Adult parenteral nutrition (PN) guideline

TARGET AUDIENCE	Secondary care only
PATIENT GROUP	Adult patients that require parenteral nutrition due to intestinal failure; when oral/ enteral feeding is unsafe or inadequate.

Clinical Guidelines Summary

This document provides guidance for use by ward multidisciplinary teams to support the appropriate, safe and effective management of patients commenced on parenteral nutrition.

Sections:

1. Criteria for a patient to commence PN
2. Referral process for assessment by the Nutrition Support Team (NST)
3. Ordering of PN and initiation
4. Monitoring of patients on PN
5. Prescribing on Hospital Electronic Prescription and Medicines Administration system (HePMA) and the fluid chart
6. Safe administration
7. Nursing competency around safe administration of PN
8. Troubleshooting
9. References

Adult Parenteral Nutrition (PN) Guideline

1. Criteria for a patient to commence PN

Introduction

Parenteral Nutrition is the intravenous (IV) administration of a solution containing macronutrients, electrolytes, micronutrients and fluid given to support patients with intestinal failure (IF).

Use of PN can be associated with complications, some of which can be life threatening if not managed appropriately. Care is best provided by a multidisciplinary team (MDT) with expertise in managing this patient group, with complex patients managed in designated IF centres.

Indications

PN is indicated in those who have been assessed as malnourished or are at risk of malnutrition, who have:

- A non-functioning, inaccessible or perforated gastrointestinal tract

  OR
- An inadequate or unsafe oral and/or enteral nutritional intake. [1]

The National Institute for Health and Care Excellence (NICE, 2006) [1] states that if intestinal tolerance persistently limits enteral tube feeding in surgical or critical care patients, parenteral nutrition can be used to supplement or replace enteral nutrition (EN).

Types of Intestinal Failure (IF) requiring Parenteral Nutrition [2]

Type 1: Acute, short term and usually self-limiting. Often peri-operative in nature such as an ileus following surgery.

Type 2: Prolonged acute IF over a period of weeks or months. Patients are metabolically unstable and it is normally associated with recurrent episodes of sepsis.

Type 3: Chronic IF in metabolically stable patients where home parenteral nutrition is required. Indications include short bowel (e.g. resections due to Crohn's disease or ischaemic vascular disease), radiation enteritis, motility disorders (E.g. scleroderma, and chronic idiopathic intestinal pseudo-obstruction).

The risks/benefits of providing PN should be considered on an individual basis, including the expected degree and duration of the IF, the overall medical goals, prognosis, the skills and experience of the healthcare professionals in managing PN.

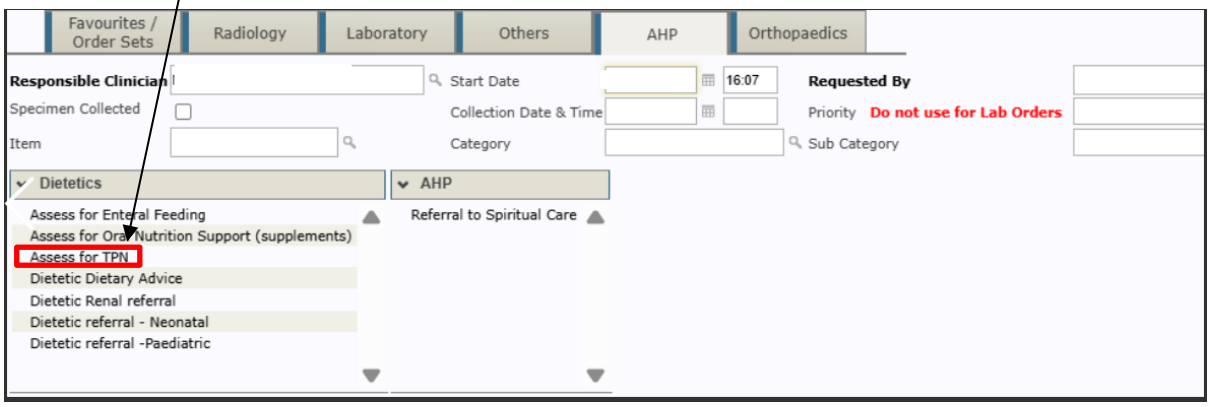
Patient Assessment

Patient assessment should be robust, ideally utilising the skills of a multidisciplinary Nutrition Support Team (NST) [3]. The elements referred to in Table 1.should be evaluated.

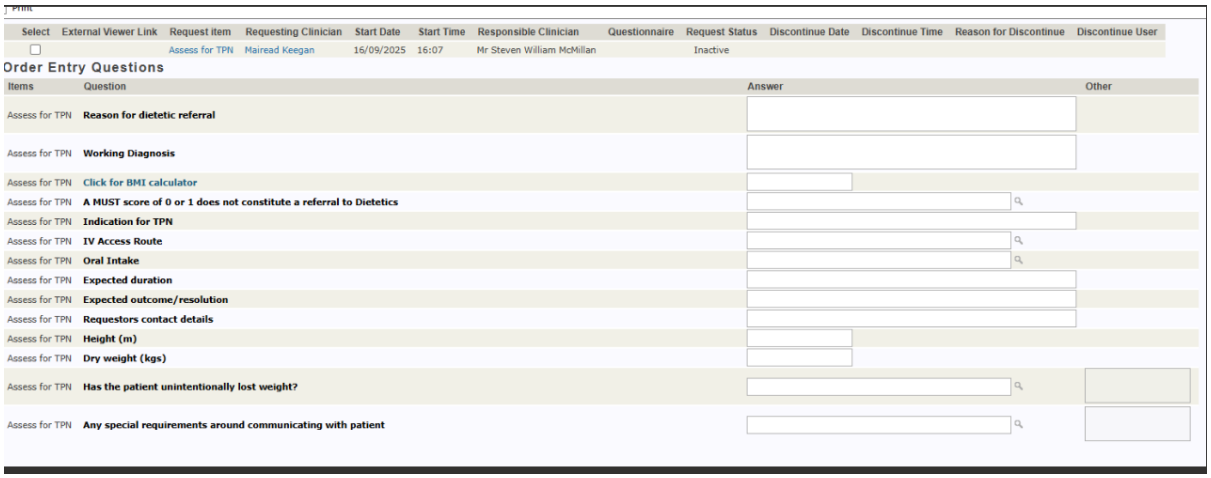
Table 1.	
1.	Consider indication for PN
2.	Consider expected duration of treatment and outcome
3.	Ensure appropriate access for PN
4.	Assess nutritional status
5.	Assess risk of re-feeding syndrome
6.	Assess biochemical and hydration status
7.	Consider pharmaceutical treatments
8.	Estimate nutritional requirements including electrolytes and micronutrients
9.	Formulate PN regimen
10.	Ensure safe ongoing catheter care / administration of PN
11.	Consider delivery of feed and duration
12.	Formulate monitoring plan

2. Referral Process for assessment by the Nutrition Support Team (NST)

All patients being considered for PN must be referred to the NST. All referrals should be made via Trakcare as shown below. Nursing or medical staff on the ward can make referrals.



Trakcare NST referral questionnaire continued:



Select	External Viewer Link	Request item	Requesting Clinician	Start Date	Start Time	Responsible Clinician	Questionnaire	Request Status	Discontinue Date	Discontinue Time	Reason for Discontinue	Discontinue User
☐		Assess for TPN	Mairead Keegan	16/09/2025	16:07	Mr Steven William McMillan		Inactive				

Order Entry Questions

Items	Question	Answer	Other
Assess for TPN	**Reason for dietetic referral**		
Assess for TPN	**Working Diagnosis**		
Assess for TPN	**Click for BMI calculator**		
Assess for TPN	**A MUST score of 0 or 1 does not constitute a referral to Dietetics**		
Assess for TPN	**Indication for TPN**		
Assess for TPN	**IV Access Route**		
Assess for TPN	**Oral Intake**		
Assess for TPN	**Expected duration**		
Assess for TPN	**Expected outcome/resolution**		
Assess for TPN	**Requestors contact details**		
Assess for TPN	**Height (m)**		
Assess for TPN	**Dry weight (kgs)**		
Assess for TPN	**Has the patient unintentionally lost weight?**		
Assess for TPN	**Any special requirements around communicating with patient**		

The order cut off time for same day provision of PN is **11am Monday – Friday ONLY**.

Patients must be referred to the NST with enough time to allow a patient to be reviewed and the PN prescription generated prior to cut off time. Please ensure patients have baseline PN bloods available (as described in this guideline) and dedicated IV access (as described in this guideline) planned to allow PN to proceed if indicated.

Please note: there is no access to commence PN out of hours or at weekends. This has been recommended and agreed by the NHS Lanarkshire NST's on each acute site and is nationally accepted, evidence based practice. If a referral is made after 11am on a Friday or on a bank holiday, please ensure adequate fluid replacement is prescribed until an NST review can be facilitated within service hours.

3. *Ordering of PN and Initiation*

- Once the patient referral has been received via the Trakcare referral process, the patient will be assessed by the NST.
- The PN prescription will be based on the patient's nutritional requirements, clinical condition, weight, gastrointestinal losses and bloods
- PN prescriptions will be completed by the NST consisting of pharmacists, clinicians and dietitians involved in the patient's care. The prescription will be reviewed updated and fully documented daily.
- Pharmacy and Dietetics will liaise on a regular basis to check requirements for the patient.

Prior to commencing PN, please ensure the following factors are considered:

1. **IV access** – PN will require dedicated IV access for administration. Ensure the intravenous access has been approved for use and is documented in the patient's clinical records before the PN is administered.

2. **Risk of refeeding** – Patients at risk of refeeding should be prescribed Vitamins B+C IV High Potency once daily prior to commencing PN (refer to NHS Lanarkshire Refeeding guidelines NHSL Refeeding Syndrome guideline). The NST will assess refeeding risk and advise what to prescribe for this.

3. **Baseline bloods** – Check **U&E, LFT, Mg, PO4, Ca, Glucose, INR and FBC** by selecting the "**Nutrition- Refeeding"** order set bundle via TrakCare and request **CRP** (to assess acute phase response).

4. **Please correct any electrolyte deficiencies** prior to commencing PN. The "Nutrition-Refeeding" order set bundle should be ordered at the point of referral for PN and then daily until the nutrition team advise otherwise

5. **Baseline ECG** - All patients starting on PN should have an ECG prior to commencing PN specifically looking at whether there is a prolonged corrected QT (QTc) interval. If this is abnormal, a clinical assessment of the patient must be carried out to assess risks of commencing PN and any ongoing monitoring.

6. **Weight** – An accurate weight is required before commencing PN. If unable to weigh the patient or if the patient has ascites or is fluid overloaded, the weight may need to be estimated.

7. **Fluid prescription** – The need for appropriate maintenance and replacement fluids should be continually assessed on commencement of and throughout the duration of PN. This is the responsibility of the ward team, and should take into account the patient's clinical condition and the contents of their PN. Ensure an accurate record of daily fluid balance is kept to assist in the fluid assessment

8. **Allergy history** – SmofKabiven® PN bags are contraindicated in patients with hypersensitivity to fish, eggs, soya or peanut protein and corn (maize) or corn products.

4. Monitoring of Patients on PN

Patients commenced on PN require daily U&Es, LFTs, magnesium, calcium, phosphate and FBC by selecting the Nutrition- Refeeding order set bundle via TrakCare and requesting CRP (to assess acute phase response).

Patients at high risk of refeeding syndrome with electrolyte derangement in the days preceding PN should have twice daily bloods (Nutrition-Refeeding order set bundle) taken and reviewed after each set of results as a clinical priority.

ALL patients must have a **baseline ECG**, please consider repeat ECG checks at an appropriate time if any clinical concerns such as abnormal heart rate and electrolyte derangement develop.

If evidence of cardiac abnormalities on ECG, please consider continuous cardiac monitoring and ensure patient escalated for senior review.

Once clinically appropriate, the daily bloods recommended above can be reduced to twice weekly on advice of the NST. All PN patients should have early morning bloods prioritised. Bloods should not be taken from PICC lines as this can increase the risk of line-related complication and harm.

Potassium

Potassium is primarily found intracellularly. As such, reported plasma levels may not reflect total body levels so care should be taken when interpreting these - it is possible for individuals with considerably depleted stores to have a normal plasma level.

Patients who are commencing PN but have been hypokalaemic prior to commencement are likely to continue to need additional IV fluids with potassium replacement particularly during the introduction of feed. Consider giving potassium in ongoing fluids even in the context of a normal potassium that day.

Consider continuous cardiac monitoring in patients who have had issues with hypokalaemia in the preceding days.

Calcium, Magnