Chapter 2

Tiered National System

JAMES V. LAWLER
ANGELA M. VASA

Introduction

The 2014–16 West Africa Ebola virus disease (EVD) outbreak, with resulting domestic importations of EVD cases, revealed that United States health care and public health systems were inadequately prepared to care for patients with highly hazardous communicable disease (HHCD) presenting to hospitals. In response, the federal government worked with state and local health authorities to develop a tiered system of acute care facilities, defined by specific standards, supported by education and training resources, and designed to safely care for future patients with EVD and manage the appearance of other HHCD patients. Currently, this system consists of a network of frontline health care facilities, Ebola assessment hospitals, Ebola treatment centers (ETCs), and ten regional Ebola and other special pathogen treatment centers (RESPTCs), conforming to the ten US regions for preparedness and response defined by the US Department of Health and Human Services (HHS). These facilities are provided with guidance by the National Ebola Training and Education Center (NETEC), the Centers for Disease Control and Prevention (CDC), the HHS Assistant Secretary for Preparedness and Response (ASPR), and public health emergency response elements of the federal government, including CDC Ebola response teams.
(CERTs). Collectively, this tiered system, according to an HHS ASPR report, “balances geographic need, considers differences in institutional capabilities, accounts for the potential need to care for a patient with Ebola,” and provides the foundation for care of other HHCDs. This chapter describes the current US tiered system, the roles that hospitals and acute care facilities can play, and the resources available to support such entities.

**Background and Origin**

In September 2014 the West Africa EVD epidemic was already the largest known outbreak of EVD in history and had resulted in thousands of deaths in West Africa. Amid rising concerns about the potential for imported cases of EVD, several hospitals in the United States and Europe treated repatriated, infected relief workers—but in specialized units that had trained specifically for management of HHCDs. Then, on September 30, the first unplanned case of EVD imported to the United States was admitted to a Dallas hospital. By the time the patient died in the hospital eight days later, two staff nurses were infected with EVD, contradicting previous claims that standard hospital infection prevention and control training and procedures should prove adequate to prevent nosocomial transmission. These events triggered a scramble among hospitals and the public health authorities to prepare the US health system to manage the potential influx of new cases.

By late October 2014, EVD treatment experts along with federal, state, and local health authorities agreed that EVD patients in the United States should be funneled to referral centers that had appropriate training and infrastructure to safely manage such infections. Out of necessity, health authorities began to take a regional and tiered approach to designating and training hospitals to serve in that role. The CDC developed and implemented training in hospitals in perceived highest-risk locations. In early December 2014 CDC designated 35 hospitals as ETCs that had been trained and inspected by CERTs and had developed interim guidance with additional training materials for hospitals occupying a frontline role in the tiered system. In addition, training teams and new training materials on a variety of media (including Apple’s iTunes
University) were developed and pushed out by expert groups such as the Nebraska Biocontainment Unit at Nebraska Medicine (NM)/University of Nebraska Medical Center (UNMC) in order to supplement activities from CDC and other official government sources. Using $260 million in 2015 Ebola supplemental funds and congressional authorization, the CDC and ASPR Hospital Preparedness Program (HPP) developed a concept for a regional treatment network for EVD by August 2015 and had launched additional training and support efforts to realize that goal.

**US Regional Treatment System for EVD**

The tiered, regional system concept recognizes that the care of patients with EVD (and other HHCDs) is hazardous, highly complex, and best implemented by clinical care teams with specific technical expertise and technological and logistical systems. However, it also acknowledges the reality that these patients can present to any hospital at any time. Therefore, all facilities must be prepared to identify, isolate, and provide initial clinical management for patients under investigation (PUIs) until safe transport can be arranged to a more capable hospital. While guidance exists for outpatient clinics and other health care facilities regarding the identification and initial management of a PUI, the tiered system is designed to encompass specifically acute care facilities: hospitals and urgent care facilities specializing in treatment of acutely ill patients that will likely be the point of entry and initial point of significant clinical intervention for PUI presenting to the health care system. While it is a national system, designation of hospital roles and coordination of regional networks occur among partners within the region to ensure it serves the specific local need.

