Hemodialysis Catheters – the good, the bad and the ugly

- Elizabeth Evans DNP
- 9th Annual Southwest Nephrology Nursing Symposium
- January 28, 2017
No disclosures

- Objectives:

1. Discuss how scrub the hub prevents infection and how to assess exit sites.

2. Review techniques to prevent catheter dysfunction.
Catheter placement

- Temporary – should not accept in outpatient clinics- not tunneled.
- Looks like Frankenstein.
- High risk for infection with temporary hemodialysis catheters.
- CDC recommends that temporary hemodialysis catheters be converted to tunneled hemodialysis catheter if planned to be in place for over 3 weeks.
Best Hemodialysis Catheter Placement sites:
Right IJ placement and tip in mid right atrium is best location – less dysfunction
Best Practice for HDC (Hemodialysis catheter) placement:

- **B.1.1** Catheters should be inserted under strict aseptic conditions.

- **B.1.2** The right internal jugular vein position is the preferred location for insertion, followed by the left internal jugular vein position. The use of the femoral vein position is discouraged.

- **B.1.3** The use of the subclavian vein position is discouraged for reasons not related to infection (frequent stenosis).
Catheter dressings – what is best practice?

1. Inspection and early intervention when abnormal findings are seen.
2. Cochrane (2003) evaluated tape/gauze, island and transparent dressings and found no difference but could be due to study design.
3. Chlorhexidine impregnated dressings or sponges have not clearly demonstrated reduced infections.
4. Dressings do not provide additional benefit to prevent infection but do help stabilize catheter (less movement) and less accidental dislodgement.
Catheter Care – what is best practice?

- Monitoring HDC sites
- Hand hygiene
- Monitoring employees
- Education & competency
- Catheter reduction
- Chlorhexidine (CHG) use
- Scrub the hub/cleansing
HDC connection & disconnection:

Hand hygiene.
Clean gloves each time.
Clamp catheter – should be clamped all the time.
Scrub the cap before removing. Scrub the hub after cap removed.
Scrub thoroughly – 5 seconds friction.
Then scrub up the catheter to patient.
Allow antiseptic to dry.
Never let hub to touch nonsterile surfaces.

Attach sterile syringe & unclamp.
Withdraw blood & flush 10mL NS – pulsatile flush.
Connect blood line to catheter aseptically.
Remove gloves and perform hand hygiene.
Do this routine every time blood lines are disconnected (Bathroom or reverse lines).
Use antiseptic for scrub the hub. Sterile alcohol is ok.

Soaking the caps not recommended by CDC.

Handle HDC hubs aseptically.

Disinfect HDC hubs after disconnecting from blood lines.

Use caution if securing caps with tape – d/t adhesive residue.

Masks – evidence is lacking; but are still recommended.

PPE should always be worn when connecting or disconnecting HDC.

Use caution to not contaminate cleaned hubs, gloves or any clean surface.
## CDC Dialysis Collaborative

**Facility Name:**
**Date:**
**Start time:** AM / PM

**Day:** M W F Tu Th Sa

**Shift:** 1st  2nd  3rd  4th

**Observer:**
**Location within unit:**

### Audit Tool: Catheter connection and disconnection observations

(Use a "v" if action performed correctly, a "0" if not performed. If not observed, leave blank)

<table>
<thead>
<tr>
<th>Procedure observed, C=connect D=disconnect</th>
<th>Discipline</th>
<th>Mask worn properly (if required)</th>
<th>Hand hygiene performed</th>
<th>New clean gloves worn</th>
<th>Catheter removed from blood line aseptically (disconnection only)</th>
<th>Catheter hub scrubbed</th>
<th>Hub antisepic allowed to dry</th>
<th>Catheter connected to blood lines aseptically (connection only)</th>
<th>New caps attached aseptically (after disconnecting)</th>
<th>Gloves removed</th>
<th>Hand hygiene performed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Discipline:** P=physician, N=nurse, T=technician, S=student, O=other

