Recommendations for Safely Performing Acute Hemodialysis in Patients with Ebola Virus Disease in U.S. Hospitals

The purpose of this document is to convey information to hospital-based dialysis providers to help them safely perform renal replacement therapy (hemodialysis) in persons confirmed to have Ebola virus disease (Ebola). Acute renal failure requiring renal replacement therapy can occur in critically ill patients infected with Ebola virus. The recommendations and information below are specific for hemodialysis and should be implemented with the precautions described in the document entitled, “Infection Prevention and Control Recommendations for Hospitalized Patients with Known or Suspected Ebola Virus Disease in U.S. Hospitals”.

Treatment decisions should be made by the clinical team caring for the patient. However, infection control considerations may help to inform providers’ decisions and should influence hospitals’ planning processes.

Managing Ebola in hospital settings

Inpatient care of patients with Ebola should be provided in a hospital with capacity to perform continuous renal replacement therapy (CRRT). Efforts to minimize direct blood exposure to healthcare personnel and blood contamination of the environment are of principal importance due to the high concentration of Ebola virus that can be present in an infected patient’s blood and the large volumes of blood involved in hemodialysis.

Patient placement

Hemodialysis/CRRT should only be performed in the patient’s isolation room.

Establishing vascular access for dialysis

Patients with Ebola may have disseminated intravascular coagulation (DIC) and correction of coagulopathy is not always possible. Read more on Ebola virus disease Information for Clinicians in U.S. Healthcare Settings.

Designate a highly competent individual, who has also been trained to follow CDC guidelines for proper personal protective equipment (PPE) procedures, to perform catheter insertion.

Perform catheter insertion in the isolation room and use local strategies to minimize blood exposure during dialysis catheter placement.
The subclavian site for catheter insertion should be avoided because of the challenges with direct site compression if bleeding occurs. Selection of the internal jugular vs. femoral vein for catheter insertion may depend on patient characteristics and operator proficiency. Using a chest X-ray to confirm line placement will require availability of portable X-ray equipment within the isolation room. This and other factors should be considered in the planning stage before it becomes necessary.

Ultrasound guidance should be used (by an individual fully trained in this technique) to reduce cannulation attempts and mechanical complications, including arterial puncture. If used, the ultrasound machine should be dedicated to the isolation room until it can be terminally cleaned and disinfected. Read more on Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011[PDF - 83 pages].

Attach closed, needleless connector devices to the catheter hubs to reduce blood exposure during catheter connections and disconnections.

Healthcare personnel movement

If possible, limit the number and different types of healthcare personnel involved in hemodialysis/CRRT procedures. For example, ICU nurses performing CRRT could eliminate need for dialysis unit nursing staff to also care for the patient.

Personal protective equipment

All staff involved in providing dialysis should follow recommendations for appropriate PPE.

Staff should wear a fluid-resistant or impermeable apron if they will be performing any circuit connection/disconnection procedures, handling used dialyzers or tubing, or handling or draining effluent.

Dedicated equipment

A hemodialysis/CRRT machine should be dedicated for use on the patient and kept in the isolation room until terminal disinfection procedures are undertaken.

All other dialysis-related supplies, including the dialyzer, should be disposed of after use in accordance with local, state, and federal regulations. Read more on Ebola-Associated Waste Management.

Under no circumstances should a used dialyzer be reprocessed or reused.

Effluent disposal

The Ebola virus should not be able to cross an intact dialyzer membrane. Because a small dialyzer leak might not be apparent, however, dialysis effluent should always be handled with care, and while wearing appropriate PPE, to avoid contact and splashes.

The effluent should be disposed of in the toilet or other dedicated drain in a manner that prevents splashes, and can be safely drained into the waste water sewer system.
Machine selection and management

Use a dialysis machine that is familiar to the staff who will perform dialysis.

Machines for CRRT

Certain CRRT machines have features that make them easier to manage and decontaminate in the context of caring for a patient with Ebola than traditional hemodialysis machines, such as a completely closed system, lack of an internal pathway, and use of disposable dialysate and saline supplies. The possibility of blood contamination of internal machine components through pressure monitors is also much less likely with these machines than other hemodialysis machines. During CRRT, staff should pay close attention to pressure alarms and failures of pressure monitors, and look for and document any failure of the tubing or spillage of fluid outside of the tubing, as these may have implications for more extensive machine disinfection procedures.

Additional considerations:

- If clinically appropriate, consider regional citrate anticoagulation during CRRT to reduce episodes of filter clotting that require manipulation of the dialyzer and/or circuit. Regional citrate anticoagulation for CRRT should be used only if the hospital has a protocol in place and nurses who are trained in the protocol.
- Consider using the same CRRT machine for hemodialysis of the patient for as long as possible (while renal replacement therapy is needed) to avoid introducing a second dialysis machine.

Machines for intermittent hemodialysis

If use of an intermittent hemodialysis machine is warranted,

- Complete all priming of the circuit prior to connecting bloodlines to the patient’s catheter.
- Use disposable accessory supplies, such as priming bucket and concentrate containers, if possible.
  - Establish steps for handling accessory supplies that are not disposable, must be dedicated to the patient, and disinfected between uses.
  - If an attached computer keyboard is needed, use a flat solid surface keyboard that can be easily disinfected or a keyboard cover that can be disinfected or disposed of.
- Pay close attention to pressure alarms, failures of the pressure monitor, and look for and document any flow of blood in the line approaching the external transducer protector, as these may signal internal contamination of the machine with blood.

Machine decontamination/terminal disinfection

External machine surfaces

Cleaning and disinfection of external machine surfaces should be performed in accordance with CDC’s “Interim Guidance for Environmental Infection Control in Hospitals for Ebola Virus” and manufacturer’s instructions.

General principles include the following:
• Use appropriate PPE
• Perform a cleaning step using a detergent
• Perform disinfection using an EPA-registered hospital disinfectant recommended for use against Ebola during the 2014 outbreak*
• Ensure all surfaces are cleaned and disinfected (including accessory equipment such as IV poles), paying particular attention to high-touch surfaces, such as control panels
  o Assure sufficient wet contact time of disinfectant according to label claims for inactivation of a non-enveloped virus

Additional considerations:

• Vaporized hydrogen peroxide and ultraviolet (UV) light applications for decontamination of isolation room surfaces (during terminal disinfection) might serve to disinfect external surfaces of dialysis machines. If UV light is used, the importance of a direct line of sight for efficient disinfection should be considered.

CDC has been in contact with some machine manufacturers and may be able to assist in providing more specific guidance for machine terminal disinfection procedures. (CDC Emergency Operations Center 770-488-7100)

**Internal pathways**

Standard heat or chemical disinfection procedures recommended by machine manufacturers and used routinely by dialysis providers are sufficient to inactivate Ebola virus.

Internal machine disinfection of hemodialysis machines should be performed between treatments and conducted in the isolation room.

**Other internal machine components**

If there is concern about the possibility of fluid contamination of internal machine components such as pressure monitors, contact the manufacturer for guidance and notify the appropriate local or state health department and CDC (CDC Emergency Operations Center 770-488-7100).

* EPA-registered disinfectant: Use a U.S. Environmental Protection Agency (EPA)-registered hospital disinfectant with a label claim of potency at least equivalent to that for a non-enveloped virus (e.g., norovirus, rotavirus, adenovirus, poliovirus).