"Line Sepsis" - Inpatients on Parenteral Nutrition - Full Clinical Guideline

Reference no.:CG-GASTRO/2024/019

Catheter Related Blood Stream Infection – "Line Sepsis" NOT Home Parenteral Nutrition Patients

1. Introduction

This is a practical guideline to aid in the management of suspected catheter related blood stream infection (CRBSI) or "line infection" in patients on parenteral nutrition (PN) on the ward. It is not a replacement for referral to the appropriate teams, e.g. Nutrition support team, gastroenterology, microbiology

2. Aim and Purpose

To offer guidance for all clinical staff treating adult inpatients with suspected CRBSI on parenteral nutrition. These will be inpatients having PN through a PICC line (large bore midline at QHB site) or multi-lumen temporary CVC. For lines used for other purposes see separate guideline - (Central Venous Catheter infection guideline). For patients on Home Parenteral Nutrition (HPN), see separate guideline.

3. Definitions, Keywords

ANTT – aseptic no touch technique

CRBSI – catheter related blood stream infection

HPN - Home parenteral nutrition

CVC – central venous catheter

PICC – peripherally inserted central venous catheter

PN – parenteral nutrition

AKI – acute kidney injury

CKD – chronic kidney injury

Na – Sodium

K – Potassium

Mg – magnesium

UC – ulcerative colitis

IBD – inflammatory bowel disease

E Mix – St Mark's Electrolyte Mix

WHO – World Health Organisation

Suitable for printing to guide individual patient management but not for storage

Key words: line infection

4. Guideline

CRBSI should be suspected in any patient on PN that develops a fever >38°, (>37.5° if elderly) when the parenteral nutrition is running. It is important to consider other sources of infection, especially in post-operative patients.

A swab should be taken from the line exit site, if there is pus or erythema, along with an MRSA screen.

Risk factors for line infection

There should be zero tolerance to CRBSI acquired in hospital. This is dependent on good line care. Methods shown to reduce central venous catheter (CVC) infections include effective hand washing, use of full sterile barrier techniques, chlorhexidine skin preparations, reminders to remove unnecessary catheters, and avoidance of femoral venous siting (Klek et al. 2016).

Treatment

CRBSI should be suspected in any patient on PN that develops a pyrexia when the PN infusion is started or during the infusion. It is important to consider other sources of infection and the patient should be thoroughly examined for evidence of infection, and investigations including chest x-ray and urine culture should be done, including abdominal imaging, e.g. CT if appropriate.

Stop PN

In the event of a pyrexia occurring as above first stop the PN.

Then, before giving antibiotics, take paired blood cultures peripherally and from all lumens of the CVC or PICC/large bore midline line using aseptic no touch technique (ANTT) and **labeled** appropriately so the lab is aware which specimen is from which source and what time they were taken. This should be done on the electronic order system AND by labelling the blood culture bottles. This is very important as time to positivity is diagnostic of a CRBSI (Al Wohoush et al. 2010; Blot et al. 1999; Raad et al. 2004), i.e. if the blood culture from the line is positive before the peripheral blood cultures.

Once blood cultures have been taken, and there is no other source of infection, antibiotics should be started and given through the line and locked in the line, NOT flushed through (Messing et al. 1990). Guidance on antibiotic choice should be as the Trust Central venous Catheter Infection Guideline. If the patient is displaying signs of septic shock, antibiotics should be given immediately and the line removed.

Prescribing Alternative Intravenous Fluids

Parenteral nutrition PN should not be given during treatment for CRBSI. The daily requirements for fluid and electrolytes should be given using peripheral intravenous fluids with the addition of magnesium, calcium and phosphate if necessary. 4% dextrose provides 40g glucose per litre and 5% dextrose provides 50g glucose per litre. 50-100g glucose per

day is sufficient to prevent starvation ketosis (NICE 2013). Very few people will be unable to continue to eat and drink as they would normally, and will gain some calories from this.

Composition of commonly used intravenous crystalloids (BNF 2017):

	Na mmol/L	Cl mmol/L	K mmol/L	HCO_3 mmol/L	Ca^{2+} mmol/L	Mg^{2+} mmol/L	Glucose g	Osm mOsml/L
0.9% Saline	150	150	0*	0	0	0#	0	300
Hartman's	131	111	5	29	2	0	0	278
0.18% Saline/4% dextrose	30	30	0*	0	0	0#	40	
0.45% Saline/5% dextrose	77	77	0*	0	0	0#	50	

*20-40 mmol/L as ready prepared bags for ward administration.
#can be added by pharmacy, usually 10-20 mmol/L

Electrolyte concentration of gastrointestinal secretions (NICE 2013):

	H^+ mmol/L	Na mmol/L	K mmol/L	Cl mmol/L	HCO_3 mmol/L
Gastric	40-60	20-80	5-20	100-150	
Biliary		120-140	5/15	80-120	30-50
Pancreatic		120-140	5/15	40-80	70-110
Jejunum		140	5	135	8
Established Ileostomy		50-100	4-5	25-75	0-30
Newly formed stoma, high stoma, high output ileostomy		100-140	4-5	75-125	0-30

Monitoring

Blood cultures will be incubated for 5 days, with interim negative results being issued at 48hrs. The results should be reviewed at 48 hours, if not previously positive. If blood cultures are negative, parenteral nutrition should be restarted and an alternative diagnosis sort. Many patients on PN may have alternative explanation for a pyrexia e.g. intra-abdominal sepsis/collection.

In some inpatients on PN, there is a clear alternative cause for pyrexia and sepsis, rather than line sepsis (e.g intra-abdominal collections) who are likely to have persistent or recurrent pyrexia. In these cases, it may be appropriate to take paired blood cultures from the vascular access and peripherally and continue the PN. This is to avoid the ongoing omission of PN. This must be decided on an individual patient basis by the nutrition team and parent team at the time of instigation of PN. If this has not been discussed for a patient, the above protocol must be followed with cessation of PN.

When PN is recommenced if this precipitates fever or rigours, repeat paired (line and peripheral) blood cultures should be sent.

If blood cultures are positive and a CRBSI is confirmed, the line should be removed. If the line is removed due to definite or probable CRBSI then please ensure that the line tip is sent for culture and sensitivities. Do not routinely send line tips upon removal. Antibiotic regimes should be adjusted as directed by culture results, discussion with microbiology and the central venous catheter guideline. Blood cultures should be repeated on day 1 and day 2 after removal. If after ≥ 48 hours of anti-bacterial and day 1 and day 2 blood cultures after removal are negative (≥48-72 hours), a replacement temporary line can be reinserted.

If they remain positive, a deep seated source of infection should be sort, as line removal will treat most infections

In fungal CRBSI, anti-fungals should continue. Blood cultures should be repeated on day 1 and day 2 after removal. If after ≥ 5 days of anti-fungals and day 1 and 2 blood cultures after removal are negative (≥ 48-72 hours), a replacement temporary line can be reinstered.

Further management:

If the line is infected with *Staphylococcus ureus* Sepsis in Immunocompetent Adults (koha-ptfs.co.uk), or *Candida* Details for: Invasive Fungal Disease in Adults; Prophylaxis, Investigation, and Treatment - Microbiology Hospital Guideline - Clinical Guidelines › Trust Policies Procedures & Guidelines catalog (koha-ptfs.co.uk), screening for endocarditis is recommended with echocardiogram. Please follow Trust guidance regarding management.

Watch out for septic emboli in patients who have had a line infection and have a low threshold for investigating particularly for discitis.

5. References (including any links to NICE Guidance etc.)

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6. Documentation Controls

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