To achieve a robust capability, the US system encourages acute health care facilities and hospitals to occupy one of four roles:

1. Regional Ebola and other special pathogen treatment center (one for each of the ten HHS regions)
2. Ebola treatment center (state or jurisdiction)
3. Ebola assessment hospital
4. Frontline health care facility
Frontline facility and assessment hospital roles emphasize early identification and the ability to safely and effectively care for EVD patients on a temporary basis until transportation is arranged to higher-tier facilities. Frontline facilities should have sufficient staffing and supplies to provide care to an EVD patient for 12–24 hours prior to transfer. Assessment hospitals should be prepared to manage patients for up to 96 hours. Both ETCs and RESPTCs should be capable of providing definitive care and sustained management for patients with EVD or other HHCDs, although the RESPTCs are preferred as they should possess more robust capacity. CDC guidance and description of capabilities for the various levels is summarized in Table 2.1 and located at the CDC’s website: https://www.cdc.gov/vhf/ebola/healthcare-us/preparing/hospitals.html.

As we write this chapter, health authorities have designated more than 4,800 frontline health care facilities and more than 200 Ebola as-
assessment hospitals. Sixty-three hospitals are considered ETCs, and the 10 RESPTCs are positioned so that a significant majority of the United States is located within 400 miles of an RESPTC. A map of treatment centers is contained in Figure 2.1.

**Support for Regional Treatment Network Facilities**

A number of resources exist to support facilities with respect to education and training in preparedness, just-in-time training, subject matter expertise, or operational assistance in response activities. The centerpiece of support is NETEC, a consortium of three academic medical centers: Emory University Medical Center, Nebraska Medicine/University of Nebraska Medical Center, and New York City Hospitals/Bellevue Medical Center, which successfully managed EVD patients during the 2014–16 epidemic. CDC and ASPR established NETEC in parallel with the tiered regional network concept with the purpose of serving as the hub for developing and delivering education and training for EVD care. Among its functions, NETEC develops a suite of exercise templates addressing EVD care to be used by coalitions and individual health care facilities, provides readiness consultations for all designated facilities to assess preparedness efforts, provides real-time technical assistance, and supports a special pathogen clinical research infrastructure in the United States. Through NETEC, institutions can find a diverse collection of resources to assist in their efforts to advance readiness for HHCDs, accessible at https://netec.org/.

In addition to NETEC, CDC and ASPR provide guidance and education tailored for all tiers. CDC’s website contains information regarding hospital preparedness and the care of PUIs and confirmed EVD patients (see the link above). The website links to specific information for each tier of the network as well as various aspects of identification, isolation, and management of cases. ASPR’s Technical Resources, Assistance Center, and Information Exchange (TRACIE) is a resource developed for a wide range of federal and nonfederal entities involved in preparedness and response for public health emergencies. The TRACIE website is accessible at https://asprtracie.hhs.gov. The website provides a portal to technical and guidance documents, subject matter expertise
<table>
<thead>
<tr>
<th>Tier</th>
<th>Capability</th>
<th>Planned and prepared duration of care</th>
</tr>
</thead>
</table>
| **Regional Ebola and other special pathogen treatment center (RESPTC)** | • Receive and isolate up to 2 patients with EVD within 8 hours of notification  
• Provide clinical care for EVD patients for duration of illness using appropriate infection prevention and control (IPC) practice  
• Treat pediatric cases of EVD and other HHCD  
• Isolate and care for up to 10 patients with pathogen infections transmitted by respiratory/aerosol route  
• Safely manage hazardous waste from EVD patients | Duration of illness–PPE on hand for 7 days’ operation |
| **Ebola treatment center (ETC)**                          | • Receive and isolate a patient with confirmed EVD  
• Provide clinical care for EVD patient for duration of illness  
• Coordinate disposal of Category A waste with commercial vendor or appropriate entity  
• Work with state, local, and regional partners to coordinate interfacility transfer of patient with EVD | Duration of illness–PPE on hand for 7 days’ operation |
| **Regional Ebola and other special pathogen treatment center (RESPTC)** | • Receive and isolate up to 2 patients with EVD within 8 hours of notification  
• Provide clinical care for EVD patients for duration of illness using appropriate infection prevention and control (IPC) practice  
• Treat pediatric cases of EVD and other HHCD  
• Isolate and care for up to 10 patients with pathogen infections transmitted by respiratory/aerosol route  
• Safely manage hazardous waste from EVD patients | Duration of illness–PPE on hand for 7 days’ operation |
<table>
<thead>
<tr>
<th>Tier</th>
<th>Capability</th>
<th>Planned and prepared duration of care</th>
</tr>
</thead>
</table>
| Ebola treatment center (ETC)        | • Receive and isolate a patient with confirmed EVD  
• Provide clinical care for EVD patient for duration of illness  
• Coordinate disposal of Category A waste with commercial vendor or appropriate entity  
• Work with state, local, and regional partners to coordinate interfacility transfer of patient with EVD | Duration of illness–PPE on hand for 7 days’ operation                      |
| Ebola assessment hospital           | • Receive and isolate a PUI  
• Provide immediate laboratory evaluation and arrange for Ebola diagnostic testing  
• Provide necessary medical treatment using appropriate IPC, including care for alternative diagnoses  
• Coordinate disposal of Category A waste with commercial vendor or appropriate entity  
• Work with state, local, and regional partners to coordinate transfer of patient to ETC or RSPTC | 96 hours                                                                  |
| Frontline health care facility      | • Rapidly identify and isolate a PUI  
• Notify local personnel and appropriate public health authorities to arrange transfer  
• Provide necessary medical treatment using appropriate IPC                     | 12–24 hours                                                               |
and assistance with answering questions on specific preparedness or response topics, and discussion boards for peer-to-peer information exchange. The TRACIE assistance center can be accessed online or through a toll-free number (1-844-5-TRACIE) but is only staffed during working hours and is not an appropriate resource for acute needs related to response.

