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THE NATIONAL EBOLA TRAINING AND EDUCATION CENTER: PREPARING THE UNITED STATES FOR EBOLA AND OTHER SPECIAL PATHOGENS

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Abstract

The National Ebola Training and Education Center (NETEC) was established in 2015 in response to the 2014–2016 Ebola virus disease outbreak in West Africa. The US Department of Health and Human Services office of the Assistant Secretary for Preparedness and Response and the US Centers for Disease Control and Prevention sought to increase the competency of healthcare and public health workers, as well as the capability of healthcare facilities in the United States, to deliver safe, efficient, and effective care to patients infected with Ebola and other special pathogens nationwide. NYC Health + Hospitals/Bellevue, Emory University, and the University of Nebraska Medical Center/Nebraska Medicine were awarded this cooperative agreement, based in part on their experience in safely and successfully evaluating and treating patients with Ebola virus disease in the United States. In 2016, NETEC received a supplemental award to expand on 3 initial primary tasks: (1) develop metrics and conduct peer review assessments; (2) develop and provide educational materials, resources, and tools, including exercise design templates; (3) provide expert training and technical assistance; and, to add a fourth task, create a special pathogens clinical research network.

Keywords

Ebola; Training; Education; Biocontainment; Hospital preparedness/response; Infectious diseases; Personal protective equipment

THE EBOLA OUTBREAK OF 2014–2016 was a wake-up call to the world. More than 28,000 individuals are estimated to have been infected with Ebola during that period, more than 11,000 died, and the lives of millions of people in West Africa and beyond were dramatically affected.¹ Members of the global healthcare community came to the aid of the people of West Africa in an effort to attempt to stem the tide of the growing outbreak, including both nongovernment and government agencies. Countries throughout the world began to assess their own preparedness and increase domestic readiness efforts. As a part of this process, it became apparent that resources were stretched thin in West Africa. As the United States began to receive infected citizens in August 2014 and prepare for the

screening and care of patients with Ebola virus disease (EVD) domestically, gaps in our own system became evident as well. In early 2015, the US Department of Health and Human Services (HHS) initiated several programs to systematically address EVD clinical care preparedness and response.

In an era of global travel, nearly any medical system may encounter an imported special pathogen. Outbreaks of severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) have shown that these diseases can spread from person to person quickly and need to be promptly identified and isolated. Caring for patients with EVD underscored that fact and caused great public concern.

Biocontainment patient care units require consistent funding and training to maintain readiness, and they have been very limited in number in the United States. However, it is understood that a patient with a high-consequence pathogen may present to any US healthcare facility—an urgent care center, a small critical access hospital, a large tertiary hospital, or a hospital with a biocontainment unit—necessitating that all points of entry into the healthcare system be included in the education and readiness efforts.

In February 2015, the HHS office of the Assistant Secretary for Preparedness and Response (ASPR) published a funding announcement titled “Hospital Preparedness Program (HPP) Ebola Preparedness and Response Activities.” This program supported the development of a tiered national network consisting of (1) 10 regional Ebola and other special pathogen treatment centers selected by ASPR (see Figure 1), with the expectation that they be prepared to receive a patient with confirmed Ebola virus infection within a few hours; (2) state- or jurisdiction-designated treatment centers able to safely care for patients with EVD in the event that a cluster of patients presented and overwhelmed the regional treatment centers; (3) assessment hospitals able to safely receive and isolate a patient until a diagnosis of EVD is ruled out or confirmed and the patient is transferred; and (4) frontline healthcare facilities able to identify and isolate potential patients with EVD and facilitate their safe transport to an assessment hospital.

This tiered network laid the foundation for a national resource that could be disseminated throughout the 50 states and US territories, with \$194,500,000 available for development and preparedness.² While the 10 regional centers were formed in response to the Ebola outbreak, their designation as regional Ebola and other special pathogens treatment centers clearly denotes the expectation that these centers will serve as a resource in the nation’s preparedness efforts for other special pathogens as well.

