Imaging in the age of Ebola: Providing high-quality imaging services while keeping staff safe

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Editor's note: This marks the debut of The 3-Piece Suit Radiologist, *a column devoted to managing quality, safety, and cost in radiology.*

News commentators speak with certainty about the topic of Ebola Virus Disease (EVD), but the uncomfortable truth is that myriad unknowns accompany this mysterious and deadly pathogen. Indeed, these uncertainties were the focus of a November 2014 workshop hosted by the National Academies' Institute of Medicine in Washington, DC, for hemorrhagic fever experts, virologists, and infectious disease physicians.

Unanswered questions discussed at the workshop included: Can the Ebola virus be transmitted through intact skin? Can it be spread by people who are not yet showing symptoms (subclinical transmission)? Does the incubation period of the virus differ with the type of bodily fluid that contacts a patient? Is foam, gas, or liquid most effective for cleaning surfaces that may harbor the Ebola virus? Does Ebola survive in sewers, where rats may potentially pick it up?[1]

As we do not yet have the answers to these and many other questions regarding EVD, we who work in radiology must adhere to known safety principles that provide additional layers of security and protection for both hospital staff and the public.

At this juncture, the U.S. Centers for Disease Control and Prevention (CDC) recommends a three-step approach to treating a potential Ebola patient. This approach can be reviewed in its entirety at www.cdc.gov, but it may be condensed to three words: Identify, Isolate, and Inform.

Identify, isolate and inform

With respect to the first step, the key is to identify two specific items, the patient's travel history and his or her signs and symptoms. As physicians, we know that obtaining an accurate history from a patient is of paramount importance. An accurate travel history should be emphasized not only to ambulatory care personnel, but also to radiology technology staff as an integral part of their patient assessment. To this end, it is vital to ask one key question: Has the patient either traveled to or lived in a country with Ebola virus transmission (West Africa, and more specifically, the countries of Liberia, Sierra Leone, and Guinea), or had contact with an individual with confirmed Ebola Virus Disease within the past 21 days?

If the answer to this question is yes, the patient should be evaluated for signs and symptoms of Ebola infection, which include fever (subjective or ≥ to 100.4°F or 38.0°C), fatigue, headache, weakness, muscle pain, vomiting, diarrhea, abdominal pain, or hemorrhage.

If the patient has a travel history and signs and symptoms of Ebola, it is vital to isolate the patient immediately and to avoid all unnecessary direct contact (Table 1). In addition,

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Table 1. Post-isolation steps

After the patient has been isolated, the following steps should be taken:

1. Place the patient in a private room, with its own bathroom and/or a covered commode,
2. Avoid all unnecessary direct contact.
3. If direct contact is necessary, personal protective equipment and dedicated equipment must be used to minimize transmission risk.
4. Only essential personnel with dedicated roles should be permitted to evaluate the patient.
5. If the patient is exhibiting obvious bleeding, vomiting, or copious diarrhea, personnel should not be permitted to re-enter the room until EMS personnel trained to transport such patients have arrived.
6. Blood draws or any other procedures should not be performed unless such procedures are urgently required for patient care.
7. The Health Department should be consulted before cleaning up blood or bodily fluids.
8. All equipment used to treat the patient should not be reused until it has been cleaned and disinfected.

inform local, state and national health department officials immediately. Do not transfer the patient without first notifying these authorities. Persons under investigation for Ebola should be sent only to hospitals and facilities specifically designated by public health officials.

A recent article in *Radiology*, "Ebola Virus Disease: Radiology Preparedness," by Bluemke and Meltzer, is recommended reading for detailed information on training protocols for radiology staff. In that article, the authors recommend the following guidelines:

- All radiologic technologists who enter an EVD isolation room should be added to the staff registry for monitoring. They will be required to undergo twice-per-day fever checks and receive instruction for 21 days of self-monitoring.
- If a radiologic technologist is needed for patient care, every effort should be made to have the study done in isolation, rather than transporting the patient to the radiology department.
- Technologists must receive training in donning and doffing PPE. The NIH has an entire section devoted to the use of PPE on its website at www.nih.gov/health/ebola.
- Close cooperation between the isolation-unit nurse and the radiology technologist is required. Before a technologist enters the area, all supplies, including disinfectant, wipes and equipment covers, must be in place. X-ray detectors should be double-bagged and each bag should be separately zip-locked before the technologist enters the patient room.
- Advanced radiology procedures, such as MRI, CT, and PET, are currently not known to have clinical utility for patients with EVD.
- Any surfaces with gross contamination from body fluids should be cleaned manually by workers wearing full protective gear (PPE).

At present, medical imaging plays a supportive role in EVD, being used primarily to exclude other diagnoses or to assess complications of EVD. Ideally, medical imaging should be provided to patients only within a specialized isolation unit. Portable X-ray and portable bedside ultrasound units have been used in biocontainment facilities. With regard to disinfection of ultrasound transducers, Trophon EPR (exclusively distributed by GE) is worth investigating as a useful tool.

Further studies on EVD will result in new information requiring us to adapt and change, while adjusting our protocols accordingly. Until we have all the answers, we should continue to obtain reliable and accurate patient histories and take all necessary precautions to keep patients and staff safe in radiology.

Reference

1. Begley S. US Scientists say uncertainties loom about Ebola's transmission, other key facts. Reuters. http://news.yahoo.com/u-scientists-uncertainties-loom-ebolas-transmission-other-key-003751718--finance.html. Accessed Nov.3, 2014.