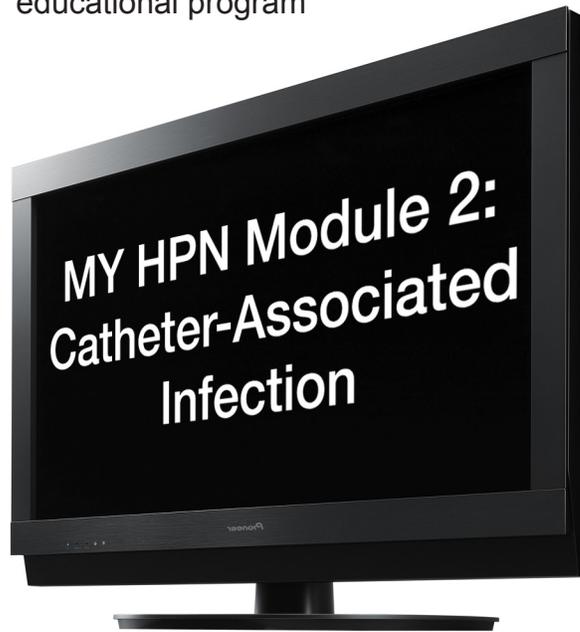




# Adult Catheter Care & Infection Prevention Guide

to accompany the interactive,  
educational program



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This *Adult Catheter Care and Infection Prevention Guide* provides general information and is not intended to replace the advice of your clinician. Consumers are strongly advised to review the material with their clinician, especially recommended actions which may be different than your usual protocol. Although much of the information will be helpful for children, not all of it is applicable. Talk to your child's pediatric specialist for guidance.

This guide was developed based on the latest guidelines from multiple professional organizations, as well as clinical practice at major HPN centers in the United States. It has been reviewed by leading clinicians from these centers, as well as the Oley Foundation's Medical & Research Director.

A list of references is provided on page six.

Credit for creating this guide, as well as the *MY HPN Modules 1 & 2*, goes to Oley Trustee Cheryl Thompson, PhD, RD, CNSD. Special thanks to Baxter Healthcare for underwriting *MY HPN Module 2: Catheter-Associated Infections*. Many thanks also to the patient and clinician volunteers who provided input on the project.

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## Summary of Catheter-Associated Infections for Adult HPN Consumers