In recognition of the complex nature of preparing the US healthcare system to safely assess and care for individuals with suspected or confirmed EVD and other special pathogens, ASPR and the US Centers for Disease Control and Prevention (CDC) partnered to support development and sustainment of the National Ebola Training and Education Center (NETEC). The concept behind NETEC was that it would support the tiered clinical network, as well as local and state partners (eg, public health departments and emergency medical services), with the expertise, training, and technical assistance necessary to develop and sustain the capabilities needed to safely and effectively manage patients with EVD or other

special pathogens, supported with peer review and technical assistance. ASPR and CDC also envisioned that NETEC would lend support to public health departments, healthcare providers, and facilities to achieve the preparedness necessary “to safely and successfully identify, isolate, assess, transport, and treat patients with Ebola or persons under investigation for Ebola.”²

FUNDING ANNOUNCEMENT AND EXPECTATIONS

In early 2015, ASPR and CDC released the Funding Opportunity Announcement (FOA) for NETEC for \$12 million, to

increase the competency of health care and public health workers and the capability of health care facilities to deliver safe, efficient, and effective Ebola patient care through the nationwide, regional network for Ebola and other infectious diseases. Comprised of staff from hospitals that have successfully evaluated and treated Ebola patients in the U.S., and in collaboration with staff from CDC and ASPR, the NETEC will offer expertise, education, training, technical assistance, peer review assessment, recognition reporting, and, if feasible, certification....³

Three activities with related strategies were delineated as requirements in the initial FOA:

Activity A: Develop Metrics and Conduct Peer Review Assessments, Monitoring, and Recognition Reporting, and if Feasible, Certification

- Strategy 1: The NETEC, in collaboration with ASPR, CDC, and other stakeholders, will develop metrics to measure facility and healthcare worker readiness to care for Ebola patients.
- Strategy 2: The NETEC, in collaboration with ASPR, CDC, and other stakeholders, will conduct peer review and readiness assessments of regional and state Ebola treatment centers.

Activity B: Establish Educational Curricula and Develop Educational Materials, Resources, and Tools

- Strategy 1: Create and maintain a comprehensive suite of timely and relevant educational materials (eg, curricula, just-in-time training, templates, train-the-trainer modules, tools, simulations, online resources, webinars) for policies and procedures related to care of patients with possible Ebola virus disease and other special pathogens.
- Strategy 2: In collaboration with health departments, identify and incorporate best practices regarding how health departments and treatment centers collaborate around the care of patients with Ebola.
- Strategy 3: Establish, in collaboration with ASPR and CDC, a repository to support dissemination of timely and relevant materials for the 5-year project period.

Activity C: Provide Expert Training and Technical Assistance

- Strategy 1: The NETEC will support the public health departments and healthcare facilities through the provision of training and technical assistance.

On July 1, 2015, ASPR and CDC announced that they would provide \$12 million over the next 5 years to Emory University in Atlanta, Georgia; the University of Nebraska Medical Center/Nebraska Medicine in Omaha, Nebraska; and NYC Health + Hospitals/Bellevue in New York, New York, to co-lead NETEC. Nicole Lurie, MD, Assistant Secretary for Preparedness and Response, stated:

The National Ebola Training and Education Center contributes to our nation's health security by developing and teaching evidence-based practices of experienced providers and health care institutions in caring for patients with Ebola and other serious infectious diseases. While this training starts with Ebola, it also will help the health care community deal with other serious infectious diseases in the future.⁴

CDC Director Tom Frieden, MD, added:

The ongoing Ebola epidemic in West Africa is proof that a threat anywhere can be a threat everywhere; the United States must continue to prepare. Hospitals are often the first place where a new disease threat is recognized. This new center will help our hospitals and healthcare workers prepare to handle new threats and safely care for patients.⁴

NETEC PROGRAM EXPANSION

In the summer of 2016, ASPR and CDC released a second FOA, providing for an expansion of NETEC programming, funded by up to \$12 million to be added throughout the remaining 4 years of the primary award.⁵ The supplemental funding offered an opportunity for NETEC to expand initial activities and address gaps in educational materials and technical assistance that were not addressed in the initial FOA. Additionally, the funding provided resources to expand NETEC's development of standard operating procedures, exercises, metrics, and support for overall readiness to address other special pathogens beyond Ebola, both contact and airborne. The FOA allowed NETEC to establish an infrastructure to rapidly respond to research opportunities and facilitate access to experimental interventions in a systematic and coordinated manner, which was not available during the 2014–2016 Ebola outbreak.

