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SHEA

SHEA Position Paper

SHEA position statement on pandemic preparedness for policymakers: emerging infectious threats

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Background

Emerging infectious diseases (EID) are defined as pathogens that have recently been identified in a population or had previously reduced in scope but are rapidly increasing in incidence or geographic range. Pandemics occur when new or re-emergent EID spread over multiple regions or continents. Interactions in our dynamic global society accelerate the emergence of EIDs (Table 1)[1,2] suggesting that other pathogens with pandemic potential remain a pressing concern and could emerge or re-emerge at any time.

Factors involved in driving the spread of emerging infectious diseases

Recent examples of EID demonstrate the importance of addressing underlying factors contributing to their emergence. The One Health concept exploring the interaction of animals and the environment with humans provides useful insights into our understanding of emerging zoonotic infections, making a strong economic case for additional investment to prevent the next pandemic.[3] Multiple interconnected changes such as increased urbanization coupled with human spread into previously uninhabited areas became opportunities for the emergence and rapid spread of pathogens such as Ebola and represents an ongoing worldwide risk. Agricultural ventures increase the potential for another severe influenza pandemic due to the reassortment of genomic material from birds, pigs, and humans leading to an antigenically shifted virus with the potential for rapid spread and high lethality. Avian influenza can stem from strains originating in other countries or in the United States, although without sustained human-to-human transmission thus far.[4] The ease of rapid international travel also facilitates rapid global spread with little warning.

Environmental factors, including warming temperatures, increased flooding, and other mechanisms, may also contribute to the rise and spread of a number of EIDs.[5,6] For example, *Candida auris*, a rapidly emerging fungal infection and public health threat, is thought to have emerged partly due to earth's warming temperatures.[7] Over the past two decades, changes in mosquito control policies, rising temperatures, and a mobile population are factors that led to emergence in the Western Hemisphere of vector-borne diseases such as West Nile virus, Zika virus, and Chikungunya virus. Between 2004 and 2016 there was an observed a 3-fold increased reporting of vector-borne diseases of all types.[8] These environmental changes, colliding with human migration and war, disproportionately increase the risk of EID among persons of color and those with lower socioeconomic status.[9]

Learning from COVID and Mpox to improve EID preparedness and response

Designing evidence-informed infection prevention programs requires understanding pathogen dynamics, and deploying appropriate public health policies and tools tailored to the specific threat.[10] Public health tools, including surveillance systems, communication and data sharing, diagnostic testing, contact tracing, isolation, and quarantine, all contribute to the containment of infectious disease outbreaks. International collaboration and data sharing are essential elements of a pandemic response in an increasingly interconnected world. Factors that hindered success during the COVID-19 pandemic included lack of transparency in early surveillance efforts, limited availability of personal protective equipment, faulty and underutilized test diagnostics, and a fragmented public health system with

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Table 1. Contributing factors to emerging infectious diseases

Changing ecosystems	Lack of political will and breakdown in public health measures
Human demographics and behavior	Climate and weather
International travel and commerce	War and famine
Technology and industry	Poverty and social inequality
Microbial adaption and change	Human susceptibility to infection

Adapted from Morse SS. Factors in the emergence of infectious diseases.[1]

suboptimal communication between various public health agencies as well as frontline providers and the public.[11,12]

The rapid containment of the Mpox epidemic, transmitted via close, prolonged contact and recognized to be globally circulating by May 2022, is an example of a more successful public health response. Improved containment could be attributed to a variety of factors, including virus characteristics, recent learning from the COVID-19 pandemic, and pre-existing availability of vaccines and therapeutics. Important public health tools that helped with Mpox epidemic management included targeted communication to groups at risk along with release of antivirals and vaccines intended for smallpox from stockpiles and changes in behavior which eventually helped mitigate spread in the US. Maintenance of limited availability of vaccine supplies in the Strategic National Stockpile could have prevented the need for health departments to improvise to extend available supplies by using a modified smaller dose intradermally instead of subcutaneously, limiting patients to a single dose instead of two doses as initially intended.[13] Resurgence of the disease remains a threat.[14]

Preparing for the next pandemic by addressing emerging infections: Recommendations

Several policy recommendations regarding preventing and mitigating the spread of emerging infections are addressed in other papers in the SHEA pandemic preparedness policy series, including increasing the infection prevention and epidemiology workforce; communication between healthcare entities, public health agencies, providers, and the public; greater sharing and transparency of data; and an ensuring a robust supply chain. In addition, SHEA endorses the following approaches to improve global preparedness and response (Table 2).

