Central Venous Line (CVL) Infection Policy

ALGORITHM FOR MANAGEMENT OF SUSPECTED CVL INFECTION

Suspected Central Venous line-related sepsis

Neutropenic or high risk patients

Not neutropenic

Exit site infection or Tunnel infection

Fever without obvious focus - but unwell/rigors within 30 mins of line usage i.e. suspicion that CVL may be the source.

Exit site infection in well patient.

Tunnel infection OR Exit site infection not responding to oral therapy.

Fever without obvious focus always consider the line as a potential source.

Blood cultures through ALL lumens of the CVL and carefully label. Ensure that the ‘discard’ is included in the culture sample. Measure FBC. Take swabs from exit site.

NEUTROPENIC

- Afebrile and well IV teicoplanin or vancomycin.
- Febrile treat as febrile neutropenia tazocin plus teicoplanin/vancomycin.
- If shocked and unwell meropenem plus vancomycin. (ciprofloxacin and gentamicin if meropenem allergic)

FEBRILE NEUTROPENIA

- Tazocin plus vancomycin
- If shocked Meropenem plus vancomycin (ciprofloxacin and gentamicin if meropenem allergic)

Discuss with senior staff to discuss outpatient management if:
- No evidence of chest wall involvement
- No fever
Flucloxacillin PO. Review at 48 hours to ensure improvement.

Empiric therapy with teicoplanin/Vancomycin
Treat unwell patients as febrile neutropenic tazocin plus teicoplanin/vancomycin.

If well discuss with Consultant - await cultures.

If unwell discuss with on call consultant but if in doubt treat as for febrile neutropenia and consider need for teicoplanin/vancomycin in addition.
Central Venous Line (CVL) Infection Policy

Any child who becomes unwell in the 30 minutes after a line has been accessed must be considered to have a line infection and managed appropriately.

Management of patient who collapses post – CVL flush:

- Assume line is infected
- If inpatient: put out Crash call
- Ensure immediate review by senior Haematology/Oncology staff
- If at patient’s home, call “999” ambulance and arrange admission to hospital via Hospital’s emergency department
- If cultures not already taken, draw back blood from both lumen for blood cultures
- Give ONLY ONE minimal volume flush of 1.3ml saline 0.9% per lumen
- Do not use CVL for fluid boluses, antibiotics, etc.
- Ensure 2 alternative large bore intravenous access are secured, this may require the insertion of intra – osseus needles
- Blood tests required:
  - Blood cultures
  - FBC, clotting
  - UEC
  - Venous blood gas with lactate
  - Venous blood sugar
- Commence broad spectrum antibiotics (meropenem and vancomycin)
- Use Ciprofloxacin and Gentamin if patient is Penicillin allergic
- Fluid resuscitate in accordance with sepsis policy
- Ensure early review by senior Haematology/Oncology staff
- Ensure early discussions with surgical team for consideration of emergency CVL removal – patient will need Anaesthetic review
Management of “non – collapsed” patients with presumed CVL infections:

Always inspect the line site in any child admitted with febrile neutropenia. Line infection can be:
- exit site – no extension of infection onto the chest wall
- tunnel infection – infection and erythema extends onto the chest wall
- bacteraemia/septicaemia

All patients must be assessed and managed as per febrile neutropenia policy:
- History
- Examination – assess for exit site erythema, discharge, collection associated with line, chest wall cellulitis
- Blood cultures of all CVL lumens

Management and antibiotic policy:
- All patients must be seen urgently and treatment commenced within 60 minutes
- First line treatment for febrile neutropenia is with Piperacillin – Tazobactam (Tazocin ™)
- First line treatment for Penicillin allergic patients is with ciprofloxacin plus gentamicin
- Additional antibiotic of choice for febrile or neutropenic patients with evidence of line infection is vancomycin
- Teicoplanin is the intravenous antibiotic of choice for well, neutropenic patients

Septicaemia/Bacteraemia Line Infections:

- **Signs/symptoms:** Rigors, pyrexia or mottling shortly after a line flush are suggestive of bacteraemia, particularly Gram negative sepsis. Patients may be perfectly well before line flush and even though not neutropenic they can deteriorate very rapidly.
- **Organisms:** Coagulase negative staphylococci, Staph aureus, aerobic Gram negative bacilli & candida albicans are the most commonly catheter related bloodstream infections & growth of these organism in the absence of other sources of infection increases the suspicion of a line related infection.
- Newly inserted lines are most likely to be colonised by skin organisms along the external surface of the catheter. Lines that have been in for longer are likely to be colonised by spread from the injection cap
Line site/tunnel infections:

- **Signs/symptoms:** erythema, discomfort ± discharge around the exit site ± pain on moving arm. Some patients tend to have some mild redness around the line site most of the time others produce a lot of crusting: this is not necessarily abnormal
- **Organisms:** Coagulase negative staphylococci, Staph aureus, pseudomonas aeruginosa
- **Tunnel infections** demonstrate erythema which advances onto the chest wall >2cm from exit site
- **Patients with cellulitis advancing onto the chest wall** require admission and commencing IV antibiotics

Management:

- Blood cultures must always be taken all lumens of the CVL (including the first 3 – 5mls which would normally be discarded) and check the line site
- Exit site swab should be taken if discharge present
- Ensure that the line is secure to prevent it being accidentally dislodged whilst the area is inflamed and infected
- When giving intravenous antibiotics through the central lines, ensure that antibiotics are administered through alternating lumens

- **Afebrile and NOT Neutropenic and exit site only:** Oral flucloxacillin or clarithromycin
- **Afebrile and Neutropenic and exit site:** tazocin plus vancomycin/teicoplanin
- **Tunnel infection or chest wall cellulitis:** tazocin plus vancomycin/teicoplanin
- **Febrile neutropenia and exit site:** tazocin plus vancomycin/teicoplanin

Duration of treatment

- Positive blood cultures must be repeated after 72 hours of appropriate treatment and then again 24 hours after the end of treatment
- Suggested durations of therapy with line left in situ should be discussed with ID:
  - Suggested length of treatment:
    - Staphylococcus aureus: 10 - 14 days
    - Coagulase negative staphylococci 7 - 10 days
    - Pseudomonas aeruginosa: 10 - 14 days
    - Other gram negatives: 10 - 14 days
    - Candida albicans: up to 1 month

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If repeat cultures on appropriate antibiotics show persistent bacterial growth the line may need to be removed. After line removed IV antibiotics will need to be continued as directed the infectious diseases team.

**Indications for line removal:**

Some patients may require removal of the CVL. These cases should be discussed with the Consultant on – call:

- Severe illness and CVL likely source
- Clinical deterioration
- Severe complication such as endocarditis, septic thrombosis, abscess or osteitis
- Staphylococcus aureus
- Pseudomonas spp, Acinetobacter spp, Stenotrophomonas maltocida
- Candida infections
- Persisting positive blood cultures 72 hours after commencing appropriate therapy

**Fever in Non – Neutropenic Patients**

- All febrile patients with a CVL need clinical examination, FBC and a blood culture, regardless of neutrophil count
- The decision to treat with antibiotics depends on their clinical state and must be discussed with senior Haematology/Oncology staff
- **If line sepsis is suspected e.g. fever and rigors after flushing line start empiric antibiotics irrespective of neutrophil count and await cultures**
- If the child is well and no site infection is found clinically it may be possible to send them home pending the blood cultures.
- For exit site infections oral Flucloxacillin should be considered if the patient is clinically well
- Well, afebrile, non-neutropenic patients with coagulase negative staphylococcus can often be managed at home with IV teicoplanin after discussion with Consultant on – call

**References:**

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