An added feature of the expansion was the ability to generate sub-awards to other entities, such as professional organizations, healthcare facilities, emergency medical services (EMS) and transport agencies, waste management experts, and individuals and international groups with expertise in treating patients with EVD and other special pathogens. This feature also allowed for sub-awards with a focus on developing research infrastructure as well, to support the development and operations of a lean but prepared research network.

Additional activities were requested in all 3 of the activity domains described above, including the addition of a research activity:

Expanded Activity A: Metrics, Readiness Assessment, and Annual Readiness Report

- Conduct up to an additional 60 hospital site visits/peer reviews for the duration of the project period.
- Provide technical assistance throughout the readiness site visits by disseminating the NETEC metrics self-assessment tool to each facility prior to NETEC's arrival, along with a request for applicable policies, procedures, and standard operating procedures.
- In collaboration with health department assessment teams, provide additional technical assistance to assessment hospitals to mitigate remaining significant capability gaps identified by the state health department or CDC during their initial visit.
- Expand hospital readiness site visit/peer review teams to include personnel from the regional Ebola and other special pathogen treatment center facilities.
- Develop metrics that allow for the expansion of Ebola contact isolation metrics to account for precautions necessary for isolation of airborne infectious diseases and other special pathogens.
- Establish an annual formal review and revision process that includes internal review of metric performance related to hospital assessment, exercise templates, education, and technical assistance.
- Conduct an annual meeting to review and validate metrics.

Expanded Activity B: Establish Educational Curricula and Develop Educational Materials, Resources, and Tools

- Create and facilitate additional educational courses covering ideal patient care strategies, train-the-trainer, research education, executive education, just-in-time vignettes, and skills labs.
- Teach 15 advanced-level courses to train up to 500 additional healthcare workers annually using inperson courses, skills labs, and simulation labs.
- Broaden training and exercises for ASPR-funded regional Ebola and other special pathogen treatment centers beyond Ebola to include other special pathogens (as determined by CDC, ASPR, and NETEC).

Expanded Activity C: Virtual Technical Assistance

- Create online courses in the Learning Management System that will enable an unlimited number of healthcare workers to access the training courses and obtain continuing education credit appropriate to their discipline.
- Build on existing ASPR and CDC Ebola preparedness training materials for facilities not designated as Ebola treatment centers or assessment hospitals (ie, frontline healthcare workers and facilities).

- Address gaps in current Ebola preparedness and training (ie, Category A waste management, laboratory issues).
- Work with ASPR and CDC to plan and implement risk assessments in US hospitals that are regional Ebola and other special pathogen treatment centers and Ebola treatment centers to identify gaps in preparedness for emerging threats (ie, preparing for an emerging respiratory threat).
- Work with ASPR and CDC to review national guidance for infection control measures and treatment of EVD and other special pathogens as needed during outbreaks of emerging threats or emergency responses.
- Coordinate input from a variety of disciplines and experts in the review of national guidance.
- Assist ASPR and CDC and coordinate with appropriate disciplines to support dissemination of national guidance.
- Develop a robust, searchable repository for real-time use by facilities, including regional Ebola and other special pathogen treatment centers, Ebola treatment centers, assessment hospitals, frontline healthcare facilities, and EMS systems.
- Configure <http://netec.org/> to allow facilities to submit requests for on-demand subject matter expert– based technical assistance.
- Establish 24/7 telephone support to provide real-time technical assistance and consultation to healthcare facilities on clinical care issues.
- Develop and implement an infrastructure, to include educational and information-sharing platforms that already exist, and that supports data collection, analyses, and rapid dissemination of clinical knowledge to healthcare providers, ASPR, CDC, and NIH.
- Develop protocols and a web-based tool to understand pathogenesis and response to clinical interventions to inform clinical management. Data elements should include, but not be limited to, clinical, virologic, and immunologic data.

Newly Established Activity D: Creation of the Special Pathogens Research Network

- Engage the 10 regional centers in a research network.
- Engage research partners such as NIH, CDC, USAMRIID, DARPA, ASPR/ BARDA, the Department of Defense, and the Department of State to coordinate research initiatives for emerging special pathogens that result in critical illness.
- Create a master protocol for research.
- Develop and operationalize a central Institutional Review Board for NETEC.
- Develop and implement a training protocol for research staff at regional treatment centers, emphasizing special issues pertaining to emerging pathogens.
- Develop model uniform policies and procedures for the conduct of clinical research in biocontainment units.

