Guidelines for the Management of Possible Infection in a Patient with a Central Venous Catheter (Hickman, Broviac, PICC or port)

1. Introduction

- Central venous catheters (CVCs) are commonly used to deliver cytotoxic chemotherapy (as well as other drugs) and many patients with lines in situ will develop signs of infection.
- It is important to establish whether an infection is likely to be related to the CVC or is incidental.
- Certain criteria will suggest CVC associated infection – either at the exit site, the tunnel (in the case of Hickman or Broviac catheters), the lumen, the tip or an associated bacteraemia.
- If a CVC is infected a decision will have to be made whether to remove it (the most effective way to treat the infection) or whether to try and keep the catheter in place for future use.
- Unfortunately there are no definitive national or international guidelines for the management of CVC associated infections in Oncology practice, although there are a number of useful publications.[1,2,3,4]

2 Criteria suggesting CVC infection

- A history of fever and/or rigors after flushing of the line
- A history of discharge from the exit site
- Inflammation around the exit site (exit site infection)
- Inflammation along the subcutaneous tract (tunnel infection)
- Positive blood cultures from the line (intraluminal or tip infection)
- If any of the above are present infection of the CVC is likely but it is important to distinguish between a purely exit site infection (common and usually less serious) and a tunnel or lumen/tip infection (less common and more serious)

3.Indications for removal of an infected CVC

- Tunnel infection or *severe* exit site infection
- Associated septic thrombosis or endocarditis
- Blood culture positive for Staph. aureus, candida, some gram negative and other organisms (see table1 but also seek microbiology advice). A risk assessment will need to be made.
- Clinical deterioration despite appropriate antibiotic therapy
- Recurrent episode particularly with the same organism and within two weeks of stopping antibiotics
- Central line no longer required e.g. no further chemotherapy planned

When removing a tunnelled cuffed catheter ('Hickman') refer to specific guidelines. Ideally cuff dissection should be performed but it is acceptable for the line to be pulled out if there is a clinical indication for urgent removal.

4 Management of the patient with signs of infection and a CVC in situ

- If neutropenic follow the neutropenic sepsis policy. In addition for all cases:
- **Discuss with SpR/Consultant**
- Take blood cultures from the CVC as well as a peripheral vein
- Consider line removal (see above). It is important that an appropriate risk assessment is made. Discussion with a microbiologist is recommended if there is any doubt about the decision.
- If line is to be retained give intravenous antibiotics via the CVC according to neutropenic sepsis policy. If the line is the likely source of infection add vancomycin empirically until culture results available.
- Antibiotic lock therapy could be considered if there is evidence of a lumen/tip infection but only after discussion with a microbiologist. There is currently conflicting evidence about how effective this is although some studies suggest that a greater proportion of lines may be salvaged.
- Monitor as per neutropenic sepsis policy and continue intravenous antibiotics for at least 48 hours after pyrexia resolves
- **If the patient fails to clinically improve after 48 hours of appropriate treatment the CVC should be removed and antibiotics continued.**

Table 1 Guidelines for line removal according to infecting organism*

*should be discussed with microbiologist

Absolute indications for removal.	**Relative indications for removal, consider trial of antibiotic therapy.**	**Treatment with line *in situ***
Candida sp. Staph. aureus Pseudomonas sp. Sten. maltophilia Acinetobacter Bacillus spp. Mycobacterium sp. Vancomycin resistant enterococci Multiple organisms	Enterococci Corynebacteria Environmental gram negatives	Coagulase negative staphylococci Strep. viridans

