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Ebola virus disease: Managing a practice challenge with evidence

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In September 2014, a patient with a possible exposure to Ebola virus disease (EVD) was admitted to the Special Clinical Studies Unit (SCSU) at the National Institutes of Health Clinical Center—one of three units in the United States originally designated as able to accept patients with EVD. The SCSU opened in 2010 and was initially designed to care for patients suspected of having a highly contagious condition, such as severe acute respiratory syndrome or another emerging infection, especially in the context of occupational exposures during research with these agents. The highest possible principles of containment and bio-safety were built into the unit and its procedures, with a focus on patients with highly contagious infectious diseases requiring respiratory and contact isolation.¹

As events unfolded in West Africa, we knew that we could be called on to accept an individual with occupational exposure to EVD. An interdisciplinary team had been preparing for months to manage the details regarding transportation of the patient and specimens, as well as isolation of the patient and management of waste materials to protect

staff, other patients, and the public. How did we prepare ourselves to be able to move into implementation mode? We pulled together all of the available evidence, much of which included lab findings, nonhuman studies, expert opinion, infectious disease guidelines, and experiential learning.

Crisis-level evidence: Expert opinion and emerging guidelines

The cornerstone of evaluating evidence as a decision-making strategy in nursing practice is weighing the quality, quantity, and consistency of available research. *Quality* refers to the extent to which the research design, implementation, and analysis limit the possibility of bias. *Quantity* is the number of research studies that have evaluated the research question and the strength of the findings across samples. *Consistency* is the degree to which the studies that address the same research question report similar findings.² Hierarchies, or levels of evidence, are used to provide clinicians with a method for evaluating the quality of the evidence, which usually ranges from systematic reviews, meta-analyses, and randomized-controlled trials at the highest level to expert opinion.³

Across versions of these hierarchies, it's clear that expert opinion, whether from an individual or a committee, is least likely to control for bias. However, in the case of caring for patients with a potentially lethal infectious disease such as EVD, expert opinion based on lab findings, observations in the field in West Africa, and now limited practical experience in the United States has quickly become a way of problem solving in a broader context that includes safety for both the patient and healthcare provider. (See Figure 1.)

Strategies for communicating experiential evidence across disciplines

When clinical practice guidelines are changing based on evolving experiential learning, the unknown can create misinterpretation, which is quickly followed by miscommunication. It was important that our leadership staff members throughout the institution become knowledgeable about the emerging evidence we did have about EVD.

There was documented evidence related to the pathophysiology of EVD, including the signs and symptoms and the route of transmission. However, there was lingering uncertainty about the possibility of droplet or aerosolized transmission. We were able to build a biological model for how the disease is transmitted and progresses in a person and create isolation and staff protection procedures that exceeded the level of safety that would be dictated by our current understanding.

The importance of clinical case studies

We had multiple additional questions that needed answers before we would be ready to care for a patient with EVD. The evidence we had was from limited research on EVD, field experience in West Africa, and the two previous health-care workers who were transported to the United States and admitted to Emory Hospital in Atlanta, Ga.

A turning point for our interdisciplinary leadership team came in the form of expert opinion from a physician who had recently returned from West Africa after caring for patients with

EVD. His message was precise and clinically focused; he provided a briefing describing the pathophysiology of EVD, followed by the practical implications of caring for acute patients who experienced profound hypovolemia and presumed electrolyte imbalances. We were cautioned that training our staff in donning and doffing their personal protective equipment (PPE) in a simulated scenario with an observer (as would be required when a patient arrived) was essential for provider safety.

Staffing and clinical procedures for EVD

After hearing about field procedures in West Africa, some of our questions were answered regarding the appropriate level of staffing for a patient with known or suspected EVD. Depending on the condition of each patient, we needed to ensure that we had staffing to provide ICU-level nursing care. We also needed to build capacity by having SCSU nurses who specialize in infectious disease, as well as two other specially trained nurses to provide safety observation and environmental support for each patient. We added an interdisciplinary role we termed the WatSan, based on the name given to monitors in Africa (for “Wat”er and “San”itation). The WatSan was a healthcare provider whose role was to instruct the staff when donning and doffing PPE.

What evidence or research was available to support the role of the second nurse or the WatSan? At the time of our first admission, the evidence was expert opinion and the consensus of our interdisciplinary team, which included infectious disease specialists, epidemiologists, intensivists, and nurses who shared a commitment to ensuring staff safety while providing quality care.

Processes for specimen transport were developed with safety in mind. Using available evidence for managing spills containing hazardous medication, a procedure using two people to transport patient specimens to the lab in the event of an untoward event was developed. A special spill kit, modeled after the spill kit for hazardous medication spills, was created and carried during each trip to the lab.

Waste management and decontamination processes that had been developed for the SCSU were updated based on expert opinion and what was known about EVD. Chemical treatments were utilized for patient waste before flushing, and policies and procedures were revised to guide staff on trash removal from the patient’s room and transport to the autoclaves. A specialized cart was utilized to remove the trash from the SCSU for transport to the autoclaves. Before exiting the SCSU, the cart was decontaminated to ensure that the environment outside the SCSU remained clean.

Training to ensure safety

Following our leadership team’s commitment to patient and staff safety, we implemented staff training. The core nurses in the SCSU needed to be reeducated and trained on all of the revised and new policies and procedures. We divided our training into two sessions: basic training with return demonstration of donning and doffing PPE and an interdisciplinary simulation session of caring for a patient in full PPE with the SCSU staff acting as evaluators. Simulation exercises in full PPE included nursing and medical procedures, waste

management procedures, communication strategies, and equipment handling and documentation requirements. The simulation exercises, along with the training drills for donning and doffing PPE, provided further evidence for the staffing levels that were developed for patients with known or suspected EVD.

During the admission for the first patient, daily huddles were held in the morning with the clinical staff in the SCSU and daily interdisciplinary meetings were held in the afternoon with representatives from multiple departments. These huddles and meetings provided team members with information about the daily occurrences, including any issues, and provided them with an opportunity to make immediate changes as needed.

Experiential outcomes

With experience, three important aspects of care emerged. The first was the type of PPE used. Although expert opinion called for specialized PPE, it wasn't clear which types of equipment were needed. In order to ensure that staff members were safe, we utilized the highest level of PPE, including a powered air purifying respirator, a coverall, booties, gloves, and a gown. The second aspect was the level of staffing. Although the number of full-time equivalents was high, we believed the cautious approach was the safest approach. Based on evidence, we felt that the number was justified to keep staff safe and free from injury, as well as an occupational exposure. The last important aspect was decontamination. The waste procedures were developed with a team of experts, including an engineer.

Using evidence that we gathered from the care of patients with multiresistant organisms, processes were put in place to ensure that waste was handled and managed with safety in mind. Based on the knowledge that we gleaned from providing care to this first patient with suspected EVD, we made changes to staffing, PPE, and waste procedures. We look forward to continuing to improve our policies and procedures and hope that human trials for a vaccine for EVD begin and are successful.

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Figure 1.
The contribution of expert opinion in emerging health crises