- Provide financial support to strengthen and expand surveillance/sentinel systems for early detection of emerging infections. Needs to be met include improving communication and data sharing between unlinked surveillance systems and expanding domestic and global surveillance to geographic areas not currently covered by EID surveillance. Examples of surveillance systems include but are not limited to, public health agency-led initiatives such as the CDC Emerging Infections Program (a collaborative network between public health departments and academic institutions), the NIH-funded Centers for Research in Emerging Infectious Diseases Network, and non-governmental organizations. Establishing connections and collaboration with a network of low- and middle-income countries mitigates pathogen spread that potentially poses a threat to the United States. The World Health Organization recently launched a global surveillance network known as the International Pathogen Surveillance Network, and similar systems are needed in the United States to facilitate early detection and deployment of resources. Supporting interconnection of these early warning systems through education, laboratory surveillance, and data sharing are keys to early identification and management of emerging threats worldwide.
- Support actions that strengthen the relationships between public health and non-governmental organizations to coordinate a standard and evidenced-based plan to mitigate the impact of EIDs, both domestically and internationally. Within the United States, federal agencies such as the White House, Department of Health and Human Services, Administration for Strategic Preparedness & Response, and the Department of Defense, should work with state governments, state and local health

Table 2. Mitigating emerging infectious threats: Challenges, recommendations to policymakers, and examples

Challenge	Recommendation (*Examples*)
Multiple EID surveillance systems create a patchwork of networks with limited data coordination and uneven geographic distribution	Fund linkages between disparate global and domestic surveillance/sentinel systems for early detection of EID. • *Government entities (e.g. CDC Emerging Infections Program, NIH Centers for Research in EID Network)* • *Non-governmental organizations* Provide funding to establish or expand domestic EID surveillance systems to additional geographic areas
Limited coordination between public health agencies, NGOs, and policymakers on EID preparation and management	Increase policymaker engagement in EID preparedness activities between multiple agencies to improve coordination of EID mitigation plans. Agencies include: • *Federal agencies (HHS, ASPR, CDC, DoD)* • *State and local health departments* • *Non-governmental organizations (CSTE, NACCHO, hospital preparedness programs)*
Lack of training for frontline providers to respond to EID	Develop resources to educate providers and health systems to respond to EID. These include professionals within: • *Academic, military, and community centers* • *Public health agencies* • *Healthcare facilities*
Need to apply lessons from most recent pandemic to better respond to the next pandemic	Support research for pandemic preparedness. Content areas include: • *Vaccines and vaccine platforms* • *Communication to combat antivaccine movement* • *Interactions between humans, animals, and environment using the One Health Model*
Factors contributing to EID include healthcare disparities and climate change	Fund programs and create policies that address healthcare disparities, such as • *Drivers of socioeconomic inequality* • *Infectious and noninfectious factors* Support healthcare- and non-healthcare-related efforts to reduce carbon emissions

Abbreviations: CDC, Centers for Disease Control & Prevention; HHS, Department of Health and Human Services; ASPR, Administration for Strategic Preparedness and Response; DoD, Department of Defense; CSTE, Council for State and Territorial Epidemiologists; NACCHO, National Association of City and County Health Organizations; EID, emerging infectious disease.

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departments, epidemiologists, and related organizations such as the Council of State and Territorial Epidemiologists, National Association of County and City Health Officials, and regional Hospital Preparedness Coalitions to conduct exercises and coordinate timely responses to EID. Earmarked funds to allow for enhanced collaborative efforts are needed to ensure these connections are strengthened and organized early in any potential EID. Developing a clearer and more transparent roadmap for informing political leadership and policymakers of these activities when early warning systems are triggered with clear reporting and management structures would help ensure an adequate, coordinated, and effective, evidence-based response.

- Develop sustainable national resources to rapidly educate healthcare personnel and health systems on coordinating and responding to public health crises. This includes identifying and strengthening centers-of-excellence (academic, military, and community centers) in pandemic preparedness, where others can train, learn, and model best practices; support healthcare and public health staff to train yearly at these facilities to increase the pool of experts and enhance national preparation.
- Support public and private research initiatives for pandemic preparedness and educational support structures needed to enhance national infrastructure, training, and preparedness which continues even during non-outbreak/pandemic years. This includes support for novel vaccines, vaccine platforms, and anti-infective agents in anticipation of both expected (eg pandemic influenza) and unexpected pandemic events.
- Provide targeted funding to promote evidence-based communication strategies to promote uptake of effective vaccines through available public health infrastructures, community-based healthcare systems, and social media.
- Support additional research within the One Health model to advance understanding of the interplay and actions between humans, animals, and the shared environment that could contribute to EIDs.
- Develop policies to address factors that contribute to global pandemics. One such factor includes healthcare disparities involving noninfectious factors such as chronic diseases, drivers of socioeconomic inequality, as well as inequalities that directly affect spread of infectious disease. Rising global temperatures contributing to climate change is an additional factor that can increase the likelihood of EID among other human health impacts. Effective mitigation strategies require global action from all, including the US healthcare sector, estimated to cause about 8.5% of US carbon emissions.[15]

In summary, various factors contribute to the increasing risk of global pandemics caused by emerging and re-emerging pathogens. Strengthening surveillance systems to identify EIDs is an important step toward mitigating future risk. However, surveillance alone is insufficient without a coordinated and standardized early response. Funding programs to strengthen relationships from interested parties involved in EID response, research, and education remains essential while continuing to address underlying causes for EIDs remains crucial to preventing the next pandemic.

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