

VIEWPOINT

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Is the United States Prepared for Ebola?

The West African Ebola epidemic is a humanitarian crisis and a threat to international security.¹ It is not surprising that isolated cases have emerged in Europe and North America, but a large outbreak in the United States, with its advanced health system, is unlikely. Yet the handling of the first domestically diagnosed Ebola case in Dallas, Texas, raised concerns about national public health preparedness. What were the critical health system vulnerabilities revealed in Dallas, and how can the country respond more effectively to novel diseases in a globalized world?

The Dallas Cases

Thomas E. Duncan, a 42-year-old Liberian citizen, contracted Ebola virus disease (EVD) on September 15, 2014, when he carried a pregnant neighbor who fainted in a taxi they shared in Monrovia; she subsequently died of Ebola. On September 19, Duncan left Monrovia's Roberts International Airport en route to Brussels, then Washington, DC, and finally Dallas. Before boarding he was asymptomatic and probably not infectious.

On September 26, 5 days after reaching Dallas, Duncan presented at Texas Health Presbyterian Hospital with Ebola-like symptoms and reported his travel from Libe-

ria, identifying 48 individuals, including 5 school-aged children, who were told to remain at home for 21 days. It was only when Pham became infected that surveillance extended to approximately 50 health workers who had cared for Duncan. The diagnosis of Pham and Vinson, following a similar case in Spain, led the Centers for Disease Control and Prevention (CDC) to reconsider the ability of hospitals to safely treat Ebola patients without advanced training and facilities.

Health System Preparedness

The Dallas case raises significant concerns about national preparedness for public health emergencies. Health emergencies (eg, anthrax, SARS, novel influenza, and hurricanes Katrina and Sandy) spurred federal preparedness planning and funding, including the Pandemic and All-Hazards Preparedness Act (reauthorized in 2013),² to ensure that federal, state, and more than 3500 local health departments coordinate their efforts effectively in disasters. Significant investments have been made in staff training, interagency coordination, legal reform, and planning.

Preparedness efforts like these are essential, but inadequate. Overall, investment in key health system functions has been in decline. The CDC's 2013 budget declined 10%, or nearly \$1 billion, from 2012.³ Since 2008, state and local public health agencies have lost more than 50 000 staff (almost 20% of their workforce),⁴ requiring cuts to preparedness programs. Many EMS agencies and hospitals are also strained, leading the Institute of Medicine to warn in 2012 of an "enormous potential for confusion, chaos, and flawed decision-making"⁵ in a public health emergency. Insufficient funding in a research and data infrastructure limits the ability to identify weaknesses and learn from mistakes. Rare, novel infections such as Ebola expose the difficulty of diagnosis and adherence to arduous infection control protocols. Following the nurses' EVD diagnosis in Dallas, future Ebola patients may be directed to centers with advance training, PPEs, and well-equipped isolation rooms. Vinson was transferred to Emory Hospital in Atlanta on October 15.

Isolation and Quarantine

The hospital's decision to isolate Duncan was consistent with the common practice of separating known infectious patients. State and local public health agencies also have the power to quarantine exposed contacts even without a confirmed diagnosis. The CDC has more limited isolation and quarantine authority that can be exercised only to prevent international or interstate spread, which it implements largely through 20 federal quarantine stations. Isolation and quarantine powers require

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ria. For reasons still disputed, Duncan was prescribed antibiotics and sent home. Two days later, after his condition deteriorated, he returned to the hospital and was admitted and placed in isolation, later testing EVD positive—10 days after his initial arrival in the United States. Duncan died on October 8, amid public concern about misdiagnosis and delayed treatment. Shortly after Duncan's death, on October 12, Nina Pham, a nurse who treated him, tested EVD positive. Another nurse on the treatment team, Amber Vinson, was confirmed to have EVD on October 14.

Duncan's delayed diagnosis triggered a cascade of public health missteps. Emergency medical service (EMS) personnel transported him without appropriate personal protective equipment (PPE). The transporting ambulance continued to be used for 48 hours before it was decontaminated. The Dallas County health department issued a communicable disease control order requiring 4 people with whom Duncan had shared an apartment to remain there—even though the apartment had not been decontaminated. The health department explained it had difficulty obtaining a permit to transport the hazardous waste. The residents were later moved to another location. Health officials traced known

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due process (usually after confinement), including a hearing, treatment, and a safe/humane environment. The quarantine of the 4 individuals in Dallas in unsafe conditions exposed them to unnecessary risk.

Public Health Emergencies

Formal emergency declarations can provide additional powers, such as social distancing (closing businesses or schools), altered scopes of professional practice, and limited liability. The Department of Health and Human Services, 26 states, and many municipal governments can declare public health emergencies. On October 6, 2014, Connecticut became the first state to designate an emergency in response to Ebola.⁶ Declared health emergencies may also help mobilize political will and release funding for preparedness.

International Exit and Entry Screening

On October 8, the CDC announced enhanced screening at 5 US airports that receive 94% of arrivals originating from Sierra Leone, Liberia, and Guinea.⁷ After passport review, customs agents escort passengers originating in these 3 countries to a designated area, take their temperature with a noncontact thermometer, observe for symptoms, and inquire about their health and exposure history. CDC officers evaluate travelers with a fever, symptoms, or potential exposure. Those requiring additional evaluation are referred to the state or local public health authority. Travelers without symptoms or exposures receive health information for self-monitoring and are asked to provide location information.

Entry screening, authorized by federal statutes and regulations, is conducted in addition to exit screening in the 3 affected countries. All outbound passengers are screened with a health questionnaire, visual assessment for symptoms, and temperature monitoring. To date exit screening has led to boarding denials of fewer than 100 persons in affected countries, none of whom were sub-

sequently diagnosed with EVD. Most had diseases endemic in the region, such as malaria or tuberculosis. If a passenger becomes ill during flight, domestic and international flight rules require airlines to inform airport authorities before landing.

The new entry screening—the first time the United States has implemented fever monitoring—represents a measured response, targeting roughly 150 passengers daily originating from affected countries. President Obama has resisted calls for travel restrictions, which would arguably violate the International Health Regulations and exacerbate the West African epidemic by impeding the flow of aid workers and supplies. US screening procedures, while moderate and lawful, will not materially increase border protection. During the 2003 SARS outbreak, Canada's screening practices did not detect any SARS cases at border entry points. Passengers exhibiting no Ebola symptoms at departure are unlikely to develop symptoms upon arrival. Most fevers detected at US airports will likely be false-positives, caused by endemic diseases or influenza.

Risk Reduction

Only by controlling Ebola in West Africa can lives be saved and the risks of international spread minimized. Domestically, Ebola prompts the recognition that preparedness depends on the core strength of health systems. Not enough has been done to support well-functioning health systems in West Africa, but the United States also needs to invest more in domestic health system capacity. After the country has spent more than a decade developing preparedness programs and laws, isolated Ebola cases reveal the vital need to build a stronger system for detecting and treating infectious diseases, evaluating and improving performance, and committing to the basic institutions and professionals charged with protecting the public's health.

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