

 **Book/Report** Published September 2015

## The Expert Panel Report to Texas Health Resources Leadership on the 2014 Ebola Events.

**CLASSIC**

*Cortese D, Abbott P, Chassin M, Lyon GM III, Riley WJ. Dallas, TX: Texas Health Resources Leadership; 2015.*

### The Expert Panel Report to Texas Health Resources Leadership on the 2014 Ebola Events

<https://psnet.ahrq.gov/resources/resource/29368/the-expert-panel-report-to-texas-health-resources-leadership-on-the-2014-ebola-events>

## Expert Panel Members & Affiliations

Dr. Denis Cortese, chair of the Expert Panel, Emeritus President and CEO of the Mayo Clinic, Foundation Professor and Director of the Healthcare Delivery and Policy Program at Arizona State University

Patricia Abbott, PhD, RN, FAAN, FACMI, Associate Professor & Director of Hillman Scholars Program, Department of Systems Leadership and Effectiveness, University of Michigan School of Nursing

Mark Chassin, MD, FACP, MPP, MPH, President and Chief Executive Officer, The Joint Commission

G. Marshall Lyon III, MD, MMSc, Associate Professor of Medicine, Division of Infectious Diseases, Emory University School of Medicine

Wayne J. Riley, MD, MPH, MBA, MACP, Clinical Professor of Internal Medicine, Vanderbilt University School of Medicine; Adjunct Professor of Healthcare Management, Owen Graduate School of Management, Vanderbilt University; and President, American College of Physicians

## **The Expert Panel Report to Texas Health Resources Leadership on the 2014 Ebola Events**

This report is the work of an Expert Panel convened by Texas Health Resources (THR) Chief Executive Officer Barclay Berdan, with the authorization and support of the THR and Texas Health Presbyterian Hospital Dallas (THD) Board of Trustees, following the Ebola Virus Disease (EVD) events of 2014.

Under the leadership of Dr. Denis Cortese, the Expert Panel—including Patricia Abbott RN PhD, Mark Chassin, MD, Marshall Lyon MD, and Wayne Riley MD—were charged with reviewing the fact pattern associated with events surrounding the care and ultimate death of Mr. Thomas Eric Duncan from EVD and the transmission of the virus to two nurses. This report outlines recommendations to the Board and to THR and Texas Health Presbyterian Dallas (THD) leadership for improving the hospital's and health system's performance and preparation for similar unforeseen, novel and rare but significant future events. While specifically directed toward the future operations of THD and Texas Health Resources, these recommendations also present an opportunity for other hospitals and health systems to review and learn so that they also may prepare for unanticipated and potentially catastrophic events. It is critically important that healthcare providers with the primary role of caring for patients work as a cohesive team. It is equally important that hospitals and health systems understand clearly how to plan and work with local, state, and federal government agencies as well as public health partners at all levels to ensure that each health facility across the U.S. healthcare system is prepared for novel events such as the nation experienced last fall when the first Ebola patient was diagnosed in the United States.

### **The Expert Panel**

The Texas Health Resources Board and leadership invited Dr. Denis Cortese to chair the panel. Dr. Cortese is the Emeritus President and CEO of the Mayo Clinic and the Foundation Professor and Director of the Healthcare Delivery and Policy Program at Arizona State University. Dr. Cortese recommended that Dr. William C. Rupp (recently retired CEO of the Mayo Clinic campus in Jacksonville, Florida) conduct a critical review of the fact pattern developed by THR and THD in the fourth quarter of 2014; corroborate the facts and circumstances; and submit a summary report to the Expert Panel.

The other four panel members include:

- Patricia Abbott, PhD, RN, FAAN, FACMI, Associate Professor & Director of Hillman Scholars Program, Department of Systems Leadership and Effectiveness, University of Michigan School of Nursing;
- Mark Chassin, MD, FACP, MPP, MPH, President and Chief Executive Officer, The Joint Commission;
- G. Marshall Lyon III, MD, MMSc, Associate Professor of Medicine, Division of Infectious Diseases, Emory University School of Medicine;
- Wayne J. Riley, MD, MPH, MBA, MACP, Clinical Professor of Internal Medicine, Vanderbilt University School of Medicine; Adjunct Professor of Healthcare Management, Owen Graduate School of Management, Vanderbilt University; and President, American College of Physicians.

