

No.	Clinical questions and recommendation statements	Strength of recommendation	Quality of evidence	Level of agreement
Indications for parenteral nutrition (PN)				
1	What are the indications for PN? PN is indicated in patients who are unable to meet their nutritional needs orally and/or enterally as a result of suboptimal function of the gastrointestinal tract (GIT) or in whom the GIT is not accessible.	Strong	High	100%
2a	When should PN be initiated? For patients who are well-nourished on initial assessment, initiating PN can be considered after 5–7 days of not achieving 60% or more of estimated total energy requirement.	Strong	Low	93%
2b	For patients who are severely malnourished or at high risk of malnutrition, consider initiating PN earlier than 5 days of not achieving 60% or more of estimated total energy requirement.	Strong	Low	93%
3a	What are the contraindications of PN? Contraindications to PN include patients with critical electrolytes abnormalities, specifically serum potassium <2.5 mmol/L, serum sodium <125 mmol/L, serum phosphate <0.4 mmol/L or serum magnesium <0.5 mmol/L.	Weak	Very low	100%
3b	Contraindications to PN include patients who have suffered irreversible brain injury or terminal illness where there is a lack of therapeutic goal to prolong life in the inevitable death.	Strong	Moderate	100%
3c	Contraindications to PN include patients who have no suitable venous access for PN.	Strong	Very low	100%
Assessment of PN patients				
4	Who should assess and manage patients prescribed with PN? Patients on PN support in hospital should be managed by a nutrition support service consisting of a team of trained physician, nurse, dietitian and pharmacist.	Strong	Low	100%
5a	How often should biochemical parameters be assessed for patients on PN? All patients should have a baseline biochemical assessment prior to initiation of PN.	Strong	Very low	100%
5b	After establishing a patient on PN, the frequency of biochemical monitoring should be adjusted according to the patient’s clinical progress, nutritional status and stage of PN therapy.	Strong	Very low	100%
6a	What are the nutritional requirements for patients on PN? Energy expenditure for patients requiring PN should ideally be measured using indirect calorimetry. However, if indirect calorimetry is not available, providing 25–30 kcal/kg/day or using validated predictive equations, taking into account physical activity and stress factor, are acceptable to calculate energy requirement.	Strong	Moderate	100%
6b	Protein requirements for patients requiring PN should be tailored to individual needs, ranging from 1 to 2 g/kg/day. Higher protein doses may be required for the critically ill, cancer and elderly patients.	Strong	Low	87%

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7	Which nutritional assessment tool should be used for patients requiring PN? There is currently no nutritional assessment tool developed specifically for patients requiring PN. Validated assessment tools, such as Subjective Global Assessment, are recommended for the diagnosis and determination of the severity of malnutrition.	Strong	Very low	100%
Titration and formulation of PN				
8	How fast should PN be introduced and progress? It is recommended to start at 15–20 kcal/kg/day on day 1 and increasing it progressively to target for non-critically ill patients. Patient's nutritional status and risk of refeeding should be considered when initiating and advancing PN infusion rate.	Weak	Moderate	100%
9	When should PN be discontinued? PN can be reduced and discontinued when the patient is receiving more than 60% of target energy requirement from enteral nutrition and/or oral diet.	Weak	Very low	100%
10	What is the recommended type of lipid emulsion used to compound PN? Fish oil containing injectable lipid emulsion should be used as part of the lipid component of PN.	Strong	High	100%
11a	Should multivitamin and trace elements be added in PN bags? Multivitamins are recommended in patients initiated on PN. In patients at risk of refeeding syndrome, additional intravenous thiamine supplementation for 3–5 days is recommended.	Strong	High	100%
11b	Trace elements are recommended in patients initiated on PN.	Weak	Low	100%
12a	Under what circumstances would additional vitamin or mineral supplementation be required? Additional supplementation of vitamin C is recommended for patients who are critically ill and patients who have had gastrectomy or colorectal resection.	Strong	High	100%
12b	Additional supplementation of zinc (Zn) is recommended for patients with high GIT losses. For every 1L of GIT losses via fistula or stoma, an additional 12–17 mg of Zn should be provided.	Strong	High	100%
13	Are there benefits in adding glutamine in PN bags? Additional supplementation of glutamine is not recommended in patients initiated on PN.	Weak	Low	100%
PN access routes and devices				
14	What types of venous access device should be used for PN? Peripherally inserted central catheter with a dedicated lumen is recommended for PN administration. However, an existing central venous access device (CVAD) in the internal jugular vein can be used for up to 14 days.	Strong	Moderate	100%
15	How should the patency of CVADs be maintained? CVADs should be flushed using normal saline after each use, or weekly if not in use, to maintain catheter patency.	Strong	Moderate	100%
16a	Under what circumstances should peripheral PN (PPN) be considered? PPN can be used as supplemental PN where oral or EN is suboptimal.	Weak	Low	100%
16b	The duration of PPN therapy should not exceed 14 days due to an increased risk of complications related to peripheral intravenous catheters.	Strong	Low	100%

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17	What osmolarity of PN admixture is safe for peripheral venous use? Osmolarity of PPN therapy should be maintained at less than 900 mOsm/L to minimise the risk of catheter-related complications.	Strong	Low	93%
Monitoring and management of PN-related complications				
18a	How should patients at risk of refeeding syndrome be managed? Patients who are at risk of refeeding syndrome are required to have their serum electrolytes monitored daily for the first few days, following which frequency of monitoring can be reduced when serum electrolytes stabilise.	Strong	Moderate	100%
18b	Serum electrolyte abnormalities should be promptly recognised and corrected.	Strong	High	100%
19	How often should blood glucose be monitored? Blood glucose levels should be measured every 6 hours at least for the initial 48 hours after initiation of PN therapy.	Weak	Low	100%
20	What is the target blood glucose range? A target blood glucose ranging 7.8–10 mmol/L is recommended for patients receiving PN.	Strong	Moderate	100%
21	Should insulin be added to PN bags? Subcutaneous insulin is preferred over the addition of insulin to PN admixtures for glycaemic control. At the discretion of the nutrition support team and guided by local institution practices, short-acting insulin may be added to PN admixture in patients whose clinical conditions and PN requirements are stable.	Weak	Low	100%
22	How often should liver function tests (LFTs) be monitored? Baseline LFTs should be obtained prior to initiation of PN. LFTs should be monitored on a weekly basis, with a reduction in frequency of monitoring subsequently depending on clinical progress.	Weak	Moderate	100%
23	How should deranged LFTs be managed? Non-PN-related causes of abnormal LFTs should first be identified and managed accordingly. Overfeeding of PN may also cause abnormal LFTs, hence adjustment of dextrose and/or lipid content of PN admixture may be necessary.	Weak	Moderate	100%
24	How should PN transition from continuous to cyclical infusion? Cyclic PN can be started when patient is clinically stable and satisfactory glycaemic control is maintained during a fasted state without PN.	Weak	Moderate	100%
25	What is the target serum triglyceride level? Serum triglyceride should be maintained below 4.6 mmol/L.	Weak	Moderate	100%
26	How should hypertriglyceridaemia be managed? If serum triglyceride is more than 4.6 mmol/L, dextrose load in PN should be reduced followed by a reduction in injectable lipid emulsion if serum triglyceride level does not improve. PN should be discontinued if serum triglyceride is more than 11.4 mmol/L.	Weak	Moderate	100%
27	How should catheter-related thrombosis (CRT) be managed? The use of thrombolytic agents and anticoagulation treatment is recommended for CRT, with removal of CVAD if complete resolution from these measures is not achieved.	Strong	Moderate	100%

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28a	How should catheter-related blood stream infection (CRBSI) be managed? In the event that CRBSI is suspected, 2 sets of blood cultures should be obtained from both the CVAD and peripheral vein before initiation of antimicrobial therapy.	Strong	Moderate	100%
28b	In complicated CRBSI, the CVAD should be removed for source control. In uncomplicated CRBSI or in patients with limited vascular access, discussion with an infectious disease specialist is recommended to explore possibility of CVAD salvage.	Strong	Low	100%
29	Should PN be withheld when patient undergoes surgery? It is not necessary to withhold PN during surgery.	Weak	Low	87%
30	Is tapering of PN and dextrose drip necessary after termination of PN? Tapering of PN or administration of intravenous dextrose solution after abrupt termination of PN may not be necessary unless the patient is on insulin therapy.	Weak	Low	80%