**Duration of observation period =** minutes

**Number of procedures performed correctly =**

**Total number of procedures observed during audit =**

### ADDITIONAL COMMENTS/OBSERVATIONS:

[Image of a CDC logo and text: Making dialysis safer for patients, National Center for Emerging and Zoonotic Infectious Diseases, Division of Healthcare Quality Promotion]
**Audit Tool: Catheter exit site care observations**
(Use a "✓" if action performed correctly, a "✗" if not performed. If not observed, leave blank)

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Mask worn properly (if required)</th>
<th>Hand hygiene performed</th>
<th>New clean gloves worn</th>
<th>Skin antisepic applied appropriately</th>
<th>Skin antisepic allowed to dry</th>
<th>No contact with exit site (after antisepic)</th>
<th>Antimicrobial ointment applied</th>
<th>Dressing applied properly</th>
<th>Gloves removed</th>
<th>Hand hygiene performed</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discipline: P=physician, N=nurse, T=technician, S=student, O=other

Duration of observation period: ________ minutes
Number of procedures performed correctly = ________
Total number of procedures observed during audit = ________

**ADDITIONAL COMMENTS/OBSERVATIONS:**

[Blank space for additional comments]

---

**Making dialysis safer for patients**

[Logo and text from CDC]

[Logo and text from CDC]

[Logo and text from CDC]
<table>
<thead>
<tr>
<th>Type of handling</th>
<th>Preventive measures</th>
<th>Optional extra measures*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catheter insertion</td>
<td>Avoid femoral vein insertion sites</td>
<td>Eradicate <em>S. aureus</em> nasal carriage by topical mupirocin for 2 weeks, followed by a once-weekly maintenance dose of the same agent</td>
</tr>
<tr>
<td></td>
<td>Introduce maximal sterile barrier precautions: wash hands with antiseptic soap or solution; wear a surgical mask, sterile gloves, cap, and use sterile instruments; use a sterile sheet to cover the patient; disinfect skin at insertion site with povidone-iodine or 2% chlorhexidine in alcohol solution</td>
<td></td>
</tr>
<tr>
<td>Inspection of exit site</td>
<td>Visual inspection and palpation with sterile or clean gloves at every dialysis session</td>
<td>Have a low threshold for removing nontunneled central venous catheters (author's personal opinion)</td>
</tr>
<tr>
<td></td>
<td>Look for signs of infection, such as swelling, pain, redness and pus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Swab and culture when infection is suspected</td>
<td></td>
</tr>
<tr>
<td></td>
<td>When clinical suspicion of infection is high start prophylactic antibiotics that are effective against <em>S. aureus</em></td>
<td></td>
</tr>
<tr>
<td>Change dressings</td>
<td>Change dressings at every dialysis and promptly replace loosened or soiled dressings</td>
<td>Application of a topical antimicrobial agent to the exit site, such as medicinal honey, mupirocin, or antibiotic-containing ointments</td>
</tr>
<tr>
<td></td>
<td>Before applying a new dressing, clean skin with antiseptic solution, preferably a 2% chlorhexidine in alcohol solution</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use nonocclusive or semipermeable dressings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note that a fully ingrown, cuffed, tunneled central venous catheters may not need a dressing</td>
<td></td>
</tr>
<tr>
<td>Opening and closing the central venous catheter</td>
<td>Wash hands with an antiseptic soap or sterile solution</td>
<td>Lock the central venous catheter using an antimicrobial solution</td>
</tr>
<tr>
<td></td>
<td>Wear sterile gloves, surgical mask, sterile gown</td>
<td>A membrane-closed or needleless connector device may be used, but the effect on the incidence of catheter-related bloodstream infection is unknown</td>
</tr>
<tr>
<td></td>
<td>Place a sterile sheet under the central venous catheter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soak the catheter hub in an antiseptic solution (such as 2% chlorhexidine in alcohol) for at least 5 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minimize exposure of the opened catheter hub to air</td>
<td></td>
</tr>
<tr>
<td>Catheter replacement over a guidewire</td>
<td>Use sterile barrier precautions similar to those applied when inserting a new central venous catheter</td>
<td>Intravenous vancomycin 1g after replacement (author's personal opinion)</td>
</tr>
</tbody>
</table>

