



HHS Public Access

Author manuscript

JAMA Pediatr. Author manuscript; available in PMC 2022 September 07.

Published in final edited form as:

JAMA Pediatr. 2017 May 01; 171(5): 411–412. doi:10.1001/jamapediatrics.2016.4947.

Preparing for Emerging Infectious Diseases

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Emerging pathogens with pandemic potential are a growing threat to human health throughout the world, including in the United States. Zoonotic and arthropod-borne infections have caused unprecedented epidemics and pandemics, exemplified by the 2014–2015 Ebola outbreak. We must acknowledge a new reality for pediatric healthcare professionals who must consider travel and other exposures when evaluating patients and, therefore, include in their differential diagnosis diseases such as Ebola virus, Zika virus, Middle Eastern respiratory syndrome coronavirus, Enterovirus D68, and measles, to name a few.

What Is Responsible for This Upsurge in Emerging and Reemerging Infectious Diseases?

Multiple, synergistic factors drive emerging and reemerging infectious diseases (EIDs) in human hosts. Human habitats are encroaching on environments that contain the natural hosts for these pathogens, thereby creating new opportunities for interaction between humans and infected animals or arthropod vectors.¹ Climates are becoming more supportive to mosquitos and other arthropod vectors, thereby increasing infections that arthropod vectors carry. Increasing access to international travel allows people to carry pathogens from one geographic region to another.

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ARTICLE INFORMATION

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the US Centers for Disease Control and Prevention.

Conflict of Interest Disclosures: None reported.

Infectious disease threats are not limited to newly recognized pathogens; old diseases remain a challenge as well. While the eradication of measles remains an achievable goal, we have seen a resurgence of the virus in unvaccinated and under vaccinated children. Most recently in 2015, 125 new measles cases resulted from a single infectious traveler on vacation at a theme park.²

How Is the Pediatric Community Preparing for EIDs?

Effective preparation for EIDs means building and maintaining a systematic approach to patient evaluation and management that reliably detects and contains high-consequence infections. Collaboration and information sharing are essential not only internationally but also across and between health systems within communities as well; public health agencies (ie, state and local health departments, the US Centers for Disease Control and Prevention [CDC], and the World Health Organization) can provide a platform to facilitate these collaborations.

Helping frontline clinical staff remain vigilant, maintain up-to-date awareness of EIDs, and ensure safe care for patients with EIDs is an ongoing challenge. Clinicians should have access to technical assistance and information, including outbreak alerts, identification of at-risk populations, geographic locations of concern, diagnostic considerations, infection control guidance, and treatment guidelines. Information on EIDs evolves quickly. The CDC website and state and local health departments can be sources of information for clinicians and facilities regarding current EID trends, interim guidance for recognition, diagnosis and management, and communication tools. Guidance needs to be implemented according to the needs of the local populations and the characteristics of health care facilities. Buy-in and collaboration among local and regional leaders, including emergency medicine, nursing, intensive care, hospital medicine, infectious diseases, infection prevention and control, materials management, and environmental services, are essential for successful and sustainable EID responses.

Effective diagnostic capability is a crucial component of case detection, treatment, and trend monitoring. Although commercial tests for EIDs are not always available, diagnostics developed by the CDC (eg, polymerase chain reaction and enzyme-linked immunosorbent assay for Ebola virus, Middle Eastern respiratory syndrome coronavirus, and Zika virus) are available to frontline clinicians through state and local health departments.

Over the past several years, specialized biocontainment units have been created to care for adults and children with suspected or confirmed EIDs. While many EIDs (eg, Zika virus) do not require specialized environments of care, others—notably, Ebola, other viral hemorrhagic fevers, and respiratory viruses, such as Middle Eastern respiratory syndrome coronavirus—can require extensive infection control needs, including meticulous adherence to isolation, correct use of personal protective equipment, and thoroughly trained interdisciplinary health care teams, which include laboratory staff, environmental services, and security teams. Although not a requirement, creating specialized units and response teams can make achieving and maintaining rigorous infection control more efficient. During the past 2 years, work by the teams at the University of Nebraska, Emory University,

Bellevue Hospital, and the National Institutes of Health demonstrated that high mortality rates from Ebola virus are not inevitable.³ These units provided care to adult patients and have advanced our collective knowledge in the care of these patients. However, there are notable differences when caring for pediatric patients in such specialized environments. Developmental issues, parental presence, specialized supplies, and equipment are important considerations when caring for children with suspected or proven EIDs and must be a central part of clinician and facility planning.^{4,5}

How Can Frontline Pediatric Health Care Professionals Enhance Their Preparedness for EIDs?

