

Parenteral Nutrition (PN): Venous access

Intravascular catheters: choice and insertion

Types of catheter

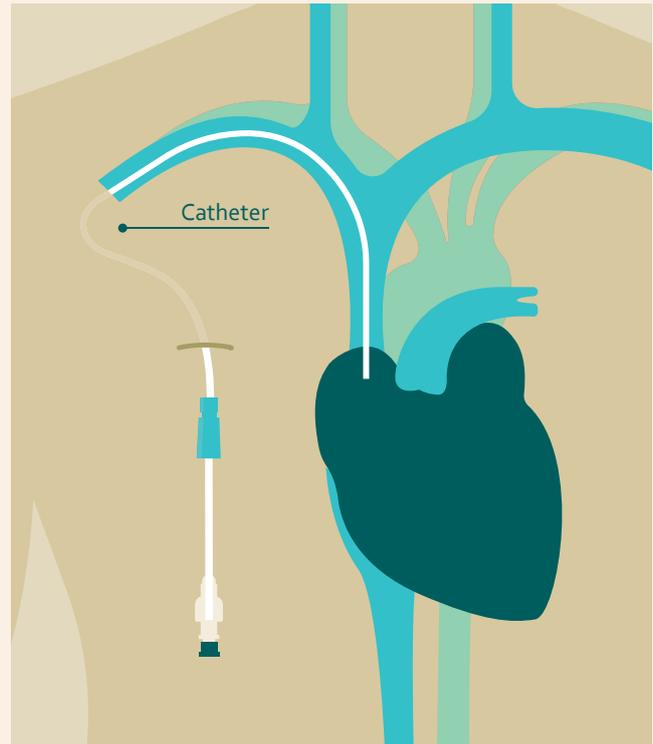
- In newborns and children, peripherally inserted central catheters (PICC) and tunneled central venous catheters (CVC) should be used for administration of prolonged PN during hospitalization
- In children requiring long-term PN and home PN, a tunneled CVC is recommended
- Catheter dedicated only to PN should be used
- A catheter with the minimal number of ports or lumens should be used
- If a multi-lumen CVC is in place, dedicate one lumen to PN; blood sampling, transfusion and central venous pressure monitoring from the CVC should be avoided
- To improve quality of life for patients on long term PN, blood sampling via CVC for routine monitoring is recommended, provided full aseptic protocol is followed

Catheter material

- Catheters used for long-term PN should preferably be made of silicone or polyurethane
- Antimicrobial coated CVC should not be used for children on long-term PN

Insertion sites

- In infants and children in whom CVC cannot be placed in superior vena cava, an option of femoral vein or subclavian catheter insertion can be recommended
- In newborns, umbilical vessels can be used for short term PN



Positioning of the catheter tip

- The CVC tip should lie outside the pericardial sac to avoid the risk of pericardial effusion/tamponade
- In small infants (body length 47-57 cm) the catheter tip of a jugular or subclavian CVC should lie at least 0.5 cm above the carina on a chest x-ray, while in older/larger infants (body length 58-108 cm) that distance should be at least 1.0 cm
- The catheter tip of a femoral catheter should lie above the renal veins (first lumbar vertebra)

Methods of insertion

- A percutaneous, radiologically or ultrasound guided insertion method may be used since this is equally effective as a surgical cut-down, and carries less risk of complications

Interventions to reduce CVC infection

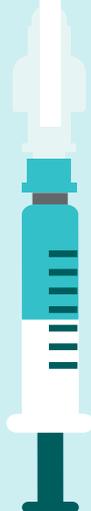
Antibiotics prior to CVC insertion and routine catheter exchange

- CVC shall not be changed routinely in order to reduce the risk of sepsis
- If a CVC requires removal, replacement rather than exchange over a guidewire decreases the risk of infection. CVC exchange may be reserved for those patients with difficult venous access
- Prophylactic antibiotics do not reduce the risk of catheter related bloodstream infection, therefore they should not be administered

