**Ideas and Opinions** | 23 September 2014

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ONLINE FIRST

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Health care workers (HCWs) in the emergency medical services (EMS) and hospital settings often encounter patients infected with dangerous communicable diseases. Such patients are usually managed without fanfare, but when it was announced on 1 August 2014 that 2 American HCWs infected with Ebola virus would return to the United States for treatment, it drew the world's attention.

The means by which Ebola is spread are well-known. Careful adherence to standard, contact, and droplet precautions, as outlined for HCWs by the Centers for Disease Control and Prevention (CDC) (1), prevents exposure to blood or bodily fluids contaminated with this virus. However, images of infected patients arriving at Emory University Hospital looked much different from what might have been expected. How can the sight of HCWs in "space suits" be reconciled with published CDC infection control guidelines? In this essay, we offer our rationale for adopting the safeguards that were used.

Prevention of disease transmission in health care settings, including EMS transport, involves more than the proper use of personal protective equipment (PPE). It also depends on the development and implementation of appropriate administrative policies, work practices, and environmental controls accompanied by focused education, training, and supervision. Health care workers inconsistently adhere to such basic infection control practices as hand hygiene (2), and EMS provider adherence to infection control precautions and equipment disinfection can be suboptimal (3). Environmental samples from clinical settings inside and outside the hospital have revealed contamination with serious pathogens (4–6).

The Grady EMS Biosafety Transport Program and Emory University Hospital Serious Communicable Disease Unit were established more than a decade ago to support the CDC, which is responsible for conducting research and intervening to control the world's deadliest pathogens. They also support CDC's quarantine station at Hartsfield-Jackson Atlanta International Airport, the busiest airport in the world and a major portal of immigration to the United States. Our goal in creating a special transport and inpatient care team was to close these and other gaps in practice and to facilitate the best care for patients while ensuring the safety of our HCWs and the general public by meticulous adherence to published CDC guidance.

The team is educated about serious communicable pathogens, methods of transmission, available vaccines, preexposure and postexposure prophylaxis and treatment for specific infections, and the importance of strict adherence to standard and transmission-based infection control practices. Understanding the nature of the illnesses they confront helps providers overcome apprehension and fear so they can render safe and effective care. Training includes special attention to the proper donning and doffing of various PPE.

Emergency medical services medics isolate the driver compartment and envelop the interior of the patient compartment with water-impermeable barriers that prevent contamination of surfaces that are difficult to clean and disinfect, which is especially important for patients with active epistaxis, coughing, or vomiting.



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Patients may be asked to wear a water-impermeable suit to prevent exposure to sites of cutaneous bleeding or an undergarment capable of collecting large volumes of diarrhea.

For management of our patients with Ebola virus disease, the team met the PPE standard by wearing a Tyvek suit (DuPont), gloves, and a hooded powered air-purifying respirator. Tyvek suits afford a high degree of splash protection, an important consideration for HCWs managing a patient with potential for copious vomit, diarrhea, and blood, which poses a serious risk for exposure. The hooded powered air-purifying respirator provided greater splash protection and was cooler and more comfortable to use. It averted eyewear fogging and prevented HCWs from inadvertently touching their face. Should the patients have suddenly required an aerosol-producing procedure, such as airway suctioning or endotracheal intubation, the team would have been properly protected. Although not strictly required, this approach was practical and allowed our HCWs to confidently focus on safely caring for and transporting these patients without needless anxiety and distraction.

Patient delivery directly into the isolation unit limited exposure to other patients or visitors at the hospital. Decontamination and disinfection of the ambulance was facilitated by use of the barrier drapes. All environmental surfaces and waste bags were disinfected with an agent approved by the U.S. Environmental Protection Agency, with appropriate surface contact time. Disinfection of the ambulance, collection of infectious waste, and removal of PPE were directly supervised to ensure no violation of technique or breach in protocol. Even without a recognized exposure, the health care team was monitored for subjective illness and fever to ensure that developing illness was recognized and swiftly evaluated.

Although the successful arrival of these patients at the isolation unit was guided by 12 years of planning, practice, and experience, it still yielded new lessons. Seemingly stable patients arriving from Ebola-endemic areas have probably had large volume losses without benefit of laboratory assessment and may have significant electrolyte abnormalities that require continuous cardiac monitoring and intravenous access, an intervention that might otherwise be deferred in austere settings to limit the risk for HCW exposure if vascular access is difficult to obtain. In our case, both patients were transported without incident.

We believe that a dedicated team is best suited for transport of patients with confirmed serious communicable illness. Although this is a particularly relevant consideration in communities that are close to CDC quarantine stations or biocontainment laboratories, HCWs in every community may be called on to assist a traveler who has recently returned from an Ebola-stricken region. For the future, because communicable disease threats may emerge inside or outside the United States with little or no notice, EMS agencies and hospitals would be prudent to implement measures to identify patients with communicable illness and ensure that their personnel can confidently and safely provide care anywhere and for all pathogens.

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