EVD and MERS PUI have been developed by the CDC, health care systems would need assistance from infection control authorities and local health departments to adapt PUI case definitions into a universal screening tool.
2. Standardized procedures to assist health care providers with next steps should a patient screen positive for symptoms and travel to areas of concern. This includes immediate identification and isolation of patients who screen positive, as was suggested for Ebola PUIs in 2015 (12,13). When designing new ED facilities, consideration of these processes can prevent workflow disruptions that result when triage areas are distant from isolation rooms. After isolation, the patient would require further evaluation by infectious disease or public health specialists to quickly determine if the patient meets PUI case criteria and if confirmatory testing is warranted. Infection control measures can be downgraded for those
- who do not meet PUI criteria, whereas others would remain in isolation pending confirmatory testing, either at the frontline facility or after transfer to a designated assessment hospital (14). For this process to occur quickly without major delays in care, the development of clear procedures and communication channels with the appropriate consultants is imperative.
3. Case definitions for PUI that can quickly screen out low-risk positives to avoid utilizing unnecessary ED and health care system resources, and to avoid alert fatigue. Additional details for case definitions for emerging infectious diseases need to be developed by our partners in public health to guide health care settings in screening. For example, the working MERS PUI case definition includes symptoms as well as exposures (close contacts with symptoms and health care exposure) and illness severity, thus increasing specificity of screen for higher-risk positives (15). Of course, symptomatic patients who do not meet these more stringent case definitions would still require standard and transmission-based precautions as indicated for common illnesses like influenza and norovirus.
4. Rapid diagnostic tests. Unfortunately, with the exception of a few health care settings, testing for viral hemorrhagic fevers and MERS are available at only a few public health laboratories without rapid turnaround times, which means that PUIs will need isolation and care in full PPE for extended time periods. Streamlined testing procedures approved by the CDC and availability of rapid diagnostics and point-of-care testing could facilitate quicker rule-outs, limiting the impact on ED and health care facility throughput.
5. Further streamlined PPE guidelines optimized for frontline provider use. Cumbersome or uncomfortable PPE with which health care workers are not routinely familiar can create a barrier to proper implementation. We need further development by CDC of evidence-based PPE guidelines for PUIs that maximize protection and ease of use, not just in biocontainment units but also by frontline providers (16,17). These guidelines should facilitate safe and expeditious donning and doffing of PPE in accordance with standard and transmission-based infection control precautions that can be routinely applied in the care of patients presenting to emergency and ambulatory care settings. PPE is but one part of the hierarchy of controls. Together with administrative policies and work procedures, frontline health care workers must have easily implementable strategies that minimize risk of extensive nosocomial spread while providing health care

workers adequate protection that encourages use (18). Furthermore, broader implementation of infection control guidelines would protect against more common infections such as influenza.

These interventions require close integration with local, state, and federal public health authorities for input on case definitions, screening strategies, and availability of laboratory testing. They also require full engagement of ambulatory and emergency care practitioners, with infection control experts acting with executive endorsement to implement these processes health system wide.

Emerging infectious disease threats at the front lines of our health care systems are the new normal, given increasing globalization. Health care systems need to support our frontline providers and departments to adapt to meet these threats, and integrate the response into routine procedures. Even if we don't see a case of emerging infectious disease, these improvements may still benefit health care workers and patients by preventing nosocomial transmission of more common but still deadly infections. Whether we prepare or not, communicable disease threats will emerge, inside or outside the United States, with little or no notice, so why not adapt our processes now to ensure that our frontline health care workers can confidently and safely provide care and minimize any impact in the future?

