

Top Tips for Managing Catheter-Related Blood Stream Infection in Patients Receiving Home Parenteral Support

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Central-venous catheter-related blood stream infection (CRBSI) is a serious cause of morbidity and mortality in patients requiring home parenteral support (HPS). It has a reported incidence of 0.22-11.5 per 1000 catheter days. In the UK, Intestinal Failure (IF) units aim for an outpatient CRBSI rate of less than 1 per 1000 catheter days. Patients with CRBSI can deteriorate rapidly so require a fast diagnosis and treatment.

Key points

1. CRBSI should be suspected when patients receiving HPS present with fever (especially if within an hour of setting up the infusion), are unwell or have been involved in events that may be associated with a catheter infection (e.g. catheter fracture, attempts at restoring patency, etc.).
2. Paired qualitative (using differential time to positivity (DTP) or paired quantitative (using pour plates)) blood cultures from a peripheral vein and from the catheter are required for the diagnosis of a definite CRBSI.
3. When central blood cultures are positive and no peripheral cultures can be taken (or *vice versa*), this can be classified as a probable CRBSI providing the symptoms and clinical picture is suggestive of a CRBSI.
4. Central venous catheter (CVC) salvage can be attempted for all bacterial CRBSIs (including for *Staphylococcus aureus* or polymicrobial infections), if the patient is not critically ill. Catheter salvage is not recommended for candida infection.
5. Once a CRBSI is suspected and while blood cultures results are awaited, empirical therapy should be commenced with a CVC antibiotic lock plus a systemic antibiotic, adjusted thereafter according to microbial sensitivity.
6. If salvage fails or the patient has recurrent CRBSI, the CVC should be removed and other sources of infection should be considered.

7. Fluid (or parenteral nutrition) during salvage is given by a different catheter (often into a peripheral vein).
8. After a CRBSI the aseptic techniques in setting up/taking down an infusion should be reassessed, and possible environmental contributors identified.
9. Central blood cultures should be taken at least 48 hours after completion of therapy to confirm successful treatment.

Explanations

- A. Most CRBSI originate from the catheter hub. The infection spreads on the intraluminal biofilm to involve the whole catheter. It may be associated with a clot at the catheter tip, this/micro-organisms can detach and give rise to infection elsewhere (e.g. chest or discitis) and these sites may be the presenting features of the CRBSI.
- B. DTP should be available in most hospitals. A positive central catheter culture more than 2 hours before the peripheral culture is regarded as a definite CRBSI.
- C. If blood cannot be withdrawn from the central catheter and peripheral blood cultures are positive (unpaired cultures) and the clinical features suggest a CRBSI, then a probable CRBSI may be diagnosed; however, this carries a risk of CRBSI over-diagnosis.

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- D.** Salvage is generally not recommended if the patient is clinically unstable and/or has a CVC tunnel or cuff infection, metastatic infection, fungal infection, septic thrombosis, or if the CVC requires removal for another reason (e.g. a mal-positioned CVC tip); in these circumstances, the CVC should be removed.
- E.** Empirical antibiotics should provide cover for both Gram positive bacteria and Gram negative bacteria and be given via a peripheral catheter or peripherally inserted central catheter (PICC). Additional empirical anti-fungal cover can be considered in critically ill patients. Once CRBSI blood culture results are available, systemic antimicrobial agents of appropriate microbial sensitivity should be administered, with a targeted CVC lock, for 7-14 days depending on local protocols and the organism isolated.
- F.** An ECHO should be performed if there is a prosthetic heart valve, pacemaker/ICD, persistent bacteraemia and/or pyrexia 72 hour after initiation of appropriate antibiotic therapy and/or with *S aureus* infection.
- G.** The CVC should be removed during salvage therapy if there are signs of on-going CRBSI (e.g. persistent fever) and the tip sent for culture. Once removed, a CVC should ideally be re-inserted after completion of a course of appropriate systemic antimicrobial therapy and having negative repeat blood cultures.
- H.** Depending on the patients' requirements and ability to absorb oral/ enteral nutrition, parenteral fluid and/or nutritional support may be administered via a peripheral vein during CVC salvage. If not possible, then intravenous fluid and electrolytes rather than parenteral nutrition can be administered via the CVC, with continuation of the CVC antibiotic lock during this period
- I.** Patient/carer's aseptic technique in handling should be reassessed. If recurrent CRBSI another source of infection should be sought (e.g. teeth, wounds, nails, urine etc). Consider the use of 70% Isopropyl Alcohol port protectors if not already used. The prophylactic use of antimicrobial locks (e.g. taurolidine) can be used for recurrent CRBSI, but ethanol locks are not recommended. For all (especially nursed) patients a root cause analysis is recommended to try and identify possible contributory factors.
- J.** Central blood cultures are taken at least 48 hours after completion of therapy to confirm successful treatment.

Suggested reading

- BIFA committee. British Intestinal Failure Alliance (BIFA) Position Statement 2016 Home Parenteral Nutrition (HPN). August 2016. www.bapen.org.uk/pdfs/bifa/position-statements/position-statement-on-hpn.pdf
- Simon Lal, Paul Chadwick, Jeremy Nightingale and the BIFA Committee. British Intestinal Failure Alliance (BIFA) Recommendations for Catheter Related Blood Stream Infections (CRBSI) Diagnosis. April 2018. www.bapen.org.uk/pdfs/bifa/recommendations-for-crbsi-diagnosis.pdf
- Simon Lal, Paul Chadwick, Jeremy Nightingale and the BIFA Committee. British Intestinal Failure Alliance (BIFA) Recommendation Management of Catheter Related Blood Stream Infections (CRBSIs). January 2019. www.bapen.org.uk/pdfs/bifa/recommendations-on-management-of-crbsi.pdf