LRI Children's Hospital

Management of central line infection, including children on long term TPN

Staff relevant to:	Clinicians within the UHL Children's Hospital caring for Infants, Children and young people who have a central line insitu
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1. Introduction and Who Guideline applies to

Children on long term Total Parenteral Nutrition (TPN or PN) via a central line are at risk of line infection. A line infection can be life threatening, and needs urgent treatment.

Any child with a central line, presenting with fever and/or other symptoms suggesting possible line infection (see below) must be treated for this even if there is another source of infection possible or likely. Treatment MUST NOT be delayed.

This guideline is aimed at those patients with an indwelling line who are receiving PN. **It excludes Haematology-oncology and CICU/PICU /NNU/SCBU patients.** The practice also applies to other patients with indwelling lines (e.g. Cystic fibrosis, immunodeficiency).

Definitions

This guideline shows management for "well" child on long term TPN with possible line infection, and "unwell" child on long term TPN with possible line infection

- **Well** = Fever but systemically well, perfusion normal, no cardiovascular compromise, no rigors, no reaction when line is used, platelet count has not fallen
- **Unwell** = Fever and some or all of the following – systemically unwell, perfusion poor, some cardiovascular compromise, rigors, some reaction when line is used, platelet count has fallen

- Long term TPN defined here as on PN >14 days
- The term “Central line” would include PICC line and hickman or broviac line.

Related documents:

Parenteral Nutrition – Administration by Nurses UHL Childrens Hospital Guideline

Parenteral Nutrition - Monitoring and Weaning UHL Childrens Hospital Guideline

Sepsis UHL Childrens Hospital Guideline

2. Guideline Standards and Procedure

History:-

A) Look for symptoms of possible central line infection

1) Significant pyrexia – treat 1 x >38.5 ^{C} or 2 x >38 ^{C} as line infection, even if there is another possible cause.
2) Low grade pyrexia - if this is very unusual and child is “not right” according to parents or team, treat this as line infection until proven otherwise
3) Unsettled, vomiting, worsening diarrhoea, unwell in any non-specific way, especially if parents are concerned about the child – treat as line infection until proven otherwise
4) Unexplained acute rise in LFT – consider treat as line infection

B) Look for symptoms of other infections

Review with Blood Culture (BC) results and stop line infection treatment if another source is clearly established and BC are negative

Examination:-

1) If child is unwell follow an ABC approach as per sepsis guideline.

2) Look at line site to see if there is any redness, discharge or problem with the line.

3) Do a full general examination looking for other infections such as chest, ENT, urine infection. These should be treated as well as for line infection, and as above antibiotics for line infection can be stopped later if appropriate (see algorithm)

Possible line site infection

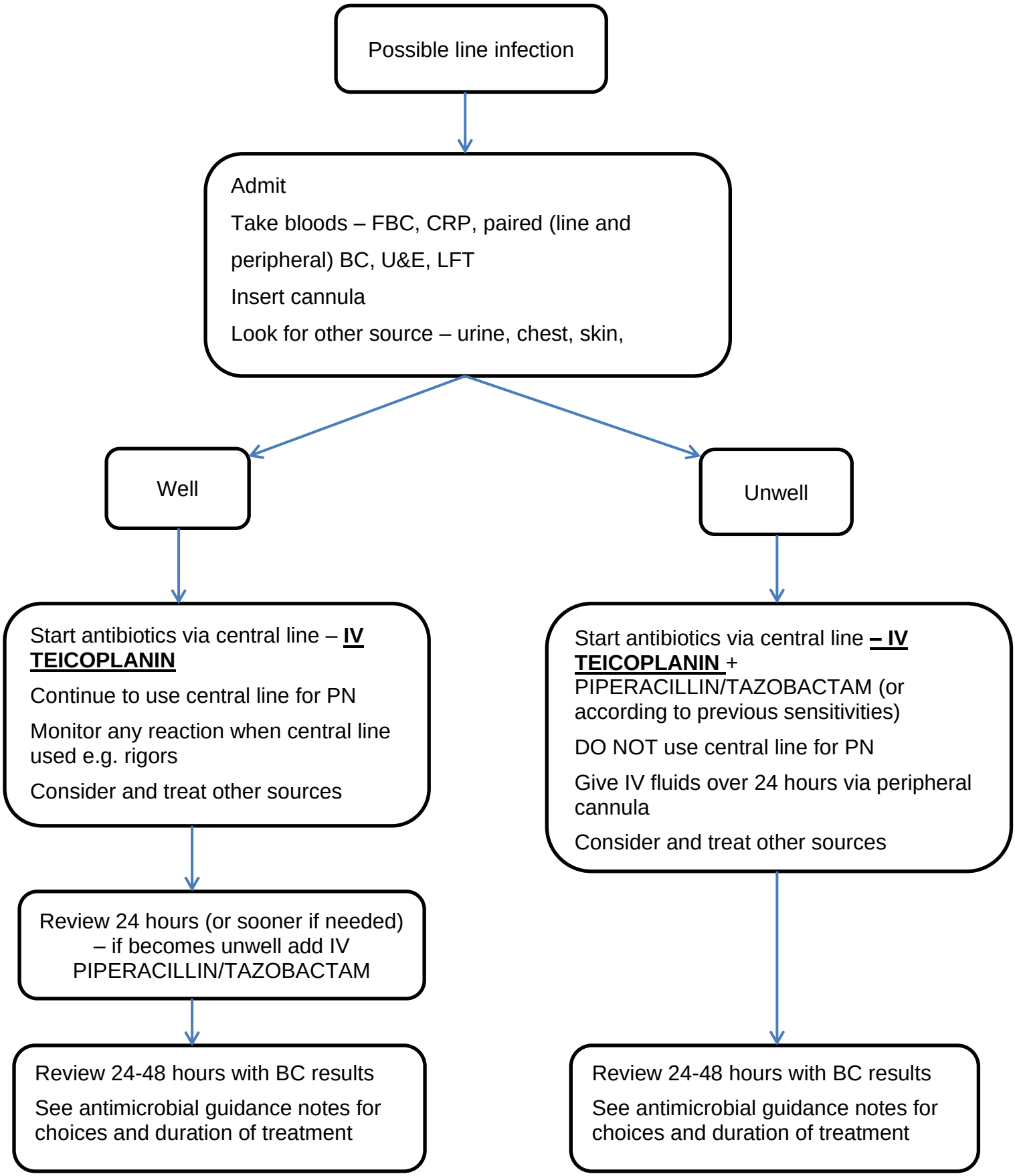
1) Any sore / inflamed / discharging line site should be swabbed

