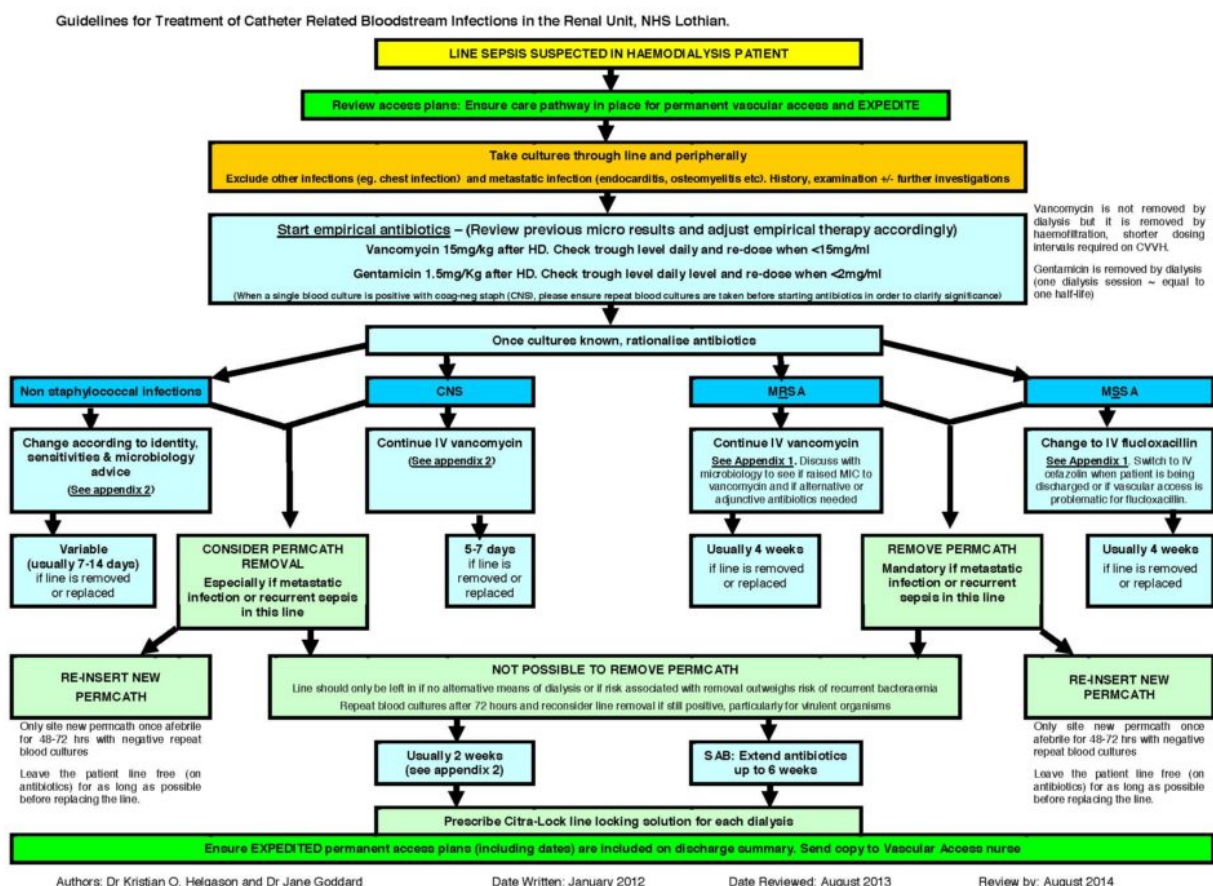


Haemodialysis Catheter (Tunneled Line) Infections

First follow the flow diagram, then according to microbiology results click on the appropriate heading below:



Please click on flow diagram to enlarge image.

- [Management of Staphylococcus aureus line-associated bacteraemia](#)
- [Management of non-Staphylococcus aureus line-associated bacteraemia](#)

Staphylococci explained

<i>Staphylococcus aureus:</i>	<i>Coagulase-negative staphylococci (CNS):</i>
<ul style="list-style-type: none"> • Coagulase positive staphylococcus • Virulent pathogen • Bacteraemia is associated with high mortality • Staphylococcus aureus which is <u>resistant</u> to flucloxacillin is called MRSA • Staphylococcus aureus which is <u>sensitive</u> to flucloxacillin is called MSSA 	<ul style="list-style-type: none"> • Most common type is Staphylococcus epidermidis • Less virulent and part of normal skin flora • Mainly cause infections associated with medical devices, e.g. long vascular lines • Rarely associated with mortality, but line infections are a significant cause of morbidity

Management of Staphylococcus aureus line-associated bacteraemia

Staphylococcus aureus bacteraemia in dialysis patients is a serious illness with reported mortality up to 30%. Relapse is common, particularly when treatment is inadequate and catheters are not removed. A number of serious complications can arise, including endocarditis, osteomyelitis and discitis.

1. Treat with systemic antibiotics for 4 weeks	
(a)	For MRSA use IV vancomycin. Please discuss with microbiology to find out if raised MIC to vancomycin, in which case alternative or adjunctive antibiotics may be required.
(b)	For MSSA use IV flucloxacillin when possible. Vancomycin is less effective against MSSA than flucloxacillin and treating MSSA with vancomycin substantially increases the risk of treatment failure. If this prevents discharge from hospital, consider whether IV flucloxacillin can be used for as long as possible (ideally up to 10 days) whilst patient remains in hospital, switching to vancomycin on discharge.
(c)	When vancomycin is being considered for treatment of MSSA bacteraemia this must be discussed with microbiology to determine whether different or adjunctive antibiotics are indicated
2. Remove Permcath. A critical factor in treating line associated Staph aureus bacteraemia is removal of the CVC or permcath in order to prevent relapse of infection and reduce the risk of infective complications. Staph aureus bacteraemias associated with lines are at far greater risk of relapsing if the line is kept in.	
(a)	For Staph aureus bacteraemia in a patient with a CVC or permcath, the line should be removed unless there are major contraindications preventing this. A line should only be kept in situ if removal means that there is no alternative means of dialysis or if risk associated with removal outweighs risk of recurrent bacteraemia and risk of developing deep seated Staph aureus infection (e.g. discitis, osteomyelitis, endocarditis).

(b)	Try to leave the patient line free (on antibiotic treatment) for as long as possible before replacing the line. A new permcath should preferably only be inserted after the patient has been afebrile for 48-72 hrs with negative repeat blood cultures.
(c)	If permcath cannot be removed then the patient may need up to 6 weeks of antibiotic therapy. Repeat blood cultures 72 hours after commencing antibiotics, if they remain positive then permcath should be removed.
3. Consider whether underlying deep-seated focus of infection. Is there a focus of infection other than the line, such as endocarditis or discitis that needs further investigation and prolonged treatment? This is particularly relevant for relapsed Staph aureus bacteraemia.	
4. Taurolidine line lock should be used after a patient has a single episode of Staph aureus line sepsis.	
5. A shorter 2 week course may be considered in patients where the infected CVC is removed and fever and bacteraemia resolve within 72 hours of appropriate antibiotic therapy, the patient has no prosthetic intravascular device, there is no clinical evidence of metastatic infection, there is no evidence of endocarditis or thrombophlebitis and the patient is not diabetic or immunosuppressed.	

Management of non-Staphylococcus aureus line-associated bacteraemia

1. Coagulase-negative staphylococci (CNS)	
(a)	Discuss choice of antibiotics with microbiology. Coagulase-negative staphylococci in renal units are not always sensitive to vancomycin. Line infections caused by CNS not fully sensitive to vancomycin should be managed with line removal when possible.
(b)	If CVC is being replaced then try to leave the patient line free (on antibiotic treatment) for as long as possible before replacing the line and continue antibiotics for 5-7 days to prevent re-infection of line.
(c)	If CVC is retained then treat with antibiotics (+/- taurolidine line lock) for 14 days.
2. Enterococcus sp.	
(a)	Remove line if possible, particularly if no other clear source of bacteraemia and if clinically unwell, persistent bacteraemia, insertion site infection or metastatic complication.
(b)	If CVC is being replaced then try to leave the patient line free (on antibiotic treatment) for as long as possible before replacing the line and continue antibiotics for 5-7 days to prevent re-infection of line.
(c)	Otherwise may attempt to retain line and treat for 2 weeks (+/- taurolidine line lock). Discuss choice of antibiotic with microbiology, usually between amoxicillin and vancomycin. VRE line infections should always be discussed with microbiology.

(d)	If CVC salvage is being attempted then send repeat blood cultures 72 hours after antibiotics are commenced. If these remain positive then line should be removed unless no alternative means of dialysis.
3. Gram-negative bacilli	
(a)	a. Remove line if possible, particularly if no other clear source of bacteraemia (e.g urinary or intra-abdominal) and if clinically unwell, persistent bacteraemia, insertion site infection or metastatic complication. Line should always be removed when <i>Pseudomonas aeruginosa</i> or multiresistant Gram-negative organisms are isolated from blood cultures, unless there is no alternative means of dialysis.
(b)	Choice of antibiotics based on identity, sensitivities and discussion with microbiology. If line is removed then usually treat for 7-14 days, depending on source of infection. If unable to remove line then treat with antibiotics for 14 days and use taurolidine line lock.
(c)	If CVC is being replaced then try to leave the patient line free (on antibiotic treatment) for as long as possible before replacing the line and continue antibiotics for at least 5-7 days to prevent re-infection of line.
(d)	If CVC salvage is being attempted then send repeat blood cultures 72 hours after antibiotics are commenced. If these remain positive then line should be removed unless no alternative means of dialysis.
4. Yeast (<i>Candida</i> sp.)	
(a)	Line should always be removed unless there is no alternative means of dialysis.
(b)	Repeat blood culture alternate days until first negative blood culture. Arrange ophthalmology review to rule out fungal endophthalmitis.
(c)	Treat with antifungal for at least 14 days after line removal or first negative blood culture. Discuss choice of antifungal with microbiology.
5. Other organism(s)	
(a)	Management depends on identity and sensitivity of organism. Discuss with microbiology.

Main References:

Diagnosis, prevention and treatment of haemodialysis catheter-related bloodstream infections (CRBSI): a position statement of European Renal Best Practice (ERBP). *NDT Plus* (2010) 3: 234-246

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