The group was selected to ensure diverse experiences and expertise including treating infectious disease, implementing systems to protect patient safety and improve quality outcomes, designing healthcare delivery systems, developing interoperable and highly usable technology as critical components of information exchange, and implementing best practices in providing world-class medical and nursing care.

The main focus of the expert panel's work was to review events related to the care and treatment of Mr. Duncan and the two nurses who became infected with Ebola at THD, and also to make recommendations that can improve the overall effort on quality and safety of THD and THR, as well as any hospital or health facility committed to continuous quality improvement.

The review by THR, corroborated by Dr. Rupp and the panel, which was used to form these recommendations focused on three themes:

1. The missed diagnosis of Ebola Virus Disease (EVD) during Mr. Duncan's first Emergency Department visit;
2. Care of the three EVD-positive patients, including the second Emergency Department visit of Mr. Duncan, whose inpatient care led to the infection of two nurses and the ultimate transfer of those two nurses to other facilities; and
3. Knowledge transfer and event management including:
  - Incident Command Center operations;
  - Infection control policies, procedures, education, and training;
  - Internal and external communications; and
  - Assessment of the culture supporting patient safety.

The Expert Panel met at THD on February 10 for a day-long, in-person discussion of the Ebola experience at THD in 2014. The Expert Panel concurs with Dr. Rupp's validation of the fact pattern developed by THR. The Expert Panel also reviewed and agreed with the conclusions set forth in THR's previously released learnings from the EVD event. In this report, THR's recommendations and lessons are incorporated along with additional recommendations from the Expert Panel to strengthen the systems and processes for quality, reliability, and patient safety in managing a novel clinical event at Texas Health Resources and Texas Health Presbyterian Dallas.

It should be noted that THD and Texas Health Resources are not alone in confronting the challenge of addressing a rare but significant event such as Ebola. Hospitals and health systems throughout the United States were (and continue to be) at various states of readiness for a similar event. Accordingly, an important outcome of the work of the panel is to inform hospitals, health systems and public health authorities as they develop processes for implementing and verifying continuous quality improvement and safety to address novel clinical events like the experience with Ebola in Dallas.

## **SUMMARY OF EVENTS**

Understanding the nature of the complex events that involved the care of Mr. Duncan during his first and second visits to THD and the infection of two nurses with the Ebola Virus Disease will help provide context for the expert panel's recommendations detailed later in this report. This brief summary of events will help shed light on some of the issues that THR and other hospitals face in preparing for the arrival of EVD in particular and infectious diseases generally.

### **THD Emergency Department, Mr. Duncan's Initial Visit**

On September 25, 2014, Mr. Duncan, arrived at the Emergency Department of Texas Health Presbyterian Hospital Dallas with complaints of dizziness, abdominal pain, nausea, and headache, and later the Emergency Department physician added symptoms of rhinorrhea and nasal congestion following the physical exam. After a wait of approximately an hour, the patient was taken back to the treatment area and assessed separately, first by a nurse and then by a physician. During the nursing assessment, when questioned as part of the influenza screening process, the patient identified that he had recently travelled from Africa. This information was documented in the patient record; however, it was not communicated verbally to the physician as directed by a prompt in the EHR. According to the record, the physician or scribe noted in a separate area of the EHR that the patient stated that he was from the Dallas area.

During Mr. Duncan's first visit to the Emergency Department, several diagnostic tests were performed including blood work and head and abdominal computed tomography scans. Blood analysis showed low white blood cell and platelet counts and mildly elevated liver enzymes. CT scans of the head and abdomen were unremarkable.

The patient received intravenous fluids and Tylenol. Over the course of the Emergency Department stay, the patient's temperature increased from 100.1 to 103.0, although it dropped to 101.2 after Tylenol and at the time of his discharge from the Emergency Department approximately 4 hours later. In addition, his heart rate increased from 90 to 104 (at discharge), and his blood pressure was stable at discharge. The automatically calculated Systemic Inflammatory Response Syndrome (sepsis) Score was displayed on Emergency Department monitors and rose from 0 on admission to 3 (out of 4) at discharge. The patient was discharged with a diagnosis of sinusitis and given prescriptions and instructions to return to the Emergency Department or go to his primary care provider if his symptoms worsened.