### Exit Site, Tunnel, and Port Pocket Infections

<u>Can occur at the</u>	<ul style="list-style-type: none"> <li>• Catheter exit site (where the catheter comes out from under the skin).</li> <li>• Cuff or along the tract of a tunneled catheter. The cuff is a device under the skin that helps to prevent a tunneled catheter from slipping and bacteria from entering the bloodstream. The tunnel is the tract below the skin from the exit site to the point where the catheter enters the vein.</li> <li>• Pocket around an implanted catheter port (also called a disc or Port-a-Cath®) that is placed completely under the skin.</li> </ul>
<u>Causes</u>	<ul style="list-style-type: none"> <li>• Usually caused by germs on the skin (e.g. staphylococcus). May occur if: <ul style="list-style-type: none"> <li>- There is a break in sterile technique when placing or accessing the catheter.</li> <li>- There is irritation from a suture (stitch) in the skin that anchors the catheter.</li> <li>- The exit site is inadequately cleaned/disinfected or a wet/soiled dressing is not replaced.</li> </ul> </li> </ul>
<u>Prevention</u>	<ul style="list-style-type: none"> <li>• Wash hands with liquid antibacterial soap for at least 15 seconds using friction before accessing the line; dry with a disposable towel. An alcohol-based gel or foam may be used if hands do not look dirty.</li> <li>• Clean skin around the catheter exit site with 2% chlorhexidine in 70% alcohol for at least 30 seconds before replacing a sterile dressing. Allow to air dry.</li> <li>• Scrub the hub (also called the injection cap), and rubber top of a medicine vial for at least 15 seconds before accessing. Some clinicians also recommend cleaning the hub after disconnecting.</li> <li>• Change the dressing immediately if it becomes loose, damp or dirty; and routinely every 2 days (if gauze) or 7 days if clear dressing. Wash your hands before/after removing the old dressing. Avoid touching the exit site. Wear sterile gloves when placing a new dressing if advised to do so by your clinician.</li> <li>• Ask your clinician about removing sutures if they remain after the exit site has healed (4-6 weeks) and/or if a sutureless system (i.e. commercial catheter-stabilization product, sterile tapes or surgical strips [such as Steri-Strips™] is an option.</li> </ul> <p>Note: Routine use of antimicrobial cream at the exit site is no longer recommended due to the potential to promote fungal infections and antimicrobial resistance.</p>
<u>Symptoms/Signs</u>	<ul style="list-style-type: none"> <li>• <i>Exit site infection</i>: local redness*, drainage often with pus (that may only be on the dressing); firmness, swelling, warmer than usual skin temperature; tenderness within 2 cm (0.8 inch) of the catheter exit site. Usually <i>not</i> very painful or associated with a fever.</li> <li>• <i>Tunnel infection</i>: redness, swelling, firmness, and moderate-severe pain &gt; 2 cm (0.8 inch) from the catheter exit site along the tract of a tunneled catheter; drainage (often with pus) from the exit site; sometimes fever. If it involves the cuff, this may be felt under the skin.</li> <li>• <i>Pocket infection</i> (implanted port): redness, tenderness, and/or firmness over the pocket; or a spontaneous opening may allow drainage of fluid with pus</li> </ul> <p>* A smaller area of redness can also be caused by irritation of a retained suture or movement of the catheter where it enters the skin – this redness without infection is typically &lt; ¼ inch (5-6 mm) in diameter.</p>
<u>Immediate action</u>	<p>Call your clinician (or go to the ER) for fever <math>\geq 101</math> F (or prolonged/recurrent temperature 1 or more degrees above normal), or shaking chills, or if the exit site has pus, redness or swelling.</p>
<u>Treatment of catheter exit site infection</u>	<ul style="list-style-type: none"> <li>• Antibiotics: antimicrobial ointment and/or oral/intravenous (IV) antibiotics.</li> <li>• More frequent dressing changes (e.g. daily gauze dressing changes to remove drainage)</li> <li>• Catheter removal is usually not necessary unless the infection is caused by certain germs that are difficult to treat; or does not go away (or comes back) after treatment with antibiotics; or the catheter cuff is visible at the exit site.</li> </ul>
<u>Treatment of tunnel or port</u>	<ul style="list-style-type: none"> <li>• The catheter is typically removed along with the use of oral or intravenous (IV) antibiotics.</li> </ul>