While the national capacity for high-level biocontainment is currently limited to specific facilities, all frontline pediatric clinicians are expected to identify, isolate, and inform when faced with a patient who might have an EID. Preparedness efforts are time consuming and costly, but practical solutions exist (Table). At each institution, EID clinician champions should work with infection prevention and control staff to develop standard triage questions to identify a patient with a potential EID (eg, “Do you have fever? Rash? Skin lesions? Trouble breathing? Cough?” and “In the past 3 weeks, have you traveled outside the United States or had close contact with someone who traveled outside the United States?”). Patients who answer in the affirmative should be promptly isolated and evaluated to rule out an EID that requires special care and precautions. During evaluation, the patient and accompanying family members should wear masks and remain in a prespecified room to limit exposure to staff, visitors, and other patients. An attending physician should assess the patient as opposed to a trainee, and the number of staff delivering care should be limited to essential caregivers. When a patient is determined to require testing for an EID, internal and external stakeholders, including public health authorities, must be promptly informed to facilitate testing and, if needed, transport specimens and/or the patient. Establishing protocols and relationships with all stakeholders in advance is critical to the successful implementation of this process. Attempting to create plans and partnerships during an event is exceedingly difficult and potentially unsafe. In-clinical care planning, regional transport partners, waste management groups, and press officers are essential for successful response to a high-consequence EID.

We all have roles to play in EID preparedness. Frontline clinicians must be supported to sustain their knowledge and enthusiasm, minimize their stress and anxiety, and maintain the safest care for these special patients. While preparedness efforts are coordinated by the CDC and health departments, preparedness must be a local effort and institutional priority.

Previous Presentation:

This Viewpoint summarizes a symposium presented by the authors, developed by the Pediatric Leadership Committee of the Society of Healthcare Epidemiology of America, and sponsored by the Pediatric Infectious Diseases Society at the Pediatric Academic Society Meeting; April 30, 2016; Baltimore, Maryland.

Additional Contributions:

We acknowledge the guidance and support of the Society for Healthcare Epidemiology of America's Pediatric Leadership Council as well as Philip L. Graham, MD,MS (New York-Presbyterian Hospital, New York), for his insightful suggestions. Dr Graham was not compensated for his contribution.

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Preparedness Steps for a Child With a Suspected EID: Identify, Isolate, and Inform

Table.

Preparedness Steps	Potential Implementation Solutions	Potential Challenges
Identify Relevant signs and symptoms and travel history	Implement and practice triage questions for signs and symptoms and travel history that trigger appropriate actions to identify patients with potential EIDs; identify local EID champions with infectious disease and infection control expertise; identify local physician and nurse liaisons within crucial points of entry, eg, emergency departments; use simple signage in multiple languages at entry points for patients/families to self-identify; and perform tabletop exercises.	Educating numbers and types of staff for rare event(s); cocirculating EIDs and seasonal infections with similar presentations; competing priorities, including mission critical functions of facility; language and cultural barriers may obfuscate obtaining relevant history; lack of commercial tests; sustaining interest and enthusiasm; and mental health and stress among staff.
Isolate Mask patient, separate from other patients, and place in designated isolation room	Ensure pediatric masks are readily available with loops to secure; mask and segregate accompanying family members; designate room to isolate patient and accompanying family members; drill rapid turnover of occupied isolation room to facilitate availability; and consider security issues.	Accompanying family members may also be infectious; designated isolation room could be occupied; and disease-specific clinical manifestation and developmental and behavioral issues may thwart containing secretions.
Inform Internal and external stakeholders	Perform tabletop exercises; maintain updated telephone trees; test communication infrastructure; and develop protocol to alert health department that includes easy access to contact information.	Requires both internal and external communication structure; rapid turnover of health care worker staff and administration; and unfamiliarity with local health department staff.

Abbreviation: EID, emerging infectious disease.