## **Key Learnings from the Initial ED Visit**

Building on the public admission by THR and THD that mistakes were made related to the care of Mr. Duncan in his first ED visit, the expert panel believes that there are significant and important lessons to be learned from this first visit. It is also important for THD and other hospitals to carefully review policies and practices within the ED. The processes in place that support the efficacy of the clinical team in an ED are critical as they work to triage and manage patients with minor complaints, serious trauma, and even a rare but significant event such as the first patient to be diagnosed with Ebola in the United States.

Findings associated with the misdiagnosis and discharge of Mr. Duncan raise a number of issues:

- Lack of inter-professional teamwork
- Inadequate communication processes and over reliance on the Electronic Health Record (EHR) to convey critical information
- Inadequate review and reevaluation of relevant clinical information before disposition
- Lack of thorough physician oversight during the ED stay
- Overemphasis on patient satisfaction versus safety and outcomes
- Dissemination of information on EVD patient treatment was not treated as a priority.

## **Insights on the Culture within the Emergency Department**

There are underlying quality concerns about the evaluation that was conducted when Mr. Duncan arrived at the ED the first time. The expert panel is concerned that the care provided to Mr. Duncan during his first ED visit may reflect larger organizational issues.

Information about Mr. Duncan entered in the EHR was not verbally communicated among the staff and the EHR configuration did not provide for automatic alerts on questions related to Mr. Duncan's travel history. Once the information was entered, there were no systems in place that would trigger a review or re-asking of critical travel information. It is also difficult to discern the level of review by the physician regarding travel history or other clinical information gathered by other members of the ED care team. For example, it is not clear that the physician was aware or reviewed information that the patient's temperature had risen to 103 at one point in the visit, or that the SIRS score went to level 3 out of 4. In this instance, once the travel history was missed and a diagnosis made, further evaluation that might have redirected the outcome did not occur.

It is unclear to the experts whether the focus of the ED is to rapidly diagnose and move to another patient rather than to manage the care of a patient throughout the entire visit. The Expert Panel recommends a further look at the clinical team's roles, responsibilities, and culture in the Emergency Department to ensure high reliability among the entire team.

## Electronic Health Record System Challenges

Prior to the arrival of Mr. Duncan, information on travel history was collected and recorded in the EHR by THD nurses and was accessible to all clinical staff in the Emergency Department. Viewing this data, however, would have required a clinician in the ED to look beyond the standard patient assessment screen in the EHR to access the travel history from the nursing assessment documentation that was located in the flu screening part of the EHR.

Subsequent to the events surrounding the misdiagnosis of Ebola in the Emergency Department, Texas Health Resources management directed the Information Technology staff to update the electronic health record to select from a list of specific countries visited by the patient and to add an alert to enact steps to manage a suspected Ebola patient.

The lessons shared by THR after the Ebola events also speaks to an over-reliance on the electronic health record for communication of important clinical information between the key members of the patient's clinical care team. As noted earlier, the Emergency Department clinical processes did not optimally address the early identification of Ebola Virus Disease or other emerging diseases during the first ED visit, nor did it optimally utilize the full capability of the electronic health record. As these deficiencies were identified during the incident, the electronic health record was redesigned during the event in order to enhance shared

communication of clinical data between physicians, nurses, and other members of the clinical team. In addition, prompts and alerts were activated to facilitate rapid sharing of patient information (detailed travel history, vital signs, and symptoms) that indicate a risk of an emerging infectious disease.

Going forward, a key system question for THR and other hospitals and health systems is how Information Technology, informatics and clinical teams will customize the electronic health record to support high quality patient care. This will require in-depth study and understanding of how information is communicated across the care team, the usability of EHRs generally, workflow modeling, and ways to enhance clinicians' situational awareness.

Finally, structures and processes that support rapid decision-making and re-configuration of EHRs in the face of urgent public health emergencies such as that faced by THD are imperative, and should be incorporated into all aspects of disaster preparedness by any institution.