## Catheter-Associated Bloodstream Infection (CABSI)

<u>Symptoms/signs</u>	<ul style="list-style-type: none"> <li>• Chills, shaking – especially while infusing HPN or flushing the catheter</li> <li>• Increased body temperature <math>\geq 101</math> degrees Fahrenheit</li> <li>• Low blood pressure; increased blood glucose; or glucose in urine</li> <li>• Skin feels unusually warm and dry; or cool and moist</li> <li>• Body aches, lethargy (i.e. less alert, less active)</li> </ul>
<u>Causes</u>	<ul style="list-style-type: none"> <li>• Germs can grow at the catheter exit site (i.e. inadequate hand washing or not adequately cleaning the exit site) and then travel along the catheter into the blood.</li> <li>• Germs can enter at the catheter injection hub (i.e. if not disinfected [cleaned] properly or by touch contamination when accessing the line); or multiply inside an occluded lumen.</li> <li>• Spreading or “seeding” of germs from another source of infection inside your body (e.g. urinary tract infection, pneumonia, ileostomy/colostomy sites, etc.).</li> <li>• Contaminated tubing or intravenous (IV) solution.</li> </ul>
<u>Risk factors</u>	<ul style="list-style-type: none"> <li>• Multiple uses of the catheter (i.e. using the HPN lumen to draw blood or give other fluids)</li> <li>• Increased contact with germs (e.g. from an ostomy, fistula, or wound drainage)</li> <li>• Decreased immune function from certain medications or medical conditions</li> <li>• Some types of catheters (e.g. non-tunneled; multi-lumen) or exit site locations (e.g. leg)</li> <li>• Germs that grow in a biofilm layer on the tip of your catheter or at a thrombus (occlusion).</li> </ul>
<u>Prevention</u>	<p>IN ADDITION TO TIPS TO PREVENT LOCAL CATHETER INFECTION LISTED ABOVE:</p> <ul style="list-style-type: none"> <li>• Discuss the most appropriate type of catheter and insertion site with your clinician. <ul style="list-style-type: none"> <li>- Do not allow your HPN catheter to be used for other purposes (eg blood samples) unless absolutely necessary.</li> <li>- A single-lumen catheter is preferred to reduce risk of infection. Dedicate one lumen for HPN if you have a multiple-lumen catheter. Have an unneeded catheter removed.</li> </ul> </li> <li>• Change the HPN tubing (administration set) every 24 hours at home.</li> <li>• Change the injection hub/cap every 7 days; or more frequently if blood is in the hub/cap.</li> <li>• Do not infuse an HPN solution or additive if you think it may be contaminated (e.g. looks cloudy or something is floating in a clear solution, aseptic technique was not used to add an ingredient to HPN, product was not refrigerated as recommended).</li> <li>• Be sure your catheter flushes easily since germs can grow at a thrombus (occlusion).</li> <li>• Ask your clinician if you need antibiotics before a dental or medical procedure.</li> </ul>
<u>Immediate action</u>	<ul style="list-style-type: none"> <li>• Contact your clinician or go to the emergency room immediately if your temperature is <math>\geq 101</math> degrees Fahrenheit (38 degrees Celsius), or you have shaking chills – especially if this occurs while infusing IV fluids (such as HPN) or flushing the catheter.</li> <li>• Ask your clinician in advance about other symptoms that warrant contacting them e.g. <ul style="list-style-type: none"> <li>- if you have a decreased immune function, since you may not have the typical rise in temperature that other people have with an infection.</li> <li>- a prolonged (or recurrent) fever of one or more degrees above normal/baseline (e.g. that lasts more than 1 or 2 days) especially if you have other symptoms of infection such as body aches, feeling unusually tired, or increased glucose in blood or urine.</li> </ul> </li> </ul>
<u>Treatment of catheter-associated bloodstream infection (CABSI)</u>	<ul style="list-style-type: none"> <li>• IV antibiotics once blood cultures have been taken.</li> <li>• Catheter removal may be necessary – e.g. catheter tunnel or implanted port pocket infection; septic shock or complicated infection; blood cultures are positive for fungi or drug-resistant bacteria; the same microorganism causes infection again -- after previous treatment; or the consumer is pregnant.</li> <li>• Antibiotic lock therapy may also be used in some cases e.g.: <ul style="list-style-type: none"> <li>- to <i>prevent</i> infection if repeated CABSI despite always using aseptic technique, or the person is neutropenic (i.e. increased risk of infection due to low white blood cells).</li> <li>- to <i>treat</i> infection if it is thought to be from the spread of bacteria on the catheter hub; the microorganism is <i>Staph. aureus</i>, coagulase-negative staphylococci, or gram-negative bacilli; and there is <i>not</i> a catheter tunnel or implanted port pocket infection.</li> </ul> </li> </ul>