- Develop universal case report forms and questionnaires that include clinical, virologic, and immunologic data.
- Develop a web-based clinical data capture tool and database with the capability of collecting and coordinating data from the research network and conducting rapid analyses to provide feedback that informs therapeutics and clinical management.
- Hold an annual investigator's meeting with the clinical research teams from regional treatment facilities and other domestic and, as able, international partners to develop protocols and research resources. In collaboration with ASPR and CDC, create policies and procedures for a biorepository focused on special pathogens.

IMPLEMENTATION OF NETEC

The 2015 NETEC award established a robust collaborative relationship with the 3 awardees, ASPR, and CDC, which was expanded with the 2016 supplement. As outlined in the FOAs, NETEC has pursued a multifaceted approach to addressing the gaps that were highlighted by the 2014–2016 Ebola epidemic. The activities of NETEC are guided by its mission and vision (Figure 2).

In support of these activities and NETEC's mission and vision, a strong administrative core was created to:

- Produce an annual summit for the 10 Regional Ebola and Special Pathogen Treatment Centers (RESPTCs), the goal of which is to increase regional and national collaboration efforts and sustain the national regional center infrastructure and culture of readiness. During the NETEC's inaugural summit in April 2016, Dr. Lurie noted in her comments regarding NETEC:

Experience has shown us that we can only respond with the systems we have in place at the time—not with the systems we wish we had. That's why we need strong day-to-day systems in place, and why our day-to-day systems have to be able to withstand emergencies. Working together, you are strengthening our nation's healthcare infrastructure. You are speeding the development of best practices. You are helping to make a difference not just for your patients but for our entire country.⁶

- Maintain communications and cooperation in the Regional Ebola and Special Pathogen Treatment Center infrastructure by providing recurring news-letters, a continued social media presence, webinars, working groups, rapid telemedicine capabilities for urgent public health and clinical management needs, and a secure means of information sharing via a centralized information technology framework.
- Leverage close partnerships with professional organizations, public health agencies, regional Ebola treatment centers and other engaged treatment and

assessment facilities for subject matter expertise in education, training, and technical assistance collaborations.

- Provide continuous evaluation of the infrastructure to collect data; improve strategies, operational coordination, and processes; and assure the quality of activities and products.

A number of resources are readily available as deliverables in response to the NETEC funding by ASPR and CDC. The Center's website (<http://netec.org>) provides access to detailed information regarding site visits, training session dates and registration links, online education, exercise materials, and general resources. Below are descriptions of NETEC's current activities.

Activity A: Metrics, Readiness Assessment, and Annual Readiness Report

- Metrics have been developed to measure facility and healthcare worker readiness to care for patients with EVD and other special pathogens in 10 CDC-defined domains.⁷ NETEC is engaging key stakeholders for feedback through an iterative metric development process.
- Regional and state Ebola treatment center peer review and readiness assessments are completed as requested, with all 10 HHS-designated Regional Ebola and Other Special Pathogen Treatment Centers assessed in year 1 and annually thereafter. These are nonpunitive, nonregulatory, nonaccreditation collaborative visits.
- The NETEC annual report provides a comprehensive summary of NETEC activities, as well as summaries of regional preparedness, notable gaps, and recommendations.⁸

Activity B: Establish Educational Curricula and Develop Educational Materials, Resources, and Tools

- Subject matter experts from NETEC include, but are not limited to, physicians, nurses, infection prevention specialists, clinical laboratory specialists, bio-safety experts, environment management specialists, and emergency managers who have designed and provided a comprehensive suite of educational materials and hands-on simulations skills and scenarios to assist regional and state treatment centers, assessment centers, and frontline hospitals in their preparedness efforts for Ebola. Education and training includes special pathogens of concern beyond Ebola. The curriculum developed includes multiple education modalities, including self-directed learning, didactic sessions, simulation, exercise design education, and tabletop exercises. The curriculum also addresses the needs of specific populations such as children and pregnant women. Training events have been hosted at all 3 NETEC awardee sites, and partnerships are being developed with the designated regional centers, jurisdictional public health authorities, and professional organizations to increase the number, scope, and reach of NETEC educational offerings.