## Systemic Inflammatory Response Syndrome Score

Even though the care team had not identified the Ebola virus on the first ED visit, there was another opportunity at that time to further evaluate the patient in light of a changing alert system, called Systemic Inflammatory Response Syndrome (SIRS) Score, which had recently been implemented. The Systemic Inflammatory Response Syndrome Score can range from 0 to 4; a higher score indicates a possible need for further diagnostic work to determine if the patient is septic. If sepsis is suspected, a sepsis protocol is then instituted. When the score is 2 or above, the electronic board visible to ED staff is highlighted in red, indicating a need for further intervention. In 2013, the Texas Health Resources hospital in Plano did an extensive pilot project on the use of the SIRS screening tool. In 2014 it was implemented at Texas Health Presbyterian Dallas, but staff had not been fully trained, and some of the staff appeared not to understand its clinical significance or to rely upon it.

The care team responsible for Mr. Duncan did not take action in response to increases in the Systemic Inflammatory Response Syndrome Score. The score had increased to 3, which signifies a high risk in terms of the Systemic Inflammatory Response Syndrome Score system; however, the nurse who noted the increase did not verbally communicate that increased score to the physician or the discharge nurse. In addition, although displayed on an electronic board visible to all members of the care team, the alert related to the increase of the SIRS was not acknowledged by the discharging physician or others involved in the discharge of the patient. This indicates the physician's and clinical teams' potential unfamiliarity with the electronic



board and SIRS score display and in retrospect appears to show a limited focus on the entire care encounter by the clinical team.

## Alignment between the Emergency Department and Texas Health Presbyterian Hospital Dallas/Texas Health Resources

The Emergency Department physicians work for a group that has a contract with Texas Health Resources. THR sent information to Emergency Department physicians related to Ebola Virus Disease preparedness, but in some cases it was reported that this information was minimized and not treated as an urgent priority.

In the context of the leadership across the Emergency Department, Texas Health Presbyterian Dallas, and Texas Health Resources, it is unclear how common goals are set and how metrics that focus on Emergency Department clinical outcomes are developed, implemented, and benchmarked.

## Expert Findings from Review of the First ED Visit

The most significant scenarios that led to the inaccurate diagnosis and discharge of Mr. Duncan are described below:

- Training for EVD preparedness had not been fully implemented in the THD ED and the awareness of risk factors for EVD across the entire clinical team was not well known at the time.
- Information concerning travel history from Africa gathered by the nurse was not verbally communicated to the physician because it was already recorded in the EHR.
- The sharing of the travel history data was not adequately designed into the workflow of the entire clinical team, therefore the information was not easily accessible to the physician. This required extra and non-intuitive steps to be taken by the physician to access information highly relevant to clinical decision-making.
- The physician assessment did not include gathering information about travel history, because he didn't see it as a significant question in the scope of the patient's symptoms and the patient's response to questioning about where he was from yielded a different response than what was elicited by the intake nurse.
- The development and deployment of policies, procedures and practices to ensure inter-professional teamwork and communication were inconsistent, and the healthcare team apparently relied too heavily on communication through the electronic health record.

In addition the following issues add further concern about communication and processes within the Emergency Department:

- It is unclear why a patient who had developed a fever of 103 was not reexamined prior to discharge or whether the physician was advised or aware of the elevated temperature.
- The SIRS Score and the highlighted ED electronic board were disregarded – raising concerns about the lack of situational awareness or training offered to the ED care teams prior to its implementation.
- Leadership in the Texas Health Presbyterian Dallas Emergency Department was said to be focused on two operational objectives rather than updating ED knowledge of responses to an event like Ebola. The ED was highly focused on:
  - Preparation for the launch of a Level II Trauma Program in the fourth quarter of 2014, and
  - An effort to improve patient satisfaction workflow, starting with an abbreviated triage process and the completion of the remainder of the nursing intake assessment at a later time in the episode of care.

The Expert Panel is concerned about the following: (1) the alignment between the Emergency Department and Texas Health Presbyterian Dallas/Texas Health Resources including concerns about how common goals are set and how metrics that focus on Emergency Department clinical outcomes are developed, implemented, and benchmarked; (2) the commitment to priority setting in the Emergency Department which must always focus first and foremost on patient safety and clinical outcomes, and never be supplanted or diminished by other goals like patient satisfaction; (3) the decision-making process regarding EHR configuration and response to emergent events must be deeply considered and planned by diverse yet cohesive stakeholder teams comprised of various informatics, clinical, IT, and administrative personnel.

The lack of complete history taking particularly travel history assessment, documentation and sharing, the ineffective communications among the clinical team and a seeming overreliance on the EHR rather than focusing on the complete care of the patient leads the Expert Panel to recommend a broad review of the quality of care, team-based care, alignment of highly usable IT with clinical workflow, and culture of the THD Emergency Department.