2) If the swab comes back as positive for significant growth (e.g. *Staph aureus*), the child should be reviewed to see if the site still looks sore/inflamed / discharging

3) If there are signs of cellulitis and/or discharge, i.e. line site not improved, treat with initially short course of appropriate antimicrobial (5 days) even if child clinically well, and even if the line has been removed. Antimicrobials are given either oral or IV depending on likely enteral absorption. In these patients there is quite high likelihood of the need for IV antibiotics, because of the underlying condition.

4) After 5 days of antimicrobials, there should be clinical review and prolonged course if visible signs of infection have not gone.

Investigation & Treatment (Refer to Appendix 1 for antibiotic dosage)



Investigation – (see algorithm page 4)

FBC, CRP, central and peripheral blood cultures (BC) (before antibiotics given)
U&E, LFT

Investigate for other source as appropriate – e.g. NPA, urine dip / C&S, Chest X-ray, LP, swab for bacterial culture from line site.

Antibiotic guidance (refer to appendix 1 for dosing)

- Empiric antimicrobial choices:
- **Well** - use **IV TEICOPLANIN**
- **Unwell** - use **IV TEICOPLANIN** and IV PIPERACILLIN/TAZOBACTAM (IV TEICOPLANIN and MEROPENEM if penicillin allergic)
    - If there are known sensitivities in a specific child's line from previously – prescribe according to these
    - If a child has a pre-existing plan for antibiotic choice, then use this
- **Line site infection** FLUCLOXACILLIN alone either oral or IV depending on likely enteral absorption pending culture results**. If penicillin allergic, use PO Clindamycin or IV Teicoplanin (if known MRSA)**
- **Treatment choice and course length once organism identified and sensitivities known: (if in doubt please discuss with microbiology)**
    a. *Coagulase negative Staphylococcus (CoNS)* - IV Teicoplanin for 7 days
    b. *Viridans Streptococci* –IV Teicoplanin for 7 days
    c. *Staph aureus* (MSSA) - IV Flucloxacillin (IV Teicoplanin if penicillin allergic), minimum 14 days
    d. *Enterococci* –IV Teicoplanin for 7 days (discuss with microbiology if Teicoplanin-resistant Enterococci isolated)
    e. MRSA –IV Teicoplanin, minimum of 14 days
    f. Gram negative organisms –IV Piperacillin/tazobactam (and change to a less broad spectrum antibiotic once sensitivities available), minimum 10 days treatment
    g. *Candida spp* –discuss with microbiology regarding appropriate antifungal agent and duration of treatment
    h. For any other organisms – discuss with microbiology
    i. If WELL child and BC is negative – if other source of infection found and child is well, stop antibiotics; if no other source of infection found but strongly suspect line infection, complete 5 days IV Teicoplanin
    j. If UNWELL child and BC is negative – if source of infection found, treat accordingly. If no source found, complete minimum of 7 days of empiric antimicrobial therapy

Use of the central line

As per algorithm this depends on whether child is well or unwell.

1) **If well** then continue to use the line for PN – if necessary use a Y connector to give a dose of antibiotic during administration of TPN (discuss with pharmacist)
2) **If unwell**
    a. GIVE ANTIBIOTICS VIA CENTRAL LINE but do NOT use it for anything else.
    b. The child will need a cannula for IV fluids over 24 hours. Give at least maintenance but bear in mind child's usual fluid and electrolyte requirements when prescribing, as they may need considerably more. The parents will be able to bring in home PN if needed so normal regimen can be reviewed.
3) Do not remove the line without discussion with a consultant, and without discussion with microbiology.

Notes regarding specific organisms

Staph aureus or *Candida spp*– repeat surveillance BC at 48-72 hours on antimicrobials, consider ECHO to rule out endocarditis, and ophthalmology review if Candida spp.

Line infection with the following organisms is hard to eradicate - *Staph aureus, Strep pyogenes*, Gram negative bacilli i.e. *Klebsiella, E coli, Pseudomonas* and *Candida spp* - line removal is very likely to be recommended, but this is a CONSULTANT decision after discussion with a Consultant Microbiologist

MSSA decolonisation protocol for paediatric TPN patients with central lines

All TPN patients with central lines who are admitted to UHL should be put on decolonisation treatment (nasal bactroban + stellisept/octenisan washes) for the duration of their stay.

a) First infection with MSSA

If a TPN patient with central line is admitted with MSSA bacteraemia for the first time, the patient should have optimal treatment with appropriate course of antibiotics as per line infection guideline. Consider change of line if this was thought to be the likely source (on discussion with microbiology and gastro consultant on duty).

- The patient should have MSSA screen at admission - swabs (nose/perineum and line site) and gastrostomy site if applicable
- Perform monthly screening swabs for MSSA from nose/perineum, line site and gastrostomy site if applicable; and if screening swab positive, offer decolonisation treatment (5 days) for patient and those who handle the line
- Discuss and get consent for screening swab (nose/perineum) from anyone in the household who accesses the line – note, this applies to household members only, not health care staff treating the patients.

- Offer decolonising treatment (5 days treatment - GP to prescribe) to household members who accessed the line regardless of swab results
- Advice for deep clean of the environment (regular change of linen/no sharing of towels/ launder clothes at 60^{C})
- Review/revise line care with those who access the line

b) Repeat MSSA line infection

If there has been recurrent/relapse line-related MSSA bacteraemia and no other focus:

- Strongly consider line change if not already done
- All steps as above AND
- Twice weekly stellisept washes (Change to Octenisan if intolerant) for the duration of the line

Line Infection Prophylaxis

Refer to:
Parenteral Nutrition - Monitoring and Weaning UHL Childrens Hospital Guideline

Antibiotic Locks

The use of antibiotic locks may be considered if there is a virulent organism, or recurrent infection, or the line is very precious. This can only be done after discussion with consultant gastroenterologist (or paediatrician), and discussion with a Consultant Microbiologist.

Refer to:
Parenteral Nutrition – Administration by Nurses UHL Childrens Hospital Guideline

3. Education and Training

None

4. Monitoring Compliance

None

5. Supporting References

1) BNF for children Available online at bnf.org

6. Key Words

Long term TPN, Central line, Line infection, Pyrexia

The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.
As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

CONTACT AND REVIEW DETAILS	
Guideline Lead (Name and Title) Anne Willmott	**Executive Lead** Chief Medical Officer
Details of Changes made during review: Added gastrostomy site to be added to screening recommendations if applicable. Clarified that screening and treatment should be offered to household members that access the site, not health professionals who are treating the patient.	

Appendix 1: Antibiotic dosage

IV Teicoplanin **Teicoplanin trough levels should be taken.** **Aim for trough level of >20mg/L for treatment of line infections.** **Please see antimicrobial website for further information.**	1-2 months	Initially 16 mg/kg for 1 dose, followed by 8 mg/kg once daily, subsequent dose to be administered 24 hours after initial dose, doses to be given by intravenous infusion.
	2 months – 11 years	Initially 10 mg/kg every 12 hours for 3 doses, then 6–10 mg/kg once daily.
	12 – 17 years	Initially 6 mg/kg every 12 hours for 3 doses, then 6 mg/kg once daily.
IV Piperacillin/tazobactam (Tazocin)	1 month – 11 years	90 mg/kg every 6–8 hours (max. per dose 4.5 g every 6 hours).
	12-17 years	4.5 g every 8 hours; increased if necessary to 4.5 g every 6 hours, increased frequency may be used for severe infections.
IV Meropenem	1 month–11 years	20 mg/kg every 8 hours (body-weight up to 50 kg) 1 g every 8 hours (body-weight 50 kg and above)
	12-17 years	1 g every 8 hours.
IV Flucloxacillin	1 month – 17 years old	25 mg/kg every 6 hours (max. per dose 1 g every 6 hours).
PO Flucloxacillin	1 month – 1 year	125 mg 4 times a day.
	2-9 years	250 mg 4 times a day
	10 -17 years	500 mg 4 times a day
PO Clindamycin	>1 month-17 years	6 mg/kg 4 times a day (max. per dose 450 mg).