*Extra preventive measures should be taken when the incidence of catheter-related infection remains persistently above the benchmark rate. Adherence to the catheter care protocol and training of staff should be ascertained.
The problems with hemodialysis catheters (and infection):
- HDCs are always available – can be placed in multiple locations and are immediately ready to use
- Polyurethane HD catheters (compared to silicone) have a higher tensile strength allowing larger inner lumen with same outer diameter – therefore allows increased blood flow rates
- Patients state must be better because: No needles and no pain
  - Fast to start and fast to end HD treatments
  - No aneurysms and no infiltrations
  - Those infections only happen to someone else
  - Can't see those internal brewing problems – so they must not be happening
- However, HD catheters must be used when patients have exhausted all other access sites.
- In particular, patient preference for a catheter vary in different countries, only 1% preferred by the Japanese, 18% preferred in the United States, 42% in Belgium and 44% in Canada.
75% of all hemodialysis patients start dialysis with HD catheters – is this one of the reasons for this high death rate? It certainly does not help lengthen the lifespan.
- Infections: bloodstream, exit site, tunnel infection
- Catheter dysfunction
- Catheter-related sheaths
- Catheter cuff exposure and catheter migration
- Catheter change out or exchanges
- Superior Vena Cava Syndrome – central vein occlusion
Infections (blood stream, exit site and tunnel infections), Catheter cuff exposure, Catheter migration.
Tunnel Infection – Catheter being removed and new catheter placed
Blood stream infections:

- Any symptoms of fever, chills, mental status changes, hypotension – suspect blood stream infection in patients with HD catheters. Draw blood cultures – 2 sets prior to any antibiotics.

- There are four recognized routes for contamination of catheters:
  1) skin organisms migrate at the HDC insertion site up the HDC tract along the catheter surface leading to HDC tip colonization (most common route of infection for short-term catheters)
  2) direct contamination of the catheter or catheter hub by contact with hands or contaminated fluids or devices (most common in chronic dialysis care)
  3) less commonly, catheters might become seeded from another area that is infected
  4) rarely, contaminated medications might lead to CRBSI
Evidence based – Infection Prevention:

- **5 seconds mechanical friction** using an antiseptic product (i.e. sterile alcohol pad) before any needle puncture or needle free access into HD dialysis catheter is needed (scrub the hub).

- **Swiping** with alcohol wipe **DID NOT** disinfect needless connectors of staphylococcus aureus or Pseudomonas aeruginosa contamination.

- Alcohol and CHG-alcohol performed equally but CHG had longer residual disinfection for up to 24 hours even with needleless connectors.

- Meta-analysis (for any port) recommended:
  - (1) Use an appropriate antiseptic **IMMEDIATELY** before connections, infusion or aspiration.
  - (2) Hand hygiene, gloving & aseptic practices should be maintained prior to any contact with HD catheter.
  - (3) Educate all clinical staff to disinfect catheter hubs and ports **PRIOR** to and **AFTER** each time they are accessed.
Infection Prevention continued:

- Staphylococcus aureus colonization is lower with pulsatile flushing of HDC as opposed to continuous flushing.
- Catheter site care/dressing changes – Catheter –related sepsis was significantly lower when CHG-alcohol was used for the cleaning agent for exit sites of CVCs.
- The risk of blood stream infections is uncertain in CVC literature but had significant decrease of infections in hemodialysis retrospective review.
- HDC is usually removed with tunnel infections, non-resolving septicemia, staph, fungal, bacilli or pseudomonas infections.
- In October 2008, CMS changed hospital reimbursement by not paying days when patients developed hospitalized vascular CRBSI which were not present on admission.
Dysfunctional Hemodialysis Catheter:

- <250 arterial pressure or >250 venous pressure with HD cath bfr >300 mL/min
- Failure to Aspirate
- Inadequate k/t/v
- Multiple alarms
Hemodialysis Catheter Dysfunction Facts: KDOQI, 2006

- Usual IJ Catheters recirculation rate: 0.4% (not reversed); Femoral Catheters usual recirculation rate: 13.1% (not reversed)