## **The care of the three EVD-positive patients, including the second Emergency Department visit of Mr. Duncan**

Dallas Fire & Rescue paramedics picked up Mr. Duncan at his apartment on September 28. While en route to the hospital, the paramedics communicated that they had an inbound patient recently arrived from Liberia with nausea, vomiting, diarrhea and an elevated temperature. On arrival at the hospital for his second ED visit, he was taken immediately to isolation. The use of personal protective equipment by the staff caring for Mr. Duncan was instituted consistent with existing guidelines from the Centers for Disease Control and Prevention. A presumptive diagnosis was made for Ebola Virus Disease, and tests were done to rule out other infectious diseases. During the first 2-3 hours of this second ED visit, the hospital notified Dallas County Health and Human Services and then reached out to the CDC. Mr. Duncan was cared for in the Emergency Department in a separate, isolated area for approximately 30 hours as the Medical Intensive Care Unit (ICU) was prepared for his admission. It is noteworthy that none of the staff became infected who participated in the care of Mr. Duncan during this 30-hour interval in the Emergency Department.

Mr. Duncan's care throughout his stay in the Emergency Department was appropriate for a person with symptoms consistent with EVD. On September 29, Mr. Duncan was transferred from the Emergency Department to the Medical ICU, a 24-bed unit that was otherwise vacated and dedicated solely for the care of this single patient. Nurses there cared for him following the CDC-directed procedures for use of personal protective equipment; however, healthcare workers had areas of exposed skin that were not fully covered or shielded by the CDC-prescribed level of protective equipment. In Mr. Duncan's case, the volume of liquid gastrointestinal efflux was massive, and these fluids were known to be highly infectious. As a result of this concern regarding exposure to massive GI efflux, nursing staff and hospital leadership decided to migrate to the use of "High-level" personal protective equipment (Powered Air Purifying Respirators and Tyvek suits). High-level PPE was inspected and tested to ensure safe use and was then provided on September 30 to Medical ICU staff. Notwithstanding the care and treatment that Mr. Duncan received, he died on October 8.

In retrospect, staff noted that they would have liked to have been better prepared in advance of the admission of a patient with EVD. However, it is clear that not only were their efforts praiseworthy, they also performed well in caring for Mr. Duncan on his second visit, in spite of the limitations described in this report. In addition, by communicating to the THD Emergency Department that they were transporting a patient from Liberia with symptoms resembling the Ebola Virus Disease, Dallas Fire & Rescue paramedics helped ensure the ED care teams were prepared for the arrival of Mr. Duncan, and should be commended for their actions.

## Personal Protective Equipment (PPE) and Other Challenges

Based on review of the timeline of events, it is clear that the CDC's focus in early conversations with the hospital was on contact-tracing and notification. It does not appear that issues such as personal protective equipment, waste management, and other challenges that would emerge as critical were addressed by CDC at the onset of this event. The first representative of the CDC did not arrive on-site until three days after Mr. Duncan entered the Emergency Department the second time, and only after there was a confirmed positive Ebola Virus Disease test.

Because of the dynamic unfolding of this event and the ongoing learning process about how to treat and manage patients with the Ebola Virus Disease, the role of the various federal advisors was unclear for the hospital. This misunderstanding led to confusion about what standards to follow and who would provide the most up-to-date guidance on managing infection control and personal protective equipment related to the care for Mr. Duncan and the two nurses.

This challenge was most evident as noted by the clinicians and their leadership concerning the evolving standards in the use of personal protective equipment. Consistent with published CDC guidelines, the staff used contact and droplet precautions at the onset, and evolved to the use of PAPRs. On arrival of CDC and following the initiation of PAPRS, the team worked with CDC to continue to evolve the approach to personal protective equipment. THD also learned from experts at Emory University Medical Center. The sequence of new PPE and training meant that staff had to adapt, train, and relearn PPE donning and doffing from shift to shift. This constant learning and relearning eroded the staff's confidence that they were fully up-to-date and competent on the latest modifications that were being developed in real-time. The doffing process was particularly difficult and required more training to build efficacy.

As with all public health emergencies in the United States involving infectious diseases, the CDC serves an important advisory role for doctors and nurses caring for an infected patient with a disease such as Ebola. Nevertheless, when preparing for such complex emergencies hospitals and health systems should understand that it is the hospital system and its clinical staff who are ultimately responsible for the care of patients.

Facility Preparedness. The Centers for Disease Control and Prevention provided written guidance to the health care industry on preparing for the arrival of a patient with Ebola prior to the event at THD. THR proactively circulated a series of recommendations and next steps for each facility following the public health alert released by CDC on the spread of the Ebola Virus. THR leadership took steps in organizing and disseminating this information in a timely fashion,

but it remains unclear as to whether doctors and nurses at each institution including THD were fully aware of or adequately acted upon these guidelines. A second outstanding question relates to the system oversight of these recommendations and who ensured their implementation. It appears to the Expert Panel that THR relied on its individual facilities to implement CDC's Ebola Virus Disease alerts and the THR system's prepared guidelines. THR leaders should consider strengthening their oversight of individual facilities and how they execute and comply with system-wide policy.

These important issues raise a larger question as to how THR prepares the system and entity hospitals for public health emergencies, particularly those involving infectious diseases. The Expert Panel therefore recommends the creation of a robust system of drills that tests each facility's emergency operations plans for different types of disasters ranging from weather events to a local outbreak of a serious infectious disease such as Middle East Respiratory Syndrome. Such drills should include not only hospital staff and administrators, but also relevant local stakeholders with which THR would collaborate during a public health emergency.

Waste Management. CDC guidelines indicated that Ebola waste was to be treated as a biohazard, but they did not specify that it is a Class A waste that requires special and separate handling, the use of solidifiers to mitigate risk of leakage, and special permits that had to be issued by the U.S. Department of Transportation. This lack of specificity in the CDC guidelines, which did not incorporate the lessons learned in August at Emory University Medical Center, led to delays in obtaining permits from the U.S. Department of Transportation to transport properly bagged waste. Even when permits were obtained, the disposal and destruction of the waste were complicated by jurisdictional issues that needed to be solved expeditiously.

#### Staffing and Furlough Process.

THR learned that cohorting of the smallest possible number of specialized expert teams was essential for managing an "Ebola unit" and a full-service hospital concurrently. Ebola was an exceptional event that tested the limits of staff and how they were managed. Policies for furloughing employees and medical staff were subject to changing public health guidance during the event on the standards for epidemiologic monitoring of affected clinicians and staff.

Staff Monitoring. A number of staff commented that they self-identified as potentially exposed. The risk categorization process changed frequently, caused primarily by changes in protocol mandated by the Centers for Disease Control and Prevention or public health authorities. The outcome of the frequent changes was that the process was distrusted by staff.

EVD Infection of Caregivers. Two MICU nurses were diagnosed with Ebola Virus Disease; one on October 12 and another on October 15. Despite careful analysis of the timeline and

fact pattern, it is impossible to know for certain exactly when or how the virus was transmitted to them. It was clear that these nurses—and other nurses and hospital staff caring for Mr. Duncan—took seriously their responsibility to follow all protocols and guidelines, including working collaboratively with CDC to refine personal protective equipment technique from shift to shift.

Staff Stress Management. It is well known that managing staff stress through major events such as Ebola is critical. Although Employee Assistance Programs are an acknowledged support mechanism for individuals within hospitals, they are frequently perceived as vehicles for staff with workplace behavior issues and are therefore viewed negatively by some staff. To support staff collectively, Critical Incident Stress Management (CISM) should be activated to look at the organization more broadly to allow it to focus on gaining better situational awareness and supporting groups of staff affected by an event. The movement from the Employee Assistance Program to Critical Incident Stress Management appeared to be hindered by situational awareness, a system gap in terms of training, and a preferred focus on the role of the Employee Assistance Program leading to a slow activation and limited reliance on CISM.

Incident Command System. Texas Health Presbyterian Dallas and Texas Health Resources believed they were prepared for an emergency situation and had the ability to set up an Incident Command System. Most healthcare institutions base their emergency response plans on the National Incident Management System, which provides a common approach to managing incidents including specified positions for leadership, communications, safety, and procurement. Texas Health Presbyterian Dallas had historically chosen to outsource the Incident Command System function to an outside vendor for education and event management. The hospital activated its vendor to set in place an Incident Command System, but there was no formal announcement in the hospital that the incident command system had been activated.