Anna Q. Yaffee, MD, MPH
Alexander Isakov, MD, MPH
Henry M. Wu, MD

*Department of Emergency Medicine
School of Medicine
Emory University
Atlanta, Georgia

†Emory TravelWell Center
Division of Infectious Diseases
Department of Medicine
School of Medicine
Emory University
Atlanta, Georgia

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REFERENCES

- McDonald LC, Simor AE, Su IJ, et al. SARS in healthcare facilities, Toronto and Taiwan. *Emerg Infect Dis* 2004;10:777–81.
- Varia M, Wilson S, Sarwal S, et al. Investigation of a nosocomial outbreak of severe acute respiratory syndrome (SARS) in Toronto, Canada. *CMAJ* 2003;169:285–92.
- Park JW, Lee KJ, Lee KH, et al. Hospital outbreaks of middle east respiratory syndrome, Daejeon, South Korea, 2015. *Emerg Infect Dis* 2017;23:898–905.
- Chevalier MS, Chung W, Smith J, et al. Ebola virus disease cluster in the United States—Dallas County, Texas, 2014. *MMWR Morb Mortal Wkly Rep* 2014;63:1087–8.
- Morse SS. Factors in the emergence of infectious diseases. *Emerg Infect Dis* 1995;1:7–15.
- Wong CH, Stern S, Mitchell SH. Survey of Ebola preparedness in Washington state emergency departments. *Disaster Med Public Health Prep* 2016;10:662–8.
- Foote MMK, Styles TS, Quinn CL. Assessment of hospital emergency department response to potentially infectious diseases using unannounced mystery patient drills – New York City, 2016. *MMWR Morb Mortal Weekly Rep* 2017;66:945–9.
- Fairley JK, Kozarsky PE, Kraft CS, et al. Ebola or not? Evaluating the ill traveler from Ebola-affected countries in West Africa. *Open Forum Infect Dis* 2016;3:ofw005.
- Koenig KL, Slassaf W, Burns MJ. Identify-isolate-inform: a tool for initial detection and management of measles patients in the emergency department. *West J Emerg Med* 2015;16:212–9.
- Tsang A. Quarantined aircraft and sick passengers. It's not as scary as it sounds. *The New York Times*; 2018. Available at: <https://www.nytimes.com/2018/09/07/business/airlines-quarantine-haji-flu.html>. Accessed January 23, 2019.
- Karwowski MP, Meites E, Fullerton KE, et al. Clinical inquiries regarding Ebola virus disease received by CDC—United States, July 9–November 15, 2014. *MMWR Morb Mortal Wkly Rep* 2014;63:1175–9.
- Che N, Perz J, Srinivasan A, Laufer A, Pollack L. Identify, isolate, inform: background and considerations for Ebola virus disease preparedness in U.S. ambulatory care settings. *Am J Infect Control* 2015;43:1244–5.
- Wadman CM, Schwedhelm SS, Watson S, et al. Emergency department processes for the evaluation and management of persons under investigation for Ebola virus disease. *Ann Emerg Med* 2015;66:306–14.
- Centers for Disease Control and Prevention (CDC). Interim guidance for U.S. hospital preparedness for patients under investigation (PUI) or with confirmed Ebola virus disease (EVD): a framework for a tiered approach. 2015. Available at: <http://www.cdc.gov/vhf/ebola/healthcare-us/preparing/hospitals.html>. Accessed January 23, 2019.
- Centers for Disease Control and Prevention (CDC). MERS interim patient under investigation (PUI) guidance and case definitions. 2017. Available at: <https://www.cdc.gov/coronavirus/mers/case-def.html>. Accessed September 24, 2018.
- Casanova LM, Erukunakpor K, Kraft CS, et al. Assessing viral transfer during doffing of Ebola-level personal protective equipment in a biocontainment unit. *Clin Infect Dis* 2018;66:945–9.
- Toon J. CDC awards \$2.2 million to prevent spread of infectious diseases in health care facilities. *Georgia Tech News Center*; 2015. Available at: <https://www.news.gatech.edu/2015/10/06/cdc-awards-22-million-prevent-spread-infectious-diseases-health-care-facilities>. Accessed January 23, 2019.
- Venkat A, Wolf L, Geiderman JM, et al. Ethical issues in the response to Ebola virus disease in US emergency departments: a position paper of the American College of Emergency Physicians, the Emergency Nurses Association, and the Society for Academic Emergency Medicine. *J Emerg Nurs* 2015;41:e5–16.