- Femoral Catheters < 20cm recirculation rate = 26.3%, compared to > 20cm length = 8.3%. The longer femoral catheter lies in the IVC as opposed to common iliac vein for the shorter catheter. **The IVC allows greater blood flow, hence the lower recirculation (hint – order greater than 20cm length when ordering femoral catheter placement or changing catheter)**

- Recirculation increases when "lines are reversed" even in well functioning nonsplit catheters from 2-3% to over 10%

- Catheter dysfunction leads to up to 33% untimely catheter removals. Catheter dysfunction increases morbidity, mortality, costs, vessel exhaustion and additional patient anxiety.
In chronic catheter dysfunction, the most common cause is a thrombus and thrombus formation is not prevented by any use of antiplatelet agents (aspirin, plavix, warfarin).

Some studies have demonstrated adequate adequacy even when bfr is less than 300 – hint evaluate the situation. Do not automatically change catheter if that is the only sign.

KDOQI workgroup felt ratio of dialyzer bfr achieved divided by the prepump arterial limb pressures in absolute units (<1.2) as best indicator of dysfunction. In my experience nurses use the frequency of pressure alarms as the best indicator of dysfunction.

The need to place patient in Trendelenberg position every time to achieve bfr > 300 is always due to improper location of the dialysis catheter.
KDOQI 2006 – mechanical occlusion – need referral back to interventional radiology

Table 20. Causes of Early Catheter Dysfunction

<table>
<thead>
<tr>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical</td>
</tr>
<tr>
<td>Kinks (angulation in tunnel)</td>
</tr>
<tr>
<td>Misplaced sutures</td>
</tr>
<tr>
<td>Catheter migration</td>
</tr>
<tr>
<td>Drug precipitation (some antibody locks or IV IgG)</td>
</tr>
<tr>
<td>Patient position</td>
</tr>
<tr>
<td>Catheter integrity</td>
</tr>
<tr>
<td>Holes</td>
</tr>
<tr>
<td>Cracks</td>
</tr>
</tbody>
</table>
How do you manage a dysfunctional HDC?: Nurses often reverse the lines – What happens then? Recirculation? But you complete the dialysis treatment – is this ok?
The performance & durability of catheter improves if tip is in the right atrium. The tip of CVC catheter moves with pt movement. Ideally bfr should be 400 mL/min for at least 3 hours.

In one study, side holes increased infections to 2.5 per 1000 catheter-days compared to 0.25 infections per 1000 catheter days when HDC did not have side holes. Side holes also promote thrombus formation.

Split-tip designed to decrease that positional dependence of the catheter tip. The movement of the split tip may decrease a thrombus and fibrin sheath forming around the catheter tip but have increased recirculation.

Step-tip catheters were originally designed to reduce recirculation between lumens. If arterial lumen again the SVC or right atrium may not function well.

The performance & durability of catheter improves if tip is in the right atrium. The tip of CVC catheter moves with pt movement. Ideally bfr should be 400 mL/min for at least 3 hours.
Recirculation- how to recognize, what does it do and can we prevent it?

- Access recirculation occurs when dialyzed blood exiting the outflow lumen directly re-enters the inflow lumen – which means the systemic circulation is bypassed.
- Reversed lines results in recirculation with the following types of dialysis catheter tips: symmetric tip = 0% to 5%; step-tip = 15 -20 %, and split-tip catheters= 20 to 30%.
- The Equistream®, Palindrome™, and Symetrex catheters had no recirculation with blood lines connected in standard or reversed configurations.
Palindrome HD catheter (symmetric tip)

Note the color at the exit site.
Types of Thrombotic Occlusions

1. Intraluminal Thrombus
2. Fibrin Tail
3. Mural Thrombus
4. Fibrin Sheath
Catheter-Related Sheaths (CRS):

- The most common sign of CRS is HDC dysfunction
- Previously CRS called fibrin sheath (not fibrin)
- The presence of sheath is a risk factor for CRBSI
- The usual first sign is inability to aspirate from the HDC, termed withdrawal occlusion
- The CRS is encasing the tip of the HDC and forms a one-way valve
Catheter-Related Sheaths (CRS):

