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Safer countries through global health security

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Countries around the world face a perfect storm of converging threats that might substantially increase the risk from infectious disease epidemics, despite improvements in technologies, communication, and some health systems. New pathogens emerge each year, some of which have high mortality and the potential for efficient transmission—eg, severe acute respiratory syndrome (SARS),¹ Middle East respiratory syndrome coronavirus,² and avian influenza A H7N9.³ Existing pathogens are becoming resistant to available antibiotics and several are now resistant to virtually all available treatment.⁴ There is also the potential threat of intentional release of biological agents, which can be developed or synthesised biologically and disseminated at low cost and with little scientific expertise. Moreover, the accelerated pace of globalisation amplifies these risks: a disease is just a plane trip away, and an outbreak anywhere is a threat everywhere.

One of the primary responsibilities of any government is to protect the health and safety of its people. There are three key elements of health security: prevention wherever possible, early detection, and timely and effective response. Although many countries are now better able to manage infectious disease threats than in the past, these improvements have often been small in scale and limited in scope. The International Health Regulations (IHR), revised by WHO in 2005 to more directly address new and emerging epidemic threats,⁵ require all 194 signatory countries to improve capacity in these and other areas as part of their commitment to protecting health.⁶ Yet, at least 80% of countries did not report full IHR compliance by the 2012 deadline.⁷

There is a perception in some quarters that tackling epidemic threats is less important than addressing

major killers, such as HIV, tuberculosis, and malaria, and that international efforts to stop outbreaks might be more in the interest of high-income than of low-income and middle-income countries.⁸ In fact, epidemic threats are potentially devastating to development through economic dislocation, decreased productivity, avoidable medical costs, loss of revenues from tourism and travel, and negative incentives for investment. The effective implementation of measures to ensure global health security builds a firm, broad-based public health foundation that promotes country self-sufficiency and can sustain health progress in any area in which a country decides to focus. Most fundamentally, addressing epidemic threats saves lives.

Rapid progress in health security is feasible if there is high-level political motivation, adequate investment, and technical expertise. After the devastating impact of SARS in 2003, China launched an ambitious programme to improve detection of new threats, strengthen response capacity, and report more transparently. The number of influenza surveillance laboratories grew to more than 400, the Chinese National Influenza Center was designated as the world's fifth WHO Collaborating Centre for Reference and Research on Influenza,⁹ the Chinese Center for Disease Control and Prevention (China CDC) was greatly strengthened with training of field epidemiologists and establishment of an Emergency Operations Centre, and mechanisms for rapid reporting to WHO were put in place. When the influenza A H7N9 virus began causing human illness in February, 2013, China was quickly able to identify and sequence the genome, and share the sequence globally within days of the first report, which enabled a rapid start on development of diagnostics and a vaccine.

Many countries have improved health security by preventing avoidable epidemics, detecting outbreaks

early, and responding effectively. A key lesson from managing health crises of the past decade is that effective response to emergencies cannot be done by having stand-by systems that are activated only when they are urgently needed, but requires strengthening day-to-day detection, response, and prevention programmes that can be scaled up quickly if needed.¹⁰ After the devastating earthquake in Haiti in January, 2010, the US Centers for Disease Control and Prevention (CDC) worked with the Haitian Ministry of Health and Population to strengthen disease surveillance and laboratory capacity and help train Haiti's public health workforce.¹¹ This laid the groundwork for rapid detection and effective response to epidemic cholera,¹² maintenance and expansion of HIV services during the cholera epidemic,¹³ and meaningful improvements to protect the health of Haiti's population through disease prevention activities, such as expanded access and higher coverage with childhood vaccines, improved control of filariasis, and improved HIV testing, care, and treatment.¹⁴

Early detection of outbreaks is vital to keep their impact to a minimum. In Uganda and Vietnam, with support from CDC and the US Department of Defense's Defense Threat Reduction Agency, the health ministries enhanced existing non-proprietary information systems and laboratory specimen referral networks for real-time reporting. This approach has already led to early detection and subsequent initiation of timely public health responses to outbreaks in Uganda from pathogens that include Zika virus, Crimean-Congo haemorrhagic fever virus, hepatitis E virus, *Neisseria meningitidis*, and multidrug-resistant and extensively drug-resistant *Mycobacterium tuberculosis*.¹⁵ The time from the start of an outbreak to detection and response has decreased substantially in Uganda, as it has in many other countries that have strengthened disease detection capacity.¹⁶

