

Patient safety

Ebola surgical protocols enhance safety of patients and personnel

n the months since Ebola patients were first treated in US hospitals, much progress has been made in establishing protocols to protect patients and healthcare workers from harm.

Though the number of Ebola patients in the US remains small compared with the thousands in African countries, the disease continues to claim lives. At press time, four Americans who may have been exposed to the Ebola virus in Sierra Leone were under observation at Nebraska Medicine in Omaha, and one who had contracted Ebola was being treated at the National Institutes of Health Clinical Center in Bethesda, Maryland. According to the Centers for Disease Control and Prevention (CDC), state health officials have identified and designated 54 hospitals as Ebola treatment centers. These centers supplement the three national biocontainment centers at Nebraska Medicine, Emory University Hospital in Atlanta, and the National Institutes of Health.

In addition to the designated treatment centers, the CDC has been working with state and local public health officials to identify Ebola assessment hospitals for those individuals being actively monitored who may or may not develop symptoms of Ebola.



Shelly Schwedhelm, MSN, RN

The Department of Health and Human Services has made funding available for Ebola preparedness that includes Ebola treatment and assessment hospitals (http://www.grants.gov/view-opportunity. html?oppId=274709).

"Every state is now looking at which hospitals have the infrastructure to serve as Ebola assessment hospitals," Shelly Schwedhelm, MSN, RN, executive director, emergency preparedness and infection prevention at Nebraska Medicine, told OR Manager. Those hospitals will evaluate and care for a patient under investigation (PUI) for a period of time until Ebola is either ruled in or ruled out.

"This can be challenging," she says, "because as soon as someone has symptom onset, it can be another 72 hours before the virus would be at a level in their blood to test positive."

If Ebola is ruled out, the PUI will go home. If Ebola is ruled in, the patient will be transported from the assessment hospital to an Ebola treatment center.

"All of these new protocols, guidelines, treatment centers, and assessment centers have sprung up just in the past several months," says Schwedhelm, a former OR Manager of the Year. "Now managers have to start thinking about what will be next."

What if a patient under investigation to rule out Ebola diagnosis is in need of an emergent surgical procedure?

Surgical protocol

Perioperative leaders need to proactively prepare for a PUI who may need an emergent surgical procedure, says Schwedhelm.

Numerous ethical and clinical considerations must be weighed in order to make a sound decision about whether to proceed with an emergent surgical intervention, she says.



The Nebraska Medicine perioperative services department has developed a process based on the surgical protocol for patients under investigation for Ebola provided by the American College of Surgeons (ACS) (https://www.facs.org/surgeons/ebola/surgical-protocol).

The ACS protocol begins with the following statement: "Elective surgical procedures should not be performed in cases of suspected or confirmed Ebola (EVD). Emergency operations can be considered in cases as defined by the CDC: Persons under investigation, probable cases, and early confirmed cases," and follows with specific training protocols for these aspects:

- preprocedure timeout/checklist
- appropriate levels of personal protective equipment (PPE), levels I, II, III, and surgical drape/equipment protection
- surgical approach
- patient transport and transfer to the OR
- donning and doffing process
- specimen and waste handling.

PUI considerations



Once PUIs are identified, they are quarantined in the emergency department (ED) at Nebraska Medicine. Patients with confirmed Ebola are cared for in the biocontainment unit.

When developing the process for the ED, Schwedhelm says, it was important to have physician and nursing champions from the front lines. Other key individuals include infection preventionists, local health department personnel, facility administrators, and laboratory personnel. Individuals from the OR and radiology also were included.

Kelly Berg, BSN, RN

^{BSN, RN} The team identified a set of three rooms in a side hallway of the ED that could be cordoned off and didn't impact egress out of the unit or safety.

The patient is isolated in one room for the duration of care, a second room is designated for supplies and specific isolation needs, and the third room is used for trash and equipment, such as an x-ray machine and ECG machine, until the patient is ruled in or ruled out to have Ebola.

The family is provided with a room that is adjacent to the clinical area. The patient's family is questioned about possible symptoms or environmental exposure. If no one has any symptoms, the local health department takes over tracking and monitoring of family members.

PPE protocols for a patient under investigation are the same as those used in the biocontainment unit, says infection preventionist Kelly Berg, BSN, RN, CNOR.

They are based on splash risk and include gloves, surgical gown, surgical boots, N95 mask, full face shield, and a hood that covers the neck and head region.

Having a donning and doffing partner in the ED is also important. Both are dressed in full PPE. The donning partner makes sure everyone gets into their PPE correctly. This is done in the clean zone before stepping into the patient's room.