In the event of an actual PUI or confirmed Ebola patient, facilities can reach out to several real-time resources. Local and state public health authorities should always be the first point of contact and should be made aware of any other outreach. The CDC Emergency Operations Center (EOC) hotline is available 24/7 as a single point of contact to access CDC subject matter experts. The CDC EOC watch officer is available at 770-488-7100. If on-site assistance is required, a CDC Ebola Response Team (CERT) can deploy to provide direct support to hospitals. NETEC also provides on-call support for technical assistance and advice. Individual hospitals can access NETEC subject matter experts either by contacting their state health department or through the CDC EOC, who have direct access to the NETEC emergency consultation phone line.

**Regional Network and HHCDs Other Than Ebola**

Although the regional treatment system was conceived to address EVD and funded by appropriations specifically tied to the response to the 2014–16 Ebola crisis, ASPR and CDC acknowledge that the network can and should be used to address a myriad of HHCD threats requiring specialized care and IPC. Guidance specifically calls for RESPTCs to have capability to manage airborne respiratory pathogens, and much of the training and exercised capabilities established under the tiered system should be directly transferrable to management of other HHCDs requiring enhanced contact, droplet, or airborne precautions. Under the ASPR HPP Ebola Preparedness Measures released in 2017, designated facilities conducting exercises with “other special pathogens” were allowed to include these efforts in the reporting requirements to meet specified metrics. ETCs and assessment hospitals must conduct, at a minimum, annual exercises, and RESPTCs must complete quarterly exercises including no-notice components. RESPTCs are also required to conduct
quarterly training for all rostered staff including IPC practices and PPE donning and doffing.

In order to support the evolution from EVD-centric preparedness efforts, NETEC, in collaboration with ASPR and CDC, have developed exercise templates that are customizable for different HHCDs of concern and map directly to the ASPR HPP Ebola Preparedness metrics, which enable all tiered facilities to more effectively plan and execute required exercises. In addition, NETEC readiness consultations now include considerations related to airborne respiratory pathogens for facilities and subject matters on site to address during the consultation.

**Conclusion**

The advent of the tiered regional system for care of EVD and other HHCD patients significantly advanced the ability of the US health care system to identify, isolate, treat, and transport these patients in a way that protects health care workers and others. This initiative, along with the implementation of NETEC working alongside federal agencies, ultimately strengthens the nation's health care and public health systems for the next emerging infectious disease threat. Health care facilities should work with local and state public health authorities and their local health care coalition to determine the appropriate tier they should occupy and coordinate training and exercise plans to integrate fully within their region's network. Guidance and training resources for each tier are available through CDC and NETEC, among others. As the threat of novel emerging infections continues to grow, this system should serve as a cornerstone for future efforts to mitigate the impact of these significant and dangerous events.