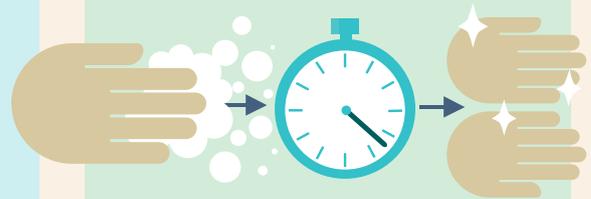


CVC locks and flushes

- Taurolidine is effective in preventing CRBSI and should be used during long term catheter use
- Ethanol line locks may be considered for preventing CRBSI
- Antibiotic line locks can be used in conjunction with systemic antibiotics to assist in the eradication of CRBSI in some patients
- Antibiotic line locks should not be used for treating CRBSI as these have not been shown to be effective



Hygiene and antisepsis on CVC insertion and during subsequent care



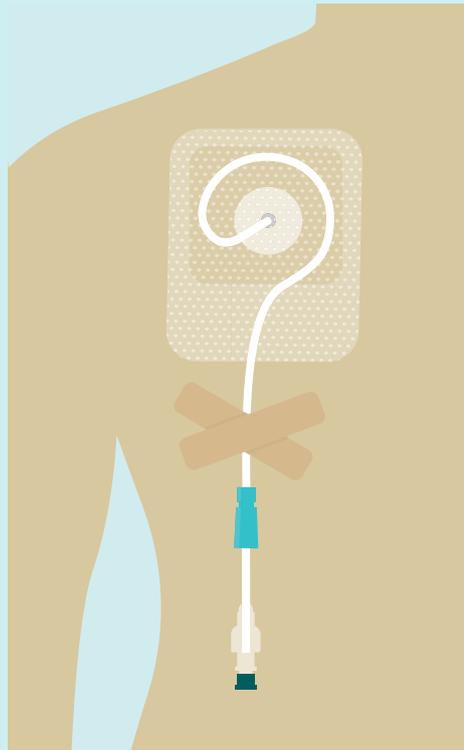
- Appropriate hygiene procedures should be followed before accessing the intravascular device or the insertion site
- Before insertion of an intravascular device and for post-insertion site care, clean skin should be disinfected with 2% chlorhexidine solution in 70% isopropyl alcohol
- Antiseptic solution should remain on the insertion site and be allowed to air dry before catheter insertion or dressing application
- Due to potential side effects, skin antisepsis with chlorhexidine in infants younger than two months cannot be recommended
- Catheter connectors, ports and hubs should be disinfected before accessing, preferably with 2% chlorhexidine solution in 70% isopropyl alcohol



Interventions to reduce CVC infection

Dressing methods

- Both sterile gauze with tape and transparent semi-permeable polyurethane dressing can be used to cover the catheter insertion site
- Sterile gauze dressing is preferable if the catheter site is bleeding or oozing
- For short term CVC, site dressings should be replaced every 2 days for gauze dressing, and every seven days for transparent dressing
- A dressing should be changed sooner if it becomes damp, loosened or soiled
- A tunnelled CVC with a well-healed exit site does not require dressing to prevent dislodgement, however, in children it is useful to have them looped and covered
- Chlorhexidine-impregnated dressing should be considered in patients older than two months with short-term catheters who are at high risk for infection
- Topical antimicrobial treatment at the insertion site cannot be routinely used as it may promote fungal infection, antimicrobial resistance and damage the surface of the catheter
- Children with well-healed tunnelled catheters may be allowed to swim, provided that a water-resistant dressing is used to cover the whole catheter. Immediately after swimming the catheter exit site should be cleaned and disinfected, and the dressing changed



Multimodal strategies for prevention of CVC-related Complications

- Regular training and education of healthcare staff with respect to catheter insertion and maintenance should be recommended
- Multimodal protocols for healthcare providers, aiming to standardize clinical practice on insertion and maintenance of intravascular devices, should be developed and regularly audited

Full references for the advice within this section can be found within the following paper, which this section is based upon: Kolaček S, Puntis JWL, Hojsak I; ESPGHAN/ESPEN/ESPR/CSPEN working group on pediatric parenteral nutrition. ESPGHAN/ESPEN/ESPR guidelines on pediatric parenteral nutrition: Venous access. Clin Nutr. 2018 Jun 18. pii: S0261-5614(18)31171-3.