The doffing partner helps the caregivers take their PPE off after patient care is completed in the designated area.

Preprocedure briefing

If a decision is made that the PUI will need to undergo a surgical procedure, all clinicians who will be involved in the intervention assemble for a preprocedure briefing. This group will include anesthesia personnel, surgeons, OR team members, ED nurses, infection preventionists, perioperative nursing leadership, industrial hygien-



ists, security personnel, transporters, and postoperative care unit (PACU) nurses.



"The goal of the preprocedure briefing is to make sure the entire team understands every step of the process," says Mark Emodi, MHA, BSN, RN, director of perioperative services.

The briefing begins with the selection of a designated OR for the procedure as it relates to the general flow of the department. Then staff discuss the ability to isolate the room, and whether the room has the facilities for donning and doffing procedures.

Mark Emodi, MHA, BSN, RN

The briefing continues with the:

- route and steps staff and security personnel will follow for transport from the ED to the OR
- intraoperative sequence of the procedure as well as sharps handling, which instruments to have available, PPE, specimens, and whether the procedure will be minimally invasive or open
- phase 1 recovery steps and postoperative processing of instruments, linen, and trash
- route and steps to follow for transport back to the ED after surgery.

"After we go over all processes and answer any questions anyone might have, we activate the protocol to transport the patient from the ED to the OR," says Emodi.

Patient transport

Nebraska Medicine has developed an algorithm for transport of a PUI from the ED to the OR or another department for a diagnostic intervention.

For transport, the patient will be moved directly to the identified OR suite, as are other patients needing a surgical procedure. The difference will be the controlled course and security personnel to control traffic along the route and to escort the patient and transporters from the ED to the OR, says Kim Hayes, BSN, RN, infection preventionist.

Security personnel will also be placed outside each door of the room where the procedure is being done to make sure no one inadvertently walks into the room.

During transport, the security people wear their regular uniforms and then don surgical attire to enter and guard the restricted areas of the OR.

The direct patient care transport personnel wear biocontainment level gear that includes:

- gloves
- Association for the Advancement of Medical Instrumentation (AAMI) fluid-resistant level 4 gowns
- eye protection (goggles or face shield)
- face mask
- hood
- leg/shoe covers.

OR preparation

Before the patient enters the OR, anything in the room that is not absolutely necessary for the procedure is removed, says Emodi. The equipment that must stay in the room is covered with plastic (sidebar, p 8).

"A good step we came up with in the development of our process was to cover the OR bed with plastic underneath the mattresses to prevent any fluid from leaking into the internal workings of the OR table," he says.

In addition, a table is set up with basins of water, enzymatic cleaners, and a rinse basin for cleaning the instruments. Furthermore, the staff in full PPE will use autoclave bags for processing trash and linens generated by the case.

Suction canisters are prefilled with a neutralizing agent, and, Emodi notes, they should not be filled with more than 500 mL of blood or body fluids during the pro-



cedure. Additionally, the fluid generated during instrument decontamination would follow the same process and limitations as fluid from the surgical field. Based on experience at the Nebraska biocontainment unit, that is the maximum quantity for successful sterilization.



Another deviation from standard is that the case is completely set up and counts completed before the patient enters the room. All trash is removed before the patient enters the room to reduce the waste that has to be autoclaved following the procedure.

Also, the entire OR team is present and donned in PPE before the patient enters the room.

Morgan Shradar, The ACS recommends the following intraoperative PPE:

• AAMI level 4 impervious surgical gowns for staff and drapes over the patient

BSN, RN • leg coverings with full plastic film coating over the fabric, not just over the foot area

- strong consideration for a surgical helmet with an integrated AAMI level 4 gown or a long full plastic face shield that comes down over the neck
- fluid-resistant surgical mask (eg, N95 mask)
- double gloves, with extra long surgical gloves as the outer layer
- cape-style, fluid-impervious hoods (place hood on prior to gown placement to allow for full neck coverage).

Intraoperative considerations

Depending on the surgical procedure, the team will want to limit the sharps they use and limit the hand-to-hand passing of sharp instruments by using a basin or neutral zone, says Emodi (sidebar, p 9). He notes that the ACS recommends performing procedures minimally invasively.



Select a hospital grade disinfectant with a label claim for one of the nonenveloped viruses (e.g., norovirus, rotavirus, adenovirus, poliovirus) to disinfect hospital environmental surfaces

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OR Manager

Vol. 31 No. 4 April 2015

"Even though it will expose our instrumentation to a substantial risk, the blood loss and risk of getting splattered would be lessened by using a minimally invasive approach," he says.