- NETEC training has targeted clinical, laboratory, prehospital, and public health staff to improve preparedness across the continuum of health care and collaboration.
- NETEC continues to develop and expand online training materials. Examples of Ebola preparedness course materials available on-line (<http://netec.org/online-education/>):
 - Overview of Ebola Outbreak
 - Hospital Preparation and Team Development
 - Personal Protective Equipment (PPE)
 - Patient Placement
 - Person Under Investigation (PUI) & Confirmed Case Patient Care
 - PPE Breakout
 - State and Regional Preparedness
 - PUI Case Studies
 - Environmental Infection Control
 - Waste Management
 - Care of Deceased
 - Care Considerations for the Laboring Patient
 - Care Considerations of the Pediatric Patient
 - Laboratory
 - Occupational Health – Health Care Worker Monitoring
 - Organizational Controls and Sustaining Readiness
- Biocontainment unit protocols, checklists, guides, and other resources from Emory, Bellevue, and UNMC/Nebraska Medicine are available online: <http://netec.org/resources/>.

Activity C: Provide Expert Training and Technical Assistance

- Exercise design templates have been developed, which directly map to and support the ASPR Ebola Preparedness 2015 Hospital Preparedness Program Measurement Implementation Guidance. Materials are available for frontline facilities, assessment hospitals, state-designated Ebola treatment centers, regional treatment centers, healthcare coalitions, and regional transport plans.⁹ Exercise templates have also been designed for other special pathogens.
- Partnerships with key stakeholders in emergency management have been formed. For example, NETEC and ASPR's Technical Resources, Assistance Center, and Information Exchange (TRACIE) conducted a joint webinar featuring jurisdictions with first-hand experience not only developing Ebola concept of

operations but also executing special pathogen plans in both real-life and exercise scenarios.¹⁰

Activity D: Creation of the Special Pathogens Research Network

- One of the lessons learned from the Ebola outbreak was the need for, and difficulty of, coordinating the collaborative research necessary to identify appropriate vaccines and medical countermeasures for a new microbial agent in the midst of an outbreak. Research, training, education, and patient care are synergistic in dealing with a special pathogen.
- NETEC, in collaboration with other federal, academic, and organizational partners, is establishing the infrastructure for a research network that will support rapid implementation of protocols for investigating interventions and related activities pertinent to Ebola and other special pathogens. This will also allow for rapid and efficient access to experimental interventions, while systematically collecting data to inform the infectious disease community. NETEC will collaborate with a network of organizations, including the regional treatment centers, as well as partners specializing in domains such as critical care and infectious disease research. This network will support the development, design, planning, conduct, monitoring, and collation and interpretation of data from clinical trials. This collaborative will not directly fund research, but rather will fund the development of infrastructure and resources to support the NETEC Special Pathogens Research Network.

CONCLUSION

NETEC is a unique national resource, created to support the US public health and healthcare systems in safely and effectively preparing for and managing individuals with suspected or confirmed infection with high-consequence special pathogens. NETEC uses education, communication, coordination, and collaboration as the foundation for its emergency management–centric approaches to special pathogen readiness.

In an era of global travel, special pathogens are a threat to every nation. The United States is no exception. The high morbidity and mortality of diseases like EVD make patient care difficult and put the healthcare worker at increased risk. The provision of care for these diseases is also extremely resource intensive, and a network of prepared healthcare centers will maximize the ability to scale the response from a single case to a pandemic. NETEC provides a vehicle to build national resilience through preparation of healthcare facilities throughout the United States. Any special pathogen presenting on US soil is a public health issue, and collaboration among public health agencies, healthcare facilities, and EMS is further optimized by NETEC.

While the initial focus was on Ebola preparedness, stemming from the recent crisis, the scope is now broader and the activities applicable for a variety of special pathogens. The recurring outbreaks of SARS, MERS, EVD, and other special pathogens emphasize the importance of the training and preparation activities that NETEC provides. NETEC will

continue to serve as a collaborative public-private partnership in its effort to develop resources, integrate organizations, and prepare the United States for future emerging infectious disease threats.

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 - Providence Sacred Heart Medical Center and Children’s Hospital, Spokane, Washington
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Figure 1.
Regional and Other Special Pathogen Treatment Centers

Mission: To increase the capability of United States public health and healthcare systems to safely and effectively manage individuals with suspected and confirmed special pathogens.

Vision: A sustainable infrastructure and culture of readiness for managing suspected and confirmed Ebola and other special pathogen incidents across United States public health and healthcare delivery systems.

Figure 2.
Mission and Vision of NETEC