Table 2 Complications associated with parenteral nutrition

	Complication	Prevention and Management
Access and delivery	Pneumothorax Haemothorax Site Haemotoma Chylothorax Thromboembolism Air embolism Pneumoclysis Brachial plexus injury	To prevent these complications: • Adhere to "Best Practice" guideline/standardised protocol for line insertion and maintenance • Choose appropriate device with smallest calibre necessary for required infusion • Insertion should be done by a skilled practitioner • Use of ultrasound guided insertion reduces complications • Use appropriate methods to stabilise the device at the entry site (preferably not sutures) • Ensure correct tip position at or near atrio-caval junction by post-insertion X-ray before use • Adhere to policies for flushing and locking/capping lines when not in use
Infectious	CLABSI* Insertion site infection	• Adhere to "Best Practice" CLABSI care bundle including: ✓ proper staff education and training ✓ adequate hand hygiene ✓ use of full barrier precautions during insertion ✓ avoidance of surgical cut-down insertion technique ✓ use of chlorhexidine skin antiseptic ✓ optimal catheter selection with minimum number of ports/lumens necessary ✓ optimal site selection, avoiding femoral lines wherever possible, at least in adults ✓ appropriate sterile dressing ✓ disinfection of hubs, stopcocks and needle-free connectors ✓ daily site inspection ✓ regular changing of administration sets ✓ prompt removal of all unnecessary lines • The following interventions are shown to be ineffective for infection prevention: ✓ in-line filters ✓ routine, scheduled central line replacement ✓ prophylactic use of antibiotics ✓ the use of heparin
Gastrointesitnal	Mucosal atrophy Cholestasis Hepatic steatosis Liver dysfunction	• Restrict parenteral nutrition to patients where enteral nutrition is contraindicated or proven to fail • Whenever possible and clinically feasible, provide enteral nutrition together with parenteral, even if low volume, for the purpose of gut mucosal support and biliary stimulus • Avoid overfeeding and limit the duration of parenteral nutrition. Liver dysfunction increases with chronic parenteral duration. • Cyclical delivery of parenteral nutrition may mitigate liver dysfunction in chronically parenterally fed patients. • Utilise a reduced omega-6 (soy) parenteral lipid emulsion
Metabolic	Refeeding syndrome Hyperglycaemia Rebound hypoglycaemia Dehydration/hyperosmolar state	• Use refeeding protocol • Avoid overfeeding and excessive glucose loads. Use insulin. • Avoid abrupt stoppage of parenteral nutrition especially when insulin infusion running. • Avoid overfeeding or over-concentrated formulation. Provide free water and insulin.
	Hyper/hyponatraemia Hyper/hypophosphataemia Hyper/hypokalaemia Hyper/hypomagnesaemia Hyper/hypocalcaemia	• When levels are high, select an electrolyte-free or electrolyte-restricted parenteral formulation • When levels are low, correct/replace IV.
	Hyperchloremic acidosis Hyperammonaemia Ureamia/raised BUN Hyperbilirubinaemia	• Avoid excessive administration of chloride. Use electrolyte-free formulation. • Indicative of hepatic dysfunction. Protein-restricted or branch-chain enriched amino acid solution may be necessary. See points on hepatic dysfunction above.
	Hyperlipidaemia	• Reduce parenteral lipids.
	Trace element deficiency EFA deficiency	• Provide adequate dose • Do not provide less than minimum of 3% of daily energy as lipid, providing 7-10g linoleic acid.

* Central line associated bloodstream infection