Effective response to epidemics is greatly enhanced by a well trained workforce, coordinated through a public health Emergency Operations Centre. Enhanced facilities, state-of-the-art equipment, standard operating procedures, and objective assessment exercises have been part of the enhancements of Emergency Operations Centres in Uganda and Vietnam.^{15,17}

Panel: Key global health security areas to prevent, detect, and respond to infectious disease outbreaks

Prevent—systems, policies, and procedures to mitigate avoidable outbreaks, including

- Surveillance to monitor and slow the emergence and spread of antimicrobial resistance
- National laboratory biosecurity system
- Policies and practices that reduce the risk of zoonotic disease transmission
- Immunisation against epidemic prone diseases (90% of 1-year-old children with at least one dose of measles vaccine)

Detect—a national surveillance and laboratory system capable of reliable testing for five or more of ten core tests relevant to the country's epidemiological profile on specimens from patients in disease clusters in more than 80% of districts and

- Standardised surveillance for three core syndromes
- Regional and national interoperable electronic reporting systems with timely reporting to WHO, World Organization for Animal Health, and Food and Agricultural Organization of the United Nations
- Multidisciplinary public health workforce with one or more epidemiologists per 200 000 population

Respond—a national public health Emergency Operations Centre capable of activating an emergency response in under 120 min, including

- Trained rapid response teams
- Linkages between public health and law enforcement for suspected biological attacks
- National framework to engage international partners during a public health emergency

On Feb 13, 2014, the US Government launched a new global health security agenda in partnership with WHO, the Food and Agricultural Organization of the United Nations, the World Organization for Animal Health, as well as with other countries.¹⁸ The goal is to accelerate progress so that every country has an effective system to prevent, detect, and respond to health threats. Over the next 5 years, the USA has committed to working with at least 30 countries to more effectively protect at least 4 billion people from naturally occurring, accidental, or intentional infectious disease threats. We are confident that with commitment from high-income, middle-income, and low-income countries, every part of the world can better prevent, more rapidly detect, and effectively respond to health threats. Core elements of effective global health security are summarised in the panel.

The global health security effort will also advance IHR implementation by prioritising key activities with national leadership, enlisting veterinary, agriculture, and other sectors where necessary and appropriate, and focusing on critical elements of the IHR core capacities.¹⁹ There has been substantial commitment from health leaders to implement the IHRs, both to

meet requirements and because of the need to protect their own people. However, lack of sustained attention, limited resources for health ministries, the need for additional technical assistance, and the lack of an objective public monitoring framework have impeded implementation.

The global health security technical package offers specific targets to gauge meaningful progress. For example, a nation that has immunised 90% of its children against measles by age 1 year has effectively prevented one prominent epidemic threat and established an infrastructure that can address other threats that arise. A country that establishes a nationwide laboratory network that can reliably undertake at least five of the core tests chosen from their epidemiological risk profile, and is capable of receiving biological specimens from patient clusters of disease occurring in at least 80% of districts across the country, has a core element of an effective disease detection system in place. Countries that have invested in a national, integrated Emergency Operations Centre with the capacity to mount a coordinated, multisectoral emergency response within 120 min will have the capability to mitigate an infectious disease outbreak or other threat of public health concern. Such measures improve the security of that country's citizens as well as people in other parts of the world, and are fundamental to a strong public health system able to manage endemic disease and epidemic threats effectively.

Global health security also focuses on long-term sustainability of national health security through public-private partnerships and the commitment of annual health investments that allow countries to become self-sufficient. Helping countries improve their ability to prevent, detect, and respond to endemic diseases, even if some of these are unlikely to be exported elsewhere, is important for the health and wellbeing of their own people and creates public health capacities that can address other threats. By focusing global health security strategies and IHR implementation on all potential health threats, and not solely on bioterror and epidemic threats, countries can

improve health in an emergency and will be better able to address everyday health challenges.

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We declare that we have no competing interests.

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