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

Reference no.:CG-GASTRO/2018/019

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 patients with suspected CRBSI on parenteral nutrition. These will be inpatients having PN through a PICC line or multi-lumen temporary CVC. For lines used for other purposes see separate 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

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, take paired blood cultures peripherally and from all lumens of the CVC using aseptic no touch technique (ANTT) and **label** appropriately so the lab is aware which specimen is from which source and what time they were taken. This should be done on the ICM order 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). The current recommendation is for vancomycin and gentamicin to be used and dosed according to the current dosing guidelines Trust Policies Procedures & Guidelines catalog › Contents of Drug Charts e.g. Gentamicin, Vancomycin. The gentamicin should be given first and the vancomycin left in the line.

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 culture results should be reviewed at 48 hours, if not previously positive. Blood cultures can be assumed to be negative if a positive result has not been flagged to the clinical team. 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.

When PN is recommenced if this precipitates fever or rigours, repeat paired culture should be sent.

If blood cultures are positive and a CRBSI is confirmed, the line (PICC or temporary CVC) should be removed. Antibiotics regime should be adjusted as directed by culture results and discussion with microbiology. Blood cultures should be repeated at 72 hours to ensure the bacteraemia is being adequately treated. If they remain positive, a deep seated source of infection should be sort, as line removal will treat most infections

Once blood cultures are negative, at 48 hours, a replacement temporary line can be requested and PN restarted.

Further management:

If the line is infected with staph. aureus, enterococcus or candida, screening for endocarditis is recommended with echocardiogram.

Ophthalmology review is recommended for candida infection to look for candida endophthalmitis

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.)

Al Wohoush, I., J. Cairo, G. Rangaraj, B. Granwehr, R. Hachem, and I. Raad. 2010. 'Comparing quantitative culture of a blood sample obtained through the catheter with differential time to positivity in establishing a diagnosis of catheter-related bloodstream infection', *Infect Control Hosp Epidemiol*, 31: 1089-91.

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NICE. 2013. "Intravenous fluid therapy in adults in hospital." In.: National Institute for health and care excellence.

Raad, I., H. A. Hanna, B. Alakech, I. Chatzinikolaou, M. M. Johnson, and J. Tarrand. 2004. 'Differential time to positivity: a useful method for diagnosing catheter-related bloodstream infections', *Ann Intern Med*, 140: 18-25.

6. Documentation Controls

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7. Appendices

Vancomycin monograph: Vancomycin Monograph

Gentamicin monograph: Gentamicin Prescription Chart