## How You Can Help Prevent Catheter-Associated Infections (local and bloodstream)

1. **Clean your work area before each use (i.e. before putting down your sterile barrier and supplies).** Wash the area with 70% alcohol, antiseptic soap, or diluted bleach; and wipe with a clean paper towel. Work at a comfortable pace -- the risk of contamination increases if you rush.
2. **Wash your hands before doing anything with your catheter or supplies.**
  - Wet hands and wrists with warm water.
  - Scrub at least 15 seconds using *liquid* antibacterial soap (including under fingernails).
  - Dry with a clean paper towel. Turn water off with the back of your wrist/elbow or paper towel.
  - Anyone helping with your catheter must wash their hands this way as well.
  - Wash your hands *again* if you touch your mouth, nose, or any unclean object.
  - Ask your clinician about using an alcohol-based foam or gel if your hands have no visible dirt; find out specific products that are acceptable.
    - Apply foam/gel to palm of one hand (see label for the amount).
    - Cover entire surface of hands/fingers; and rub hands together until dry.
3. **Avoid touch contamination.**
  - Only use sterile supplies when infusing your HPN or caring for your catheter.
  - When piercing, opening, or connecting sterile items, allow only sterile surfaces to touch other sterile surfaces. Also, do not touch your catheter exit site with anything that is not sterile.
    - Some clinicians recommend sterile gloves when applying a new dressing or if you must touch the exit site.
    - Handle dressings only at the edges.
4. **Scrub the hub for at least 15 seconds every time you access or flush the catheter.**
  - Scrub the injection hub/cap for at least 15 seconds before accessing the catheter (e.g. every time you infuse an IV fluid or flush the catheter). The friction is very important. *Twist at least 10 times – like juicing an orange.* Also scrub the top of any medicine vial before accessing.
  - Use 2% chlorhexidine solution in 70% alcohol, 70% alcohol or povidone-iodine.
5. **Properly clean/disinfect the exit site during the dressing change.**
  - Wash your hands, using friction, after removing the old dressing. Put on sterile gloves if recommended by your clinician. Wear a mask if you have an illness where you might cough near the exit site.
    - Do not routinely use antimicrobial ointments on the catheter exit site.
  - Notify your clinician if you see any drainage, swelling or redness at the exit site.
  - Use 2% chlorhexidine solution in 70% alcohol to clean the skin around your catheter exit site.
  - For most applicators, press sponge against skin and apply chlorhexadine solution using a back/forth and up/down scrub **for at least 30 seconds**. Do not wipe or blot. Allow to air dry completely (~ 2 minutes) before placing the dressing – otherwise a rash may form.
  - If unable to use chlorhexidine (e.g. sensitivity or allergy), use 70% alcohol or povidone-iodine.
6. **Cover the catheter exit site with a dressing as instructed by your clinician.**
  - Change your dressing routinely: gauze every 2 days; clear dressing every 7 days.
  - Change your dressing immediately if it becomes damp, loose, or dirty; or moist from sweat.
    - Carry supplies to change the dressing when traveling.
  - Use gauze dressing if the exit site is bleeding or oozing.
  - Chlorhexidine-soaked (impregnated) dressings may help prevent contamination of the catheter exit site. Their use should be considered for adult consumers with non-tunneled catheters (e.g. PICC) who are at high risk for infection or if the infection rate is high despite using other strategies. Discuss the risks and benefits with your clinician.
  - If you may have contaminated any supply, throw it out. Call your provider early to reorder supplies.

**7. Replace catheter-related equipment on a regular schedule.**

- Change HPN tubing (administration set) every 24 hours (ie use new tubing each day).
- Change injection hub/cap (and sutureless securement devices) every 7 days or as instructed by your clinician (e.g. change more frequently if there is blood in the hub/cap).

**8. Never infuse any fluid through the catheter that you think might be contaminated.**

- Do not use HPN if you see particles, the fluid is cloudy, or if there is a leak in the bag.
- Do not use any IV fluid if the “beyond use” (expiration) date has passed.
- Whenever possible, use single-dose containers/vials for HPN additives or medications. Do not combine the leftover content of single-use vials for later use. If a multidose vial is used, refrigerate after opening if recommended by the manufacturer.
- Scrub the rubber top of any container (e.g. multivitamins) with 70% alcohol before accessing it and only use a sterile needle/access device. Avoid touch contamination; throw away any unused portion if you think it might be contaminated (e.g. if the vial had been accessed *before* cleaning).
- Do not infuse HPN longer than 24 hours.

