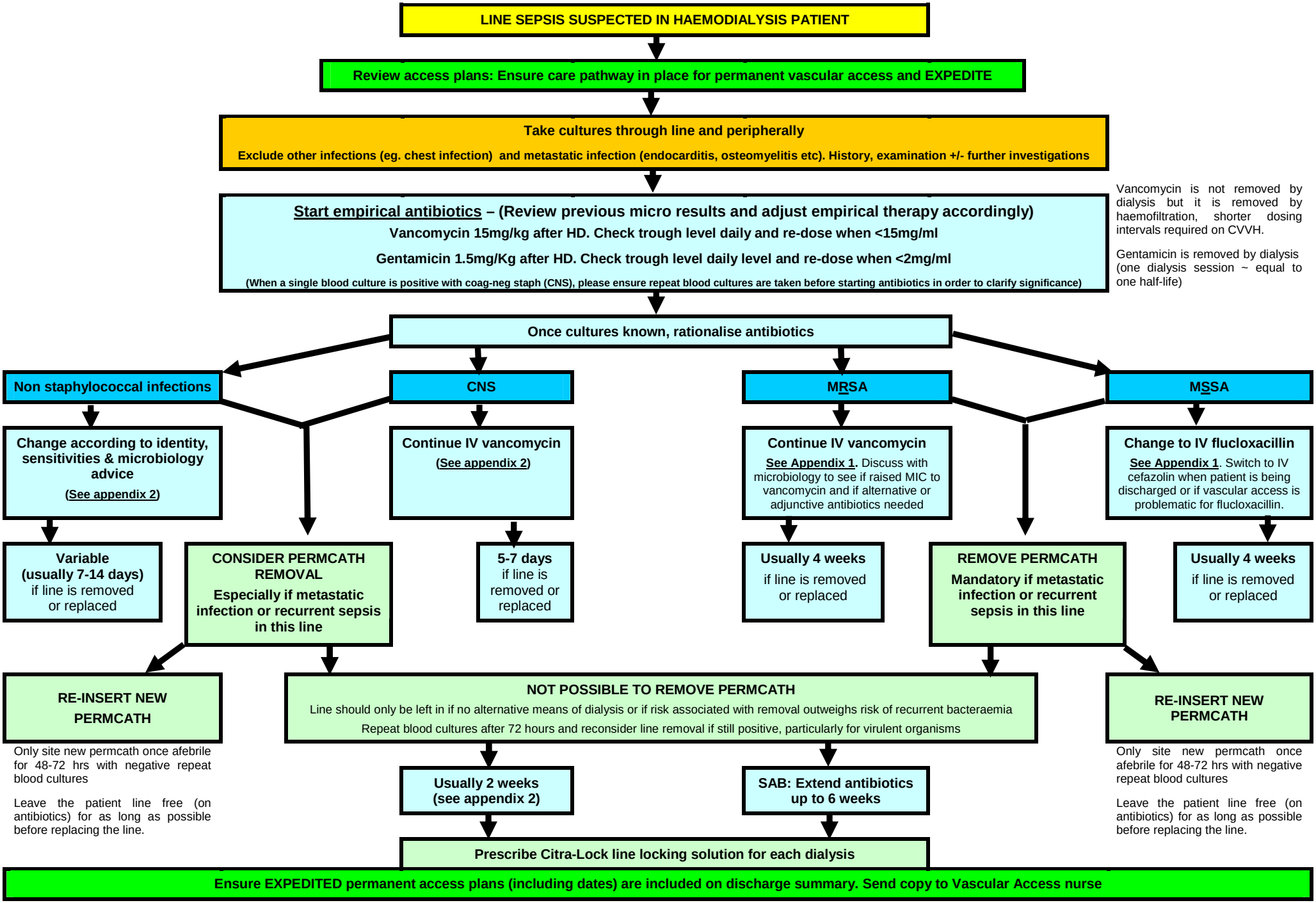
Guidelines for Treatment of Catheter Related Bloodstream Infections in the Renal Unit, NHS Lothian.



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Appendix 1: 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 CVCs 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 MSSA use IV flucloxacillin whilst inpatient. Switch to IV cefazolin (dose is 2 g if next dialysis in 2 days or 3 g if next dialysis in 3 days) when patient is being discharged or if vascular access is problematic for 6 hourly flucloxacillin. If unable to use cefazolin, then IV flucloxacillin is preferable to vancomycin. Vancomycin is less effective against MSSA than β-lactam antibiotics and treating MSSA with vancomycin substantially increases the risk of treatment failure.
    - **b.** 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.
    - **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 there is an 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. Citra-Lock line locking solution should be used after a patient has a single episode of Staph aureus line sepsis.
5. A shorter 2 week antibiotic 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. Bear in mind that most patients with renal failure are relatively immunosuppressed.

Staphylococcus aureus:

- Coagulase positive staphylococcus.
- Virulent pathogen and bacteraemia is associated with high mortality.
- Staphylococcus aureus which is resistant to flucloxacillin is called **MRSA**
- Staphylococcus aureus which is sensitive to flucloxacillin is called **MSSA**

Coagulase-negative staphylococci (CNS):

- 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.

It is not possible to tell apart Staphylococcus aureus from Coagulase-negative staphylococci at the Gram stain stage (e.g. when preliminary blood culture results are phoned out).

Appendix 2: Management of non-Staphylococcus aureus line-associated bacteraemia

1. **Coagulase-negative staphylococci (CNS)**
    - **a.** Discuss antibiotic therapy with microbiology. Coagulase-negative staphylococci in renal units are not always fully 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 (+/- line locking solution) 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 (+/- line locking solution). 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.** 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 Pseudomonas aeruginosa 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 Citra-lock line locking solution.
    - **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 (Candida 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

Prevention of Intravascular Catheter-related Infection in Ireland 2010

Guidelines for the Prevention of Intravascular Catheter-Related Infections, CDC 2011