- Defects in the CRS may allow infusion but won’t allow aspiration.
- The persistent CRS causes ongoing dysfunction & decreased flow rates.
- The peri-catheter thrombus can cause stenosis or vein occlusion.
- Mural thrombi can block a vein (presenting as neck, arm, jaw, head pain, numbness of extremity, erythema, phlebitis or vein distention) or be asymptomatic. The extreme symptom is SVC syndrome.
CRS treatment


- Percutaneous CRS stripping and other mechanical interventions- more expensive and shorter time to return of CRS symptoms as compared to catheter exchange
- Catheter exchange with or without balloon disruption of CRS
- Endoluminal brushing of occluded HDC during thrombolysis – only targets inner lumen thrombus of the catheter not the external CRS
- Thrombolytics: Withdrawal occlusion or sluggish catheter Technique for Activase. Flush catheter with saline. Direct instillation Activase and allow this to dwell for appropriate amount of time. Withdraw and discard Activase. Flush catheter well with NS. Negative Pressure Technique No Stopcock Indication for complete Occlusion Technique. Create negative pressure with empty syringe. Instill Activase using gentle push/pull action – DO NOT use force when pushing. Allow Activase to dwell for appropriate amount of time. Withdraw and discard Activase. Flush catheter well with NS.
- Are thrombolytics administered as an infusion that flows over the internal lumen and external lumen of the CRS more effective?
Catheter dysfunction prevention

- Right IJ route to the right atrium location is the preferred location – since it is a more direct route with placement of the HDC in the right atrium of the heart allow better HDC function
- Biofilm production begins early after HDC placement – can occur as early as 1-14 days after placement
- It is hypothesized that one complication of biofilm formation is development of a fibrin sheath (actually a CRS) which plays a major role in HDC dysfunction
- The most common form of prevention is the use of an anticoagulant HDC locking solutions used between dialysis (Heparin low dose, Heparin high dose, thrombolytics, 4% citrate or oral anticoagulants (Warfarin or combination with antiplatelet agents) – all these products have generally been unsuccessful in preventing CRS.
- Heparin coated HDC have not been shown to reduce CRS or reduce the need for thrombolytics.

Flushing and Locking of Venous Catheters: Available Evidence and Lack of Evidence (Goosens, G.A., 2015). What we know for flushing and locking of all CVCs:

- The NS volumes should be at least 10 mL in order to rinse the CVC sufficiently.
- After any blood administration, at least 20 mL should be used to rinse the CVC.
- It is unknown the amount used to lock the CVC – but at least 1 mL lock volume will safely fill the CVC.
- Pulse pause flushing using NS has now been endorsed for flushing and locking all other CVCs other than HD catheters. There is no published literature in HD catheters.
- Using a positive pressure clamping technique after NS flushing has also been endorsed in all other CVCs. What is positive pressure clamping technique?
Press part of flushing and close clamp = positive pressure clamping

Catheter Flushing

- Positive Pressure Flushing
  - Technique that prevents blood from backing up into the catheter by keeping pressure on the syringe plunger while pulling out of the injection cap. Don’t completely empty your syringe of flush
- Effects of valve products
  - e.g. Posiflow
What we know for flushing and locking of all CVCs:

- NS flushing with push pause administration and positive clamping technique has been shown to be equal (or better) than locking with heparin in all other CVCs.

- Heparin administration may lead to heparin-induced thrombocytopenia (HIT) and heparin hypersensitivity. There is also an increased risk of infection using heparin because heparin stimulates *S. aureus* biofilm formation.

- The other risks from using heparin include the multiple dose vial contamination & the risks associated with breaks in the integrity of the dialysis tubing.
The most crucial factor to prevent dysfunctional catheters (all types) is using a pulse pause technique with Normal Saline and clamping with positive pressure.

The evidence on flushing techniques, volumes, which product to use and regimens is lacking and non-existent in HD catheter use. The scientific knowledge for catheter locking with heparin is weak.
### Table 1: Flushing and locking recommendations.