**9. Make sure your catheter is flushing well because any clot in the catheter can be a gathering place for germs.**

A partially or completely blocked catheter can decrease your ability to infuse your medications as well as increase your risk of infection. Contact your clinician if you have any difficulty infusing your IV medications/fluids or HPN.

**10. Secure your catheter to prevent accidental removal. Take steps to prevent catheter damage and be prepared if your catheter breaks.**

- Loop and secure the catheter at all times (with a dressing or tape) to prevent pulling even if you are not using a dressing. Do not allow the catheter to dangle. Women should tuck excess catheter tubing under the strap of their bra.
- Keep a repair kit at home and take on trips in case a hole develops in a tunneled catheter.
  - Include alcohol-based gel/foam in case soap and water is not available to wash your hands.
  - Immediately clamp the catheter (between the catheter exit site and the hole).
  - Call your clinician and go to an emergency room or clinic. Bring your repair kit because, unfortunately, many emergency rooms do not have them.
- Ask your clinician about a *sutureless* securement device to reduce the risk of infection and accidental catheter migration/removal.

**11. Showering is permitted but the catheter must be kept dry.**

- For the first 30 days after catheter placement (or longer if the site hasn't healed), special precautions should be taken to reduce the risk of introducing germs into the catheter (e.g., protect the catheter and connecting device with a waterproof cover during the shower).
- The dressing needs to be changed if it becomes wet.
- Ask your clinician about the best way to care for your catheter when bathing or swimming. Some physicians permit only sponge bathing or showering for patients who have immune issues or experience frequent line infections. For additional information go to: Oley's Swimming with Home Parenteral and Enteral Nutrition <http://www.oley.org/Swimming.html>

**12. If your HPN catheter is being replaced, discuss the options with your clinician so you can choose the catheter with the lowest risk of infection.**

- A tunneled catheter is most commonly recommended for long-term HPN. An implanted catheter (port) or PICC may also be used.
- A single-lumen catheter is preferred (compared to multi-lumen) to reduce risk of infection.
- If you have a multi-lumen catheter, always use the same lumen for HPN. This should be labeled and should not be used for other purposes except in emergency situations.
- Your clinician should remove any catheter that is no longer needed.

## General Information about Central Venous Catheters for Adult HPN Consumers

The type of catheter and choice of vein depends on several factors including risks associated with the placement method, potential complications (thrombotic, infectious, mechanical), ease of site care, number of weekly infusions and anticipated duration of therapy. When a clinician places a central line, he/she should follow maximum barrier precautions: wearing a head cap, face mask, sterile body gown, and sterile gloves, and use a full size drape to cover the patient from head to toe.

### Tunneled (cuffed) catheters are recommended for long-term home parenteral nutrition (HPN).

General Information	<ul style="list-style-type: none"> <li>Tunneled catheters follow a tract under the skin before entering a central vein and have a cuff. They are the most common type of long-term HPN access.</li> <li>Often called by a brand name (eg Broviac®, Groshong®, Hickman®) or number of lumens (e.g. single, double or triple lumen).</li> </ul>
Comments	<ul style="list-style-type: none"> <li>Lower rate of infection than non-tunneled catheters because 1) a cuff helps prevent germs from traveling along the catheter and 2) the catheter tract is a longer distance for germs to travel from the skin to vein.</li> <li>Under the skin, fibrin and collagen that form around the cuff help to secure the catheter in place. The cuff should be placed far enough from the exit site so that it doesn't work its way out with gentle tugging on the line associated with day-to-day use.</li> </ul>
Placement	<ul style="list-style-type: none"> <li>Typically placed by a Surgeon or Interventional Radiologist. Expert opinion suggests the preferred vein for a tunneled catheter is the right internal jugular (neck) with an exit site on the chest wall; the next best is the left internal jugular, then subclavian (chest) veins. However, long-term HPN consumers that have thrombosed (clotted) neck and chest veins may need a tunneled catheter in the femoral or saphenous vein. The exit site should be placed so that it is easy for the consumer to see and as far as possible from an infecting area such as an ostomy.</li> <li>For long-term HPN consumers, consider a standard-length silicone catheter with the cuff placed at least 2.5 cm from the exit site.</li> </ul>