The scope and scale of the plan initially implemented at THD was supplemented and expanded significantly in order to manage the evolving demands of the situation. For example, the initial plan did not fully meet the clinical needs of the response as this event evolved, prompting Texas Health Resources leadership to create a separate clinical Incident Command System. Another problem included the omission of key care givers, such as nurses, when physicians were having phone conferences about clinical care with Emory. Similarly, management of the growing and significant volume of external and internal messaging, media relations, and ongoing collaboration with government officials and public health authorities resulted in the creation of an additional communications command center to connect with these key stakeholders. These dimensions of incident command had not been adequately defined and executed in the initial phase of the event.

Texas Health Presbyterian Dallas understood that it was responsible for activating the Incident Command System, but a role for Texas Health Resources in the command system was not explicitly understood by staff within Texas Health Presbyterian Dallas. Roles and responsibilities between Texas Health Presbyterian Dallas and Texas Health Resources evolved over time as the crisis unfolded through cycles of learning and improvement.

## **Summary of Findings and Conclusions**

Notwithstanding the events that led to the missed diagnosis of Ebola during Mr. Duncan's first visit to the Emergency Department at THD, the Expert Panel commends the doctors, nurses, and staff at THD for their care of the three patients infected with the Ebola Virus Disease including Mr. Duncan, once he was admitted to the hospital and known to be infected, and the two nurses who cared for him and became infected. Emory is also to be commended for the invaluable contributions they made during the event on the use of high-level personal protective equipment, the use of solidifiers to manage biological waste and many other contributions to the care of EVD-positive patients at THD. The events surrounding the diagnosis of the first patient with EVD in the US and the circumstances that led to the infection of two nurses highlighted a number of lessons learned and opportunities for improvement for THR and other hospitals and health systems regarding planning and response to similar scenarios.

The death of Mr. Duncan and the infection of two nurses we see as coming from three distinct but overlapping issues:

1. THD and THR were not prepared to diagnosis and manage a patient who came to their facility without a preexisting diagnosis of Ebola. The ED lacked awareness of the risk and the required response to EVD. The improper diagnosis and release of Mr. Duncan on his first visit highlights a number of issues that were delineated earlier. How a department functions within a hospital or health system puts an entire health system and larger community at risk. It is not clear that the culture within the ED was focused on quality and safety as foundational for its role in a complex health system.
2. It was evident during this process that the CDC and others were learning alongside the actual providers. In retrospect, it appears that there was a lack of effective and efficient collaboration prior to the event between THR, Texas Health Presbyterian Dallas, the Centers for Disease Control and Prevention (CDC), HHS, and the Department of Transportation as well as city, county, and state public health resources. The roles and responsibilities of all parties were not clearly outlined in advance of the Ebola event, and this led to many of the consequences that ensued, particularly after Mr. Duncan was properly diagnosed.

3. When preparing for future disease outbreaks, hospital administrators, doctors, and nurses must understand that the CDC serves only in an advisory role and it is up to the institution to take care of individual patients and ensure quality, safety and high reliability of clinical operations. It is also critical for CDC to better communicate its role and to work collaboratively with health systems prior to, during, and after an event like Ebola.

These two challenges require a careful look at how health partners work together. The fact that CDC and the hospital staff were learning together as circumstances evolved demonstrates a misunderstanding by both partners for the need to drill and train together in a comprehensive way prior to a public health event like Ebola. These learnings are now relevant in that they have helped shape the standard operating procedures for how personal protective equipment must be used for an infection such as EVD. Arriving at this collaboration, the Expert Panel notes, was not simple, but its final results are critical for what is known today about protecting staff from transmission of an infectious disease.

In retrospect, THR learned that reaching an appropriate level of preparedness requires addressing two important issues: preparing a community hospital for the arrival and diagnosis of a patient infected with Ebola Virus Disease or any other emerging infectious disease, and making sure the staff and the facility are ready to treat a patient who is infected. These are two distinct dimensions of preparedness that community hospitals must drill for to ensure their staff is ready to diagnose, stabilize and treat and prepare for transfer when appropriate for patients in similar situations while remaining acutely aware of the various clinical scenarios, potential public health emergencies and other novel challenges facing an Emergency Department.