VIEWPOINT

An Improved Alert System for Emerging Infectious Diseases

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The US health care system faces a growing challenge from emerging and reemerging pathogens. As the current H5N1 outbreak illustrates, this risk exists along a spectrum. However, public health alerts about new infectious disease health threats tend to be binary—either low risk or a crisis. These alerts are inadequate because they do not account for uncertainty or provide actionable guidance needed if the situation evolves. Such guidance is helpful for health care delivery because of the ramp-up time needed to acquire equipment, train health care workers, and implement new policies and procedures. An improved outbreak alert system is needed to ensure a coordinated response across health care and public health sectors, similar to the Defense Readiness Condition (DEFCON) system utilized by the US Department of Defense, which sets the perceived level of threat and defines the required level of activation across different actors and agencies.[1]

The 2013 to 2016 West African Ebola virus disease epidemic led to the development of specialized health care capacity in select centers to address high-consequence pathogens. These centers of excellence can provide care to sporadic cases of viral hemorrhagic fevers and other pathogens needing resource- and labor-intensive care delivery.[2] However, pathogens such as mpox, H5N1, and COVID-19 pose ongoing challenges due to their varying severity and unpredictable spread. This is because they require a pervasive level of readiness and ongoing vigilance beyond designated hospitals. When new threats appear, health care facilities need to balance their preparedness and readiness posture with their ability to deliver routine care. To avoid disruptions and guide appropriate allocation of resources, they would benefit from assessments that rank new threats along a larger spectrum of risk (which accounts for uncertainty in the evolution as well as the spread of the pathogen) and a clearer understanding of current and future vulnerabilities based on their capacity.

Gaps in Current Alert Systems

A comprehensive alert system that directly links changing threat levels to specific preparedness and response actions is lacking. Existing risk assessments for novel pathogens also do not take health system capacity into account. For example, the US Centers for Disease Control and Prevention's (CDC) Influenza Risk Assessment Tool assesses the risk of new virus strains based on biological factors as well as epidemiological and scientific uncertainty.[3] However, it does not provide guidance to facilities on how to prepare or give ongoing assessments on escalating readiness in response to situational changes. Additionally, existing alerts do not consider that the same threat would pose a different level of risk to frontline or rural facilities compared with tertiary care or urban hospitals. Individual facilities often make their own risk assessments about a new threat based on their understanding of the hazard and interpret its impact on their operations. Hence, depending on resources and competing demands, they may prepare differently. Such variation can impact how ready they are to receive a patient with an uncommon infection and ultimately affect clinical outcomes and overall outbreak response. Improved standardization of the needed readiness stance for an evolving situation can help more quickly identify a patient with infectious disease with the potential to disrupt normal operations, improving care for not only the patient of interest, but also others seeking care. It can also improve equity in the quality of care that patients with emerging pathogens receive.

Although a variety of metrics already exist for critical health care and public health capacities and timeliness of response to infectious disease threats, they provide a baseline level of competencies and are static in nature, rather than a situational and dynamic guide to preparedness.[4] Public health alerts, such as the CDC's Health Alert Network, address dynamic risk by providing tiered warnings (alerts, advisories, and updates) around new infectious diseases threats, but often focus on actions that individual clinicians can take. They do not include enough guidance for a facility-level response and only encompass some elements but not the entire spectrum of readiness activities needed for care delivery, such as patient transport and referral, preparedness for surge capacity, impacts to supply chain, level of investment in practitioner education and outreach, and planning and acquisition of appropriate and sufficient medical resources. They additionally lack a foresight dimension on how an outbreak may evolve, which could help ready the health care sector for a variety of potential scenarios and plan ahead if the situation worsens.

Identifying Essential Alert Components

A tiered outbreak alert system for health care facilities could have 3 main components. First, it should establish objective criteria to assess the risk of new pathogens of concern to health care delivery. In addition to factors such as biology, epidemiology, and the availability of medical countermeasures that are often included in public health alerts, an alert system for health care should also focus on how the pathogen's impact could vary with facility and regional care capacity as well as larger geographic features, such as connectivity via travel, population density, supply chain gaps, and socioeconomic vulnerability index. In other words, aside from information about the pathogen itself, which is the hazard, the risk assessment should provide tools for health care facilities to determine threat to their functions based on their vulnerabilities and assets. This approach also has a secondary benefit of quickly identifying facilities and regions that may need targeted assistance if an outbreak worsens.

Second, the alert system should define the specific health care preparedness postures needed by level of threat, encompassing factors such as space, supplies, staff, protocols, communications, and linkages to the larger public health response. These postures would trigger corresponding actions, investments and acquisitions, and training

based on the severity and location of the threat. Emerging pathogens often require adoption of new diagnostics or treatments in clinical care, but the act of seeking out these new countermeasures is left up to the individual clinician, leading to slower adoption.[5] An improved alert system should identify the facility's role in raising awareness about new pathways or processes needed to access new medical countermeasures, such as diagnostics and treatments.

Third, this alert system should identify missing data or knowledge that could impact threat level and what additional actions would be expected at that level. Such missing knowledge could include gaps in surveillance data, diagnostic capabilities, or therapeutic options, as well as scientific understanding of transmission or natural history that would have critical implications for health care response. An alert system that provides foresight into preparedness and response depending on answers to missing information is equally valuable as forecasting, which provides the likely scenario based on current knowledge.

Developing such an alert system will be complex, requiring multidisciplinary and multistakeholder input. The type of alert system described here would be best operated as a partnership between public health officials and stakeholders in the health care field with technical expertise in facility preparedness and response. It could be initially developed in partnership with local, state, and federal public health agencies; health care consortia; patient advocacy groups; and professional societies. The benefits of this alert system include increased clarity among stakeholders, enhanced coordination, and improved resilience and resource allocation. By including health care capacity as part of the assessment, these alerts could highlight the investments that many safety-net and lower-resourced facilities must make to ensure readiness, underscoring a case for future federal assistance. By communicating about new threats along a spectrum, such alerts can also reduce confusion among health care workers and concern among the general public.

ARTICLE INFORMATION

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