Infection Prevention and Control: Reducing the Risk of the Hemodialysis Patient

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CDC HEALTH ADVISORY

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CDC URGING DIALYSIS PROVIDERS AND FACILITIES TO ASSESS AND IMPROVE INFECTION CONTROL PRACTICES TO STOP HEPATITIS C VIRUS TRANSMISSION IN PATIENTS UNDERGOING HEMODIALYSIS

Summary
The Centers for Disease Control and Prevention (CDC) has received an increased number of reports of newly acquired hepatitis C virus (HCV) infection among patients undergoing hemodialysis. Infection control lapses in dialysis care could expose patients to HCV. Any case of new HCV infection in a patient undergoing hemodialysis should prompt immediate action. CDC is urging dialysis providers and facilities to:

1) Assess current infection control practices and environmental cleaning and disinfection practices within the facility to ensure adherence to infection control standards;
2) Address any gaps identified by the assessments;
3) Screen patients for HCV, following CDC guidelines, to detect infections, determine treatment potential, and halt secondary transmission; and
4) Promptly report all acute HCV infections to the state or local health department.

Background
CDC has received an increased number of reports of acute HCV infection among patients undergoing hemodialysis. Between 2014 and 2015, CDC has been contacted about 36 cases of acute HCV infection in 19 different hemodialysis clinics in eight states. While investigations are ongoing, so far, HCV transmission between patients has been demonstrated at nine of those clinics, based on epidemiologic and viral sequencing evidence. Lapses in infection control (e.g., injection safety, environmental disinfection, and hand hygiene) were commonly identified at these facilities. Although the exact means of transmission could not be discerned, these lapses all could potentially contribute to HCV transmission. The increase in acute HCV infections might be due, in part, to improved screening and awareness of the potential for HCV infection in the hemodialysis setting. Regardless, this increase underscores the widespread potential for patients to acquire serious infections during dialysis care.
Dialysis Safety

Patients who undergo dialysis treatment have an increased risk for getting a healthcare-associated infection (HAI). Hemodialysis patients are at a high risk for infection because the process of hemodialysis requires frequent use of catheters or insertion of needles to access the bloodstream. Also, hemodialysis patients have weakened immune systems, which increase their risk for infection, and they require frequent hospitalizations and surgery where they might acquire an infection.
TRANSMISSION
DO YOU....

• Perform HH in and out of the room?
• Perform HH in the room after patient contact?
• Wear gown and gloves if you are anticipating soiling, even when pt not on precautions?
• How often to you wear mask and eyeshield? Ever empty a urinal?
Increased Hand Hygiene Associated with Decreased MRSA Transmission

Hand Hygiene Adherence

<table>
<thead>
<tr>
<th>Year</th>
<th>Hand Hygiene</th>
<th>MRSA Transmission Rate</th>
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<tbody>
<tr>
<td>1994</td>
<td>50</td>
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<td>1998</td>
<td>20</td>
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Lancet 2000;356:1307-12

“I use so much alcohol, my hands had to join!”
Hand Hygiene

• How to perform hand hygiene
  – Soap and water
  – Waterless Hand Sanitizer

• Using the appropriate amount
Audit Tool: Hemodialysis hand hygiene observations
(Use a "✓" for each 'hand hygiene opportunity' observed. Under 'opportunities successful'; use a "✓" if successful, and leave blank if not successful)

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Hand hygiene opportunities observed</th>
<th>Hand hygiene opportunities successful</th>
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Discipline: P=physician, N=nurse, T=technician, S=student, D=dietitian, W=social worker, O=other
Duration of observation period = _____ minutes
Number of successful hand hygiene opportunities observed = ____________
Total number of patients observed during audit = ____________
Total number of hand hygiene opportunities observed during audit = ____________

** See hand hygiene opportunities on back page

National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion

Patient HAND HYGIENE
Gloves

• Do NOT replace hand hygiene!

• Clean, new gloves for contact with patients

• Gloves should be changed often and HH performed during care!
  – After contact with blood or body fluids
  – After completing tasks at one patient station before moving to another station
  – After contacting a potentially contaminated site before moving to a clean site
Donning and Doffing Appropriately!

**Donning**
- Apply gown
- Apply mask/eye protection (if necessary)
- Apply gloves

**Doffing**
- Remove gloves
- Remove gown
- HAND HYGIENE
- Remove mask
- HAND HYGIENE!
Environmental Cleaning

**ASK YOURSELF**

When was the last time this keyboard was cleaned?

Would I want to sit on that wheelchair/commode/stretcher?

Would I put ________ on my body?

How would you like it if your team members weren’t there to help you?
IF YOU’VE GOT TIME TO LEAN you have time TO CLEAN.
The Room IS the Patient!

