

# Complications of Parenteral Nutrition (PN)

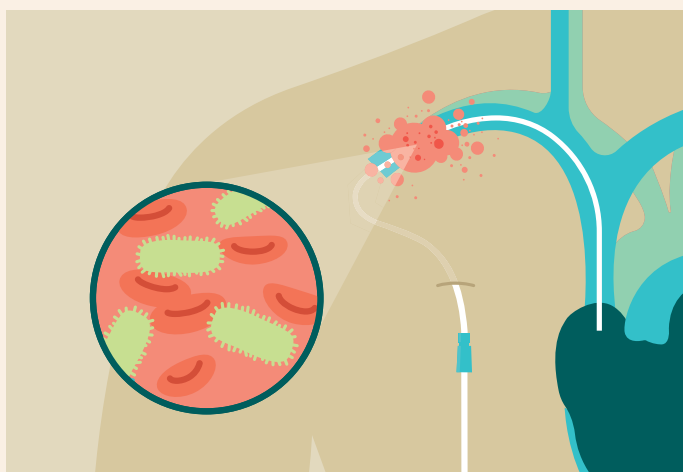
## Complications can be reduced and quality of life improved by:

- Using existing evidence-based guidelines
- Limiting the number of infusions/week, if possible
- Limiting hours of PN to a minimum – aiming for no more than 10-12hrs
- Replacement of excessive fluid losses in PN if at all possible
- Use of portable pumps
- Care as close to home as possible

### Catheter-related bloodstream infection (CRBSI) diagnosis



- Any child with intestinal failure (IF) and a central venous catheter (CVC) is at significant risk of CRBSI. Any fever (temperature  $>38.5$  or rise  $>1^{\circ}\text{C}$ ), or change in clinical or laboratory parameters should raise the suspicion of CRBSI until proven otherwise
- Paired quantitative blood cultures taken simultaneously from both the CVC and a peripheral vein should ideally be obtained when a CRBSI is suspected and before the start of antibiotic therapy
- To confirm CRBSI without catheter removal, calculate the differential time (difference in time to positivity between central and peripheral blood withdrawal) between blood cultures drawn from the catheter and from a peripheral vein or separate lumen



### CRBSI therapy

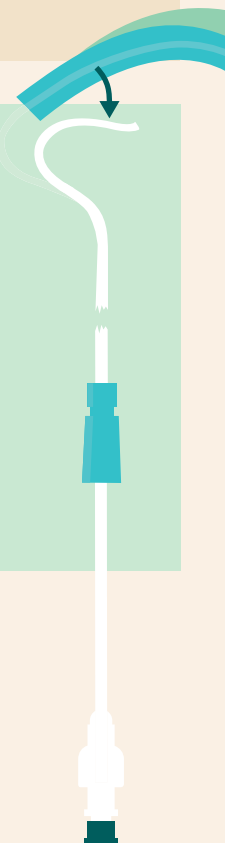
- Empirical antibiotic therapy including coverage for grampositive coagulase-negative or positive staphylococci and gramnegative bacilli
- The duration is generally 10-14 days, assuming clinical and microbiological response within 48-72h and no evidence of complications
- Removal of the CVC only if clinical deterioration or persisting or relapsing bacteremia.

### Complications with Catheters

- Investigate immediately when catheter breakage or fluid extravasation are suspected
- Educate users about correct maintenance and safety of the catheter

### Interventions to decrease thrombotic complications and CVC occlusion

- Routine use of heparin cannot be recommended over use of saline flush
- For CVC that are being accessed intermittently, flushing with 5-10 U/mL heparinized saline 1-2 times weekly helps maintain patency
- Recombinant tissue plasminogen activator or urokinase should be used to unblock a catheter
- There is insufficient evidence to advocate the prophylactic use of anticoagulants



## Complications and considerations related to the composition of PN solution

### Stability

- PN should be administered wherever possible using an admixture formulation validated by a licensed manufacturer or suitably qualified institution
- A matrix table should be sought from the supplier of the formulation detailing permissible limits for additions of electrolytes and other additives
- Alternative ingredients should not be substituted without expert advice or repeat validation
- Phosphate should be added in an organic-bound form to prevent the risk of calcium-phosphate precipitation
- If inorganic phosphate is used, stability matrices and order of mixing must be strictly adhered to
- When '2 in 1' admixtures with Y-site lipids added are used, addition of lipids should be fully validated by the manufacturer or accredited laboratory or the lipid infused through an alternative line

### Drug compatibility

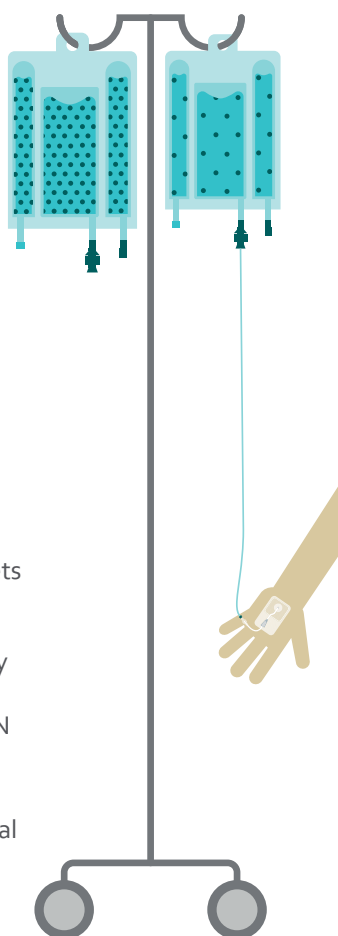
Mixing of medications with PN in administration lines should be avoided unless validated by the manufacturer or accredited laboratory

### Peroxidation, light protection and vitamin stability

- Multi-layer bags which are impermeable to oxygen are recommended for PN administration
- Light/sun protection is recommended for both PN bags and administration sets

### Osmolarity

- The recommended delivery site for PN is via a central line; however peripheral PN can also be given for short periods
- The osmolarity of peripheral PN solution should be kept at less than 900 mosmol/l



## Metabolic complications of PN

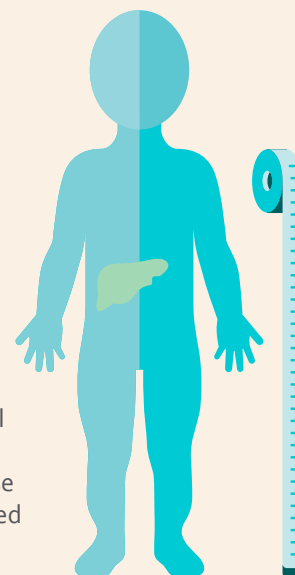
### Metabolic bone disease



- In children on home PN, regular measurements of urinary calcium, plasma calcium, phosphorus, parathyroid hormone and 25-OH vitamin D concentrations and serum alkaline phosphatase activity should be taken
- Ingredients with the lowest amount of aluminum are advocated for the preparation of PN solutions provided to patients receiving PN
- Regular assessment of bone mineralization should be performed

### Growth retardation

Paediatric patients on long term PN require regular monitoring of growth and body composition



### Hepatobiliary complications

- In patients with intestinal failure-associated liver disease (IFALD), maximise enteral intake, as tolerated enteral nutrition may improve liver disease outcome
- In patients on long-term and home PN, cycling of PN infusion is recommended as soon as metabolic and fluid status allows
- Pure soybean-based lipid emulsions (LEs) should be avoided in the presence of cholestasis
- The use of mixed LEs may be encouraged in IFALD patients for long term PN
- The initiation of ursodeoxycholic acid may be considered in the presence of biochemical signs of cholestasis
- Early referral to an experienced paediatric intestinal failure rehabilitation/transplantation centre is recommended in infants/children with IFALD