Other ACS recommendations include:

- using instruments, rather than fingers, to grasp needles, retract tissue, and load/un-load needles and scalpels
- using alternative cutting methods such as blunt electrocautery
- using round-tipped instead of sharp-tipped scalpel blades
- using blunt-tip suture needles when possible
- no needles or sharps on the Mayo stand
- no recapping of needles.

Considerations from the anesthesiologist's perspective include using IV sedation, narcotics, and muscle relaxants throughout the procedure. Instead of an anesthesia gas machine, the anesthesiologist uses a ventilator that can be sequestered until the patient is determined to be positive or negative for Ebola.



Kim Hayes,

A respiratory therapist will assist with the ventilator during the procedure and during recovery. The protocols for decontami-

nation of a ventilator have already been written for the biocontainment unit, says Hayes. Some parts can be autoclaved, and the rest can be decontami-

BSN, RN and the rest can be deconated following the standard protocols.

During the procedure, runners are assigned at each OR entrance to get any needed instruments or supplies that are not in the room. The runners wear gloves and place the items into a basin held by the circulating nurse.

Any specimens are kept moist until the end of the case.

"We have a special process developed to transfer specimens to the laboratory," says Morgan Shradar, BSN, RN, OR lead nurse and

biocontainment unit nurse. The specimens stay in formalin for 24 hours before they are processed.

Once a specimen is collected during the case, the circulating nurse double-bags the specimen container, wipes it down with bleach wipes at each step, and hands it to the laboratory staff member for direct transport to the processing center.

"We have the luxury of having a public health lab here at Nebraska Medicine, which is where they process a majority of the specimens," says Hayes.

Postoperative procedures

A PACU nurse dons PPE and recovers the patient in the OR (sidebar, p 9). While the

Intra-operative Considerations

•A trained PPE Donner to inspect clinicians donning PPE procedures

•Remove as much trash and linen possible before the patient enters the OR

•Use minimal instrumentation •Utilization of blunt needles/ instruments

•Avoid hand to hand passage of sharps, consider neutral zone

passing •Surgical methods to reduce the amount of blood loss (MIS)

Incise patient using cautery vs. scalpel

 Keep instrumentation free from bio-burden during procedure
 Protective face respirator
 NIOSH-certified (N-95) or higher







Communicate to team procedure is nearing completion
Phase 1 recovery to be completed in the OR suite
Instrument preparation to be completed in OR

- · Back table to soak instrument sets in sterile water
- · Remove gross contamination, below the water line
- Place instrument in closed container
- Apply pre-soak enzymatic cleaner

Contain all contaminated items and place in sterilizer bags
Trash, linens, plastic covering, disposable sharps

- •OR staff in PPE will perform the initial OR cleaning using a bleach concentration
- Transport autoclave items to the designated area for processing
- •Transport patient to receiving unit, reversing the Algorithm



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patient is being recovered, the OR team cleans the gross bioburden off the instruments in basins of water and bags all linens and supplies that were used or not used. Once the patient is stable, the PACU nurse notifies the ED that the patient will be returning.

All of the security is again put in place to protect the patient's route back to the ED and to protect the route the instruments and trash bags will take to the biocontainment unit to be sterilized.

An autoclave that reprocesses reusable medical devices cannot be used to sterilize instruments, linen, and waste that may have been in contact with the Ebola virus.

The instruments are treated with a presoak enzymatic cleaner, placed in closed containers, and then placed in a case cart, which is wiped down with bleach. The trash bags are also wiped down with bleach and put into a plastic cart, which is also wiped down with bleach. The staff transporting the instruments and trash are dressed in appropriate PPE for the designated area.

Staff in the biocontainment unit are alerted and will be waiting to receive the instruments and trash bags. Donning the appropriate PPE, the staff designated to process the instruments and waste will receive the items and begin the terminal sterilization. When the patient leaves, the OR team does the initial decontamination of the room, and then they doff in the OR doffing area and shower in the locker room.

The used OR will be sequestered for 48 hours to allow the virus to desiccate on its own, which is the same protocol used in the biocontainment unit. Then the staff will clean the furniture and equipment with bleach, and the OR will have ultraviolet light treatment for 8 hours. The room is terminally cleaned before being put back into service.

"It took a lot of work for the OR team to set up these processes and procedures," says Schwedhelm, "but there now is a high level of confidence among the staff that they are prepared to perform a surgical procedure on a PUI if need be." �

—Judith M. Mathias, MA, RN

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