<table>
<thead>
<tr>
<th>Flushing recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technique</strong></td>
</tr>
<tr>
<td>Use a pulsatile flow when flushing</td>
</tr>
<tr>
<td>Use a flush with $10 \times 1$ mL boluses with a time interval of 0.4 s between 2 boluses</td>
</tr>
<tr>
<td>Use SAS and SBS order for the administration of medication/fluids and blood sampling procedures</td>
</tr>
<tr>
<td><strong>Volume</strong></td>
</tr>
<tr>
<td>Use a $10$ mL flush for all IV catheters (except for peripheral cannulas, use $5$ mL)</td>
</tr>
<tr>
<td>Use a $20$ mL flush after infusion of viscous products like blood components, parenteral nutrition, and contrast media</td>
</tr>
<tr>
<td><strong>Regimen</strong></td>
</tr>
<tr>
<td>Flush with NS before and after administration of drugs of fluids (SAS)</td>
</tr>
<tr>
<td>Flush with NS before and after blood sampling (SBS)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Locking recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technique</strong></td>
</tr>
<tr>
<td>Use the positive pressure technique when disconnecting a syringe</td>
</tr>
<tr>
<td>Close clamps and let them closed when not in use</td>
</tr>
<tr>
<td><strong>Volume</strong></td>
</tr>
<tr>
<td>$1.0$ mL for peripheral cannulas</td>
</tr>
<tr>
<td>$1.5$ mL for midlines, PICCs, nontunneled CVCs, and small bore tunneled catheters ($\leq 1$ mm ID)</td>
</tr>
<tr>
<td>$2.5$ mL for large bore tunneled catheters ($&gt;1$ mm ID) and TIVADs (reservoir volume up to $0.6$ mL, Huber needle volume not included)</td>
</tr>
<tr>
<td><strong>Regimen</strong></td>
</tr>
<tr>
<td>q8h–q24h for short-term catheters</td>
</tr>
<tr>
<td>Weekly in long-term catheters</td>
</tr>
<tr>
<td>q6w–q8w in TIVADs</td>
</tr>
</tbody>
</table>
You tube video demonstrating pulse pause NS flush technique:

https://www.youtube.com/watch?v=ZsWWY8wsCZM
Using Tego Catheter Caps - do not use heparin.

Is the lack of heparin another reason for less CRBSI?
Protect the Catheter from Contamination

- The TEGO Connector creates a closed system, reducing manipulation of the catheter hub. Eliminates open catheter hubs.

- A high percentage of patients with long term Central Venous Catheters for chronic hemodialysis will develop a catheter related blood stream infection (CRBSI).

- CRBSI can result in increased complications for the patient as well as costly scheduling disruptions for the clinic.

Functional Attributes

- The TEGO remains in place during the hemodialysis treatment. It permits flow rates through an unobstructed fluid path of greater than 600mL/min.

- The TEGO is ultra small and comfortable for the patient with the first and only non-abrasive exterior.

- When the TEGO is not activated the silicone seal completely closes the fluid path eliminating blood exposure during the dialysis procedure.
Central vessel stenosis

Vessel site exhaustion
Central Stenosis – complication of hemodialysis catheter

- Vessel injury model:
  - Trauma
  - Inflammation
  - Intimal Hyperplasia
  - Fibrotic Response
  - Often other factors – multifactorial
  - Ongoing movement of catheter due to breathing and heart beats
  - Increased curves of vessels increase stenosis – reason that subclavian is avoided with left IJ also less used
  - Increased inflammation with increased catheter related blood stream infections
Early signs of SVC Syndrome

Figure 1. Dilated tortuous superficial veins of the chest wall in the shape of a garland.
Engorgement of left jugular vein due to central vein stenosis.
A graft tunneling under the skin – painful, risk for bleeding and infection – a surgical emergency.

Blisters from the skin over the tunnel, a risk for big-time bleeding. Another surgical emergency.

Arm swelling – from central venous stenosis on the same side as a fistula.

Arm swelling – from central venous stenosis on the same side as a fistula.

Dr. Webb has extensive experience managing central stenosis, maintains a registry with over 500 patients managed with central access, and has presented his findings on an interventional radiology conference.