Percent of Surfaces Positive for MRSA

- Bed Linen
- Patient Gown
- Overbed Table
- BP Cuff
- Side Rails
- Bath Door Handle
- IV Pump Button
- Room Door Handle

Contact Contamination
- Contact with patient
- Contact with environment

Infect Control Hosp Epidemiol 1997;18:622-627
Prevent Cross-Contamination

• Minimize shared equipment
  – Dedicated stethoscope in contact precaution rooms
  – Single use scissors for changing dressings
  – Items must be cleaned before going to next patient, ie blood pressure cuff

• Invasive equipment
  – must be disinfected or sterilized between patient use

• Non-invasive equipment
  – Quat ammonium
  – Sani-cloth for electronic equipment
  – Bleach (for C diff)

• Proper disposal of PPE (No gloves, gowns, masks, haircover, or booties in public areas)
**Checklist: Dialysis Station Routine Disinfection**

This list can be used if there is no visible soil on surfaces at the dialysis station. If visible blood or other soil is present, surfaces must be cleaned prior to disinfection. The proper steps for cleaning and disinfecting surfaces that have visible soil on them are not described herein. Additional or different steps might be warranted in an outbreak situation. Consider gathering necessary supplies\(^3\) prior to Part A.

**Part A: Before Beginning Routine Disinfection of the Dialysis Station**

- Disconnect and takedown used blood tubing and dialyzer from the dialysis machine.
- Discard tubing and dialyzers in a leak-proof container\(^2\).
- Check that there is no visible soil or blood on surfaces.
- Ensure that the priming bucket has been emptied\(^3\).
- Ensure that the patient has left the dialysis station\(^3\).
- Discard all single-use supplies. Move any reusable supplies to an area where they will be cleaned and disinfected before being stored or returned to a dialysis station\(^5\).
- Remove gloves and perform hand hygiene.

**PART B: Routine Disinfection of the Dialysis Station – AFTER patient has left station**

- Wear clean gloves.
- Apply disinfectant\(^4\) to all surfaces\(^7\) in the dialysis station using a wiping motion (with friction).
- Ensure surfaces are visibly wet with disinfectant. Allow surfaces to air-dry\(^4\).
- Disinfect all surfaces of the emptied priming bucket\(^3\). Allow the bucket to air-dry before reconnection or reuse.
- Keep used or potentially contaminated items away from the disinfected surfaces.
- Remove gloves and perform hand hygiene.

Do not bring patient or clean supplies to station until these steps have been completed.

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\(^2\) EPA-registered hospital disinfectants has instructions explaining how they should be used in healthcare settings.

\(^3\) EPA-registered sodium hypochlorite or other products for healthcare settings are available and are preferred over household bleach products that are not EPA-registered for disinfection of surfaces.

\(^4\) Routine disinfection of environmental soil can be accomplished using a low-level disinfectant (any EPA-registered hospital disinfectant). However, intermediate-level disinfectants must be available in the facility for disinfection of surfaces that are soiled with blood or body fluids.

\(^5\) Intermediate-level disinfectants are more potent to inactive mycobacteria and nontuberculous mycobacteria. Low-level disinfectants are not strong enough to inactivate these bacteria.

\(^6\) For convenience, consider selecting and routinely using hospital disinfectants that are nontuberculosis or nontuberculous mycobacteria and hepatitis B virus (HBV) and human immunodeficiency virus (HIV). These products may be used to perform routine and intermediate-level disinfection.

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Notes and Select References:

INJECTION PRACTICES

• 370,000 people on HD
• 75,000 people receive HD through a central line.
• 2008: 37,000 CLABSIs related to HD lines


Promote fistula use
Central Line Insertion Bundle

Central Venous Catheter Insertion Bundle

- Hand Hygiene
- Maximal Barrier Precautions Upon Insertion
- Chlorhexidine Skin Antisepsis
- Optimal Catheter Site Selection, with Avoidance of the Femoral Vein for Central Venous Access in Adult Patients
- Daily Review of Line Necessity with Prompt Removal of Unnecessary Lines
Central line Maintenance Bundle: 4 easy steps!

- Daily review of Catheter Necessity
- Catheter hub, cap, and tubing care
  - Care
  - Accessing the Line
  - Blood draws
- Catheter-site Care
  - Infection Control
  - Dressing
  - Activity
  - Evaluation
- No routine replacement of CVCs
EVERYTIME YOU ACCESS THE LINE YOU ARE PUTTING THE PATIENT AT RISK FOR AN INFECTION!

Rate of Colonization

- CVC internal Hub colonization
  - 29-38%
- CVC external Hub colonization
  - 57%
- Stopcocks
  - 22-32%
- Arterial catheter hubs
  - 31%
- Piggy-back sideports 6x per day
  - 10-20%

Hemodialysis Central Venous Catheter Scrub-the-Hub Protocol

This protocol outlines a suggested approach to preparing catheter hubs prior to accessing the catheter for hemodialysis. It is based on evidence where available and incorporates theoretical rationale when published evidence is unavailable.