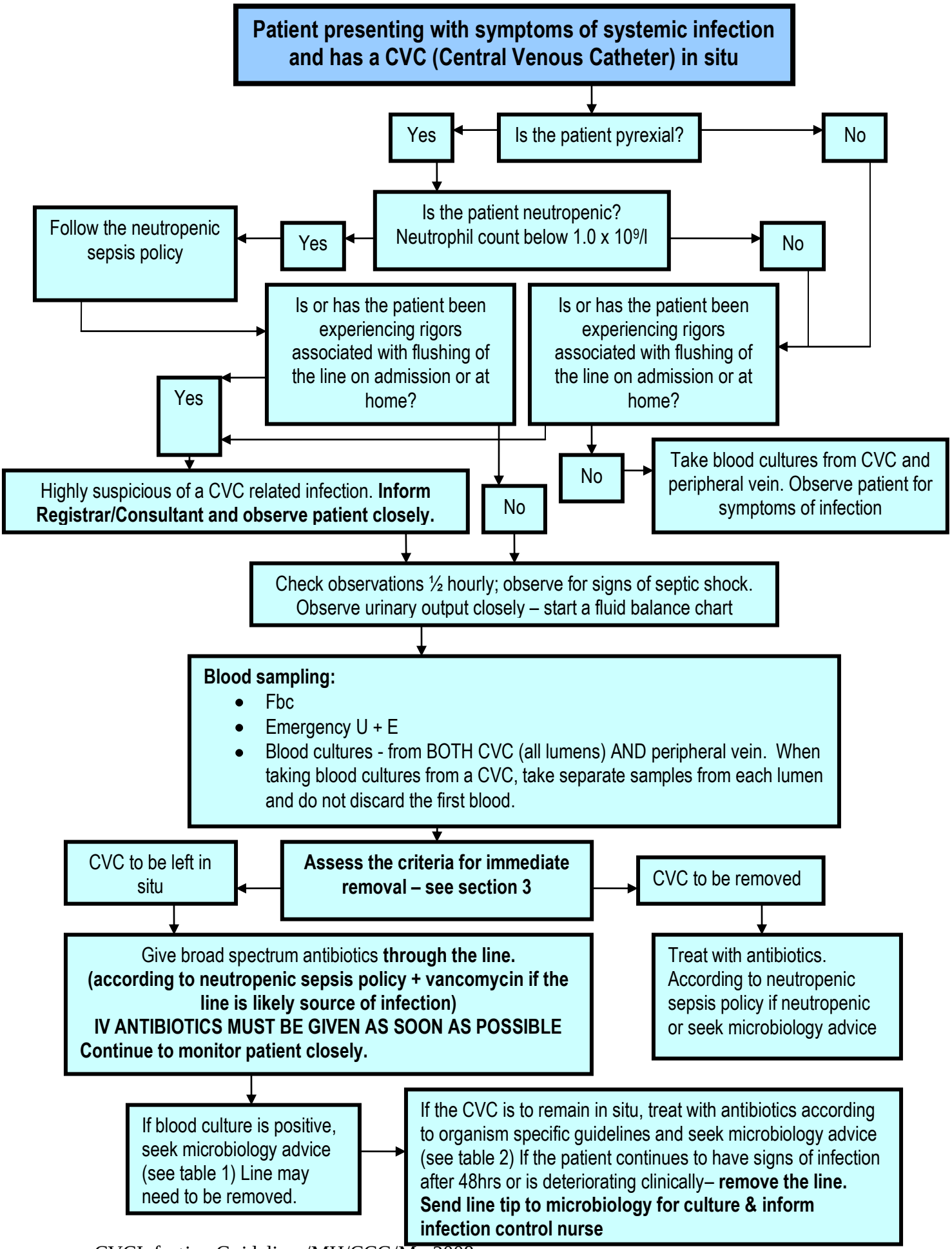
Table 2 Guidelines for duration of antibiotic therapy*

* should be discussed with microbiologist

Organism	Line Removed[1]	Length of therapy
Culture negative	Yes No	No further Rx if fever resolves 48hrs after normalisation of temperature
Staph. epidermidis	Yes No	No further Rx if fever resolves 7 days total therapy
Strep. viridans Enterococci Corynebacteria Environmental gram negatives	Yes No	48hrs after normalisation of temperature 10-14 days total therapy
Staph. aureus	Yes	14 days for uncomplicated infection 4 weeks for complicated infection[2].
Bacillus Pseudomonas sp. Sten. maltophilia Acinetobacter	Yes	10-14 days total therapy
VRE	Yes	14 days total therapy
Candida sp. Mycobacterium sp.	Yes	Consultant Microbiologist

[1] Consider using oral therapy with well absorbed antibiotics after discussion with bacteriology

[2] Complicated infection = endocarditis, bone or joint infection.


Patient presenting with symptoms of systemic infection and has a CVC (Central Venous Catheter) in situ
Is the patient pyrexial?
Yes
No
Is the patient neutropenic? Neutrophil count below 1.0 x 10⁹/l
Yes
No
Follow the neutropenic sepsis policy
Is or has the patient been experiencing rigors associated with flushing of the line on admission or at home?
Is or has the patient been experiencing rigors associated with flushing of the line on admission or at home?
Yes
No
Take blood cultures from CVC and peripheral vein. Observe patient for symptoms of infection
Highly suspicious of a CVC related infection. Inform Registrar/Consultant and observe patient closely.
No
Check observations ½ hourly; observe for signs of septic shock. Observe urinary output closely – start a fluid balance chart
Blood sampling:
Fbc
Emergency U + E
Blood cultures - from BOTH CVC (all lumens) AND peripheral vein. When taking blood cultures from a CVC, take separate samples from each lumen and do not discard the first blood.
CVC to be left in situ
Assess the criteria for immediate removal – see section 3
CVC to be removed
Give broad spectrum antibiotics through the line. (according to neutropenic sepsis policy + vancomycin if the line is likely source of infection) IV ANTIBIOTICS MUST BE GIVEN AS SOON AS POSSIBLE Continue to monitor patient closely.
Treat with antibiotics. According to neutropenic sepsis policy if neutropenic or seek microbiology advice
If blood culture is positive, seek microbiology advice (see table 1) Line may need to be removed.
If the CVC is to remain in situ, treat with antibiotics according to organism specific guidelines and seek microbiology advice (see table 2) If the patient continues to have signs of infection after 48hrs or is deteriorating clinically– remove the line. Send line tip to microbiology for culture & inform infection control nurse

References

[1] Guidelines for the Management of Intravascular Catheter-Related Infections. Mermel et al, Clinical Infectious Diseases 2001;32:1249-72

[2] Use of antibiotic locks to treat colonised central venous catheters. Berrington A & Gould K, Journal of Antimicrobial Chemotherapy 2001; 48:597-603

[3] A Retrospective Analysis of Hickman Line-Associated Complications in Patients with Solid Tumours Undergoing Infusional Chemotherapy. O'Neill et al, Acta Oncologica; 1999; 38:1103-1107

[4] Diagnosis and Management of Long-term Central Venous Catheter Infections. Hall K & Farr B, J Vasc Interv Radiol 2004; 15:327-334