Overholser, DO...
We see the bad....exhausting all possible veins which leads to femoral catheter use.
Anterior Superior Iliac Spine

Inguinal Ligament

Site of Femoral Venipuncture
(approximately 1 cm below inguinal ligament and 1 cm medial to femoral arterial pulsations)

Femoral Vein
Femoral Artery
Femoral Nerve

Sartorius Muscle
Adductor Longus Muscle

Superficial Saphenous Vein
Or worse yet, no options for vessels: Consider PD or transplant

- Is patient a Peritoneal Dialysis Candidate or previous PD and deemed a PD failure and unable to return?

- Any possibility for any other type of AV access?

- Is patient a transplant candidate?
Take Home Messages:

- Best method to prevent HDC dysfunction – never have a catheter. Work to move toward AV access ASAP.

- Scrub the hub – 5 second vigorous scrub with sterile alcohol pad – one time use and scrub the hub every time that you access the hubs.

- Probably most CRBSI is due to hub care (or lackluster care).

- Vigorous 5 second scrub prior to accessing any ports on bloodlines for meds or blood sampling (even CBGs). Use **sterile** alcohol pad for scrub.

- Mask use for hub care – evidence is lacking; is still recommended. PPE should always be worn when connecting or disconnecting HDC.
Take Home Messages Continued:

- Use caution to not contaminate cleaned hubs.

- We are looking at stopping all heparin flushes and only use NS pulse pause flushes. Using this flushing technique is the most important nursing technique to prevent catheter dysfunction.

- A weekly cap change (that is designed for this) leads to less manipulation of the hub which has been shown to lower CRBSI risk. Keep HDC clamps closed all the time and use positive pressure when disconnecting syringe.

- Masks for exit site care and HDC dressings have been shown by 2 studies to have no impact on CRBSI or exit site infections.

- Continue CHG for exit site care – allow to **dry, dry, dry** prior to applying dressing or pt may choose no dressing one month after HDC placed (healed tunnel).

- What happens if CHG is not allowed to dry……..
CHG Scalded skin......
Another view of CHG scalded skin
Hemodialysis Catheter Outcomes Pilot Study: No Dressing Coverage With Prescribed Showering

Elizabeth C. Evans
Debra Hain
Tamara M. Keer

Leslie A. Dork
Christine Schrauf

Copyright 2014 American Nephrology Nurses’ Association


This six-month prospective, multi-site study incorporated no dressing coverage over hemodialysis central venous catheter exit sites and compared the outcomes of two groups of patients receiving incenter hemodialysis: a shower group and a non-shower group. Outcomes included exit site infection rates, tunnel infection rates, and catheter-related bloodstream infection rates. The study enrolled 40 patients – 31 patients in the shower group and nine patients in the non-shower group. The study was initially designed as a randomized controlled study, but after a month of enrolling patients, most patients insisted on being in the shower group. Results for both groups demonstrated infection rates that were not statistically different and were below levels reported in other studies. The qualitative satisfaction in ability to shower by patients in this study was an additional important finding.

Key Words: Hemodialysis, central venous catheter, exit sites, catheter-related bloodstream infection.

Goal
To review the outcomes of a hemodialysis catheter pilot study on dressing coverage with prescribed showering.

Objectives
1. List three interventions noted to decrease catheter-related bloodstream infection rates.
2. Compare the research outcomes for the hemodialysis catheter groups; the shower group and non-shower group.

This six-month prospective, multi-site study incorporated no dressing coverage over hemodialysis central venous catheter exit sites and compared the outcomes of two groups of patients receiving incenter hemodialysis: a shower group and a non-shower group. Outcomes included exit site infection rates, tunnel infection rates, and catheter-related bloodstream infection rates. The study enrolled 40 patients – 31 patients in the shower group and nine patients in the non-shower group. The study was initially designed as a randomized controlled study, but after a month of enrolling patients, most patients insisted on being in the shower group. Results for both groups demonstrated infection rates that were not statistically different and were below levels reported in other studies. The qualitative satisfaction in ability to shower by patients in this study was an additional important finding.

Key Words: Hemodialysis, central venous catheter, exit sites, catheter-related bloodstream infection.
Thank you.....