### Peripherally Inserted Central Catheters (PICC)

General Information	<ul style="list-style-type: none"> <li>PICCs are typically used in the hospital or for short-term HPN. However, the use of PICCs for long-term HPN is becoming increasingly common.</li> <li>The exit site is on the arm (usually just above the bend at the elbow). As with other central catheters, the tip is placed in the distal superior vena cava (i.e. the main vein near your heart where the blood flows quickly). A PICC should not be confused with other catheters placed in the arm (e.g. peripheral or midline) that <i>cannot</i> be used for HPN.</li> </ul>
Comments	<ul style="list-style-type: none"> <li>Short-term catheters such as a PICC are not tunneled (i.e. they do not have a long tract under the skin), and most do not have a cuff. Therefore, germs on the skin can be a major source of catheter-related bloodstream infection; and the catheter needs to be secured.</li> <li>For adult patients at high risk for infection, a chlorhexidine-soaked (impregnated) sponge can be placed over the exit site to reduce growth of bacteria. The sponge releases medication for 7 days if dry; however, it is less effective (and may cause skin irritation) if it becomes moist.</li> <li>Compared to other non-tunneled catheters placed at the neck or groin, the risk of infection may be lower because it is easier to keep the dressing clean/dry for a PICC placed in the arm.</li> <li>Further research is needed to assess risk of infection, and other complications (e.g. peripheral vein thrombophlebitis [inflammation of a vein], PICC-related thrombosis [clotting within the vein], and premature dislodgment).</li> </ul>
Placement	<ul style="list-style-type: none"> <li>Typically placed by a Vascular Access/PICC team into a basilic, cephalic or brachial vein.</li> <li>Recent guidelines suggest using a commercial catheter-stabilization product, sterile tapes or surgical strips to secure a non-cuffed/non-tunneled catheter, rather than sutures. Ask your clinician about the best securement method to minimize catheter movement and contamination. A securement device is typically replaced every 7 days when the dressing is changed.</li> </ul>

## Implanted port catheters

General Information	<ul style="list-style-type: none"><li>• Implanted port catheters (also called a “Port” or “Port-a-Cath”) are commonly used for weekly/monthly access (e.g. chemotherapy).</li><li>• The port (or disc) of an implanted catheter is completely under the skin.</li><li>• An acceptable option for HPN especially if the consumer has not previously had catheter-related bloodstream infections (because infection of the port requires surgical removal); and is willing to insert a needle into the port each time HPN is infused.</li></ul>
Comments	<ul style="list-style-type: none"><li>• Lowest risk of infection because the entire catheter is under the skin.</li><li>• Improved self-image; easier catheter-site care (no dressing is needed); safer for swimming.</li></ul>
Placement	<ul style="list-style-type: none"><li>• Typically placed into subclavian or internal jugular vein by General Surgery in an operating room. Minor surgery is required for catheter placement, repair or removal.</li></ul>

## Central Line Catheters *Not* Recommended for HPN

### Non-tunneled, non-cuffed catheters

General Information	<ul style="list-style-type: none"><li>• Non-tunneled, non-cuffed catheters are intended for short-term use. They are not recommended for HPN due to high rates of infection, obstruction and dislocation.</li><li>• The catheter may be referred to by the vein insertion site (e.g. subclavian, internal jugular, or femoral catheter) or number of lumens.</li></ul>
Comments	<ul style="list-style-type: none"><li>• Account for the majority of catheter-related bloodstream infections.</li></ul>
Placement	<ul style="list-style-type: none"><li>• A non-tunneled catheter inserted in the subclavian vein is the safest, while the neck or groin is associated with the highest risk of infection.</li></ul>

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