Definitions:
- **Catheter** refers to a central venous catheter (CVC) or a central line
- **Hub** refers to the end of the CVC that connects to the blood lines or cap
- **Cap** refers to a device that screws on and occludes the hub
- **Limb** refers to the catheter portion that extends from the patient's body to the hub
- **Blood Lines** refer to the arterial and venous ends of the extracorporeal circuit that connect the patient's catheter to the dialyzer

Catheter Connection and Disconnect Steps:

**Connection Steps:**
1. Perform hand hygiene and don new clean gloves.
2. Clamp the catheter (Note: Always clamp the catheter before removing the cap. Never leave an uncapped catheter unattended).
3. Disinfect the hub with caps removed using an appropriate antiseptic (see notes).
   a. (Optional) Prior to cap removal, disinfect the caps and the part of the hub that is accessible and discard the antiseptic pad (ie., use a separate antiseptic pad for the next step).
   b. Remove the caps and the antiseptic with friction to the catheter, moving from the hub at least several centimeters towards the body. Hold the limb while allowing the antiseptic to dry.
   c. Using the same antiseptic pad, apply antiseptic with friction to the catheter hub (leaving the hub at least several centimeters towards the body). Hold the limb while allowing the antiseptic to dry.
   d. Use a separate antiseptic pad for each hub/catheter limb. Leave hubs "open" (ie., uncapped and disconnected) for the shortest time possible.

**Disconnection Steps:**
1. Perform hand hygiene and don new clean gloves.
2. Clamp the catheter (Note: Always clamp the catheter before disconnecting. Never leave an uncapped catheter unattended).
3. Disinfect the hub before applying the new cap using an appropriate antiseptic (see notes).
   a. (Optional) Disinfect the connection prior to disconnection. If this is done, use a separate antiseptic pad for the subsequent disinfection of the hub.
   b. Disconnect the blood line from the catheter and disinfect the hub with a new antiseptic pad. Scrub the sides (threads) and end of the hub thoroughly with friction, making sure to remove any residue (e.g., blood).
   c. Use a separate antiseptic pad for each hub. Leave hubs "open" (ie., uncapped and disconnected) for the shortest time possible.
4. Always handle the catheter hubs aseptically. Once disinfection, do not allow the catheter hubs to touch nonsterile surfaces.
5. Attach sterile syringe, unclamp the catheter, withdraw blood, and flush per facility protocol.
6. Repeat for other limb (this might occur in parallel).
7. Connect the ends of the blood lines to the catheter aseptically.
8. Remove gloves and perform hand hygiene.

Notes/Discussion:

**Antiseptic Use and Selection**
As described in the 2011 CDC/Healthcare Infection Control Practices Advisory Committee (HICPAC) Guidelines for the Prevention of Intravascular Catheter-Related Infections, prior to accessing the catheter hub it should be disinfected with an appropriate antiseptic (greater than 65% chlorhexidine with alcohol, 70% alcohol, or 10% povidone-iodine). There is not enough evidence to recommend one antiseptic over the others. Generally, antiseptics should be allowed to dry for maximal effect.

If using 70% alcohol, sterile antiseptic pads should be used (sterile pads are labeled sterile and packaging for nonsterile pads often does not state whether the pads are sterile or nonsterile). For practical reasons, pads or similar products might be preferred over other forms of antiseptics (e.g., swabs) for disinfecting the catheter as they are malleable and allow for vigorous cleaning of small spaces.

If using an antiseptic that leaves a residue (e.g., chlorhexidine), avoid allowing large amounts of antiseptic to enter the lumen of the catheter to avoid potential toxicities to the patient.

If using chlorhexidine, removing all blood residue is particularly important to maximize the effect of the antiseptic.

**Soaking Caps**
The role of soaking caps in an antiseptic prior to removing them is not clear. It is not a CDC/HICPAC recommendation. This procedure is described in the 2000 National Kidney Foundation’s Kidney Disease Outcomes Quality Initiative (KDOQI) Vascular Access Guidelines but was not included in the 2006 update.

**Handling Catheter Hubs**
Catheter hubs should always be handled aseptically. Once disinfection, the catheter hubs should not be allowed to touch nonsterile surfaces. This might be best performed by holding them until the antiseptic dries. During this time, the staff member performing the procedure should also ensure that the catheter remains clamped.

When disinfecting catheter hubs, clean, nonsterile gloves are used if aseptic technique is maintained.

**Bloodline Disinfection**
When accessing the line, disinfecting the ends of the sterile blood lines is not required if care has been taken to contain the ends of the blood lines (i.e., through careful aseptic technique). Blood lines can become contaminated during connections and disconnections, as well as during the priming process. Contact with contaminated prime waste in prime buckets that have not been properly cleaned and disinfected or through backflow from waste handling ports must be avoided. Disinfecting the bloodlines does not address this issue.

**Disconnection and Line Reversals**
Catheter hubs should be disinfected again after disconnecting from bloodlines and before replacing a new cap at the end of a treatment. This should be done in a manner similar to that used when disinfecting the hub prior to accessing. Disinfecting the catheter hub and the end of the extracorporeal blood line should also be performed if, during a treatment, a patient must be disconnected and their blood is re-circulated. Anytime a patient's circuit is disconnected this should be done aseptically and the number of times a patient's catheter is disconnected from the blood lines should be minimized to the extent possible.

**Securing Caps with Tape**
Caution should be used if taping caps on to hubs between treatments. Tape can leave residue on the hubs that might make disinfecting them more difficult.

**Use of Masks**
Although data supporting the use of masks during catheter accessing/deaccessing to prevent vascular access infections is lacking, this practice is recommended for patients and staff in the 2000 KDOQI guidelines and is included in the Centers for Medicare and Medicaid Services (CMS) End Stage Renal Disease Program Conditions for Coverage Interpretive Guidance.

**Personal Protective Equipment (PPE)**
Proper PPE should always be worn by staff to avoid exposure to potentially infectious blood and body fluids when connecting/disconnecting catheters.

**Aseptic Technique**
This includes practices that prevent the contamination of clean/sterile items and surfaces. Once tasks requiring aseptic technique have been started, care must be taken to avoid contamination of gloves and other clean/sterile items that can occur when touching dirty surfaces (e.g., positioning patient, using computer keyboard).

**Selected References:**
CLMB: Catheter Site Care: Dressing

- HAND HYGIENE!
- Sterile vs Clean procedure?
- How often?
- Masks?
- Maintain aseptic technique throughout dressing change
- Use Povidone Iodine/Chlorhexidine gluconate scrub to sites for dressing changes (SCRUB TIME?)
• When and how do you evaluate your line dressing?

EVERY SHIFT!!!
TOUCH IT, INSPECT IT, DO SOMETHING ABOUT IT!
**Audit Tool:** Hemodialysis injectable medication preparation

Observe a medication preparation session. (Use a “✓” if action performed correctly, a “✗” if not performed/performed incorrectly. If not observed, leave blank. All applicable actions within a row must have “✓” for the procedure to be counted as successful.)

<table>
<thead>
<tr>
<th>Day (i.e., M, Tu, W)</th>
<th>Shift (i.e., 1-4)</th>
<th>Discipline</th>
<th>Med prep done in designated area</th>
<th>Med prep area is clean *</th>
<th>All vial(s) are inspected **</th>
<th>Hand hygiene performed</th>
<th>Septum of all vial(s) disinfected</th>
<th>All vials entered with new needle and new syringe</th>
<th>Med prep done aseptically</th>
<th>All single dose vial(s) discarded</th>
<th>All multi dose vial(s) discarded or stored properly</th>
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Discipline: P=physician, N=nurse, T=technician, S=student, O=other

Number of sessions performed correctly =

Total number of sessions observed =

**ADDITIONAL COMMENTS/OBSERVATIONS:**

*Preparation of injectable medications must be performed in a designated clean area that is free of obvious contamination sources (e.g., blood, body fluids, contaminated equipment, tap water).

**Vial should be discarded if sterility is questionable, or expiration date or beyond-use date has been exceeded. If a multi-dose vial will not be immediately discarded after use, the vial should be labeled upon opening to indicate the beyond-use date.*
CDC CORE INTERVENTIONS for BSI PREVENTION: HD

- Surveillance and feedback using NHSN
- Hand Hygiene observations
- Catheter/vascular access care observations
- Staff education and competency
- Patient education and engagement
- Catheter reduction
- CHG skin antisepsis
- Catheter hub disinfection
- Antimicrobial ointment ***
Assume knowledge deficit

"Yes, I know all about MRSA, my mother has had it for a year"

A. Cool! Let me know if you have any questions. You know this stuff is nasty!

B. So you know that it is a bacteria that is resistant to a certain type of antibiotic and that this bacteria is easily transmitted through touching?
Stop and THINK for a moment:

Your patient acquires ____________________

Your Grandma(pa) acquires ____________________

You acquire ____________________

Questions? Contact the Nurse’s Station.
Additional References and Websites

Centers for Disease Control http://www.cdc.gov/dialysis/index.html
The Joint Commission National Patient Safety Goals: http://www.jointcommission.org/GeneralPublic/NPSG/
Institute for Healthcare Improvement, Central Venous Catheters:
http://www.jointcommission.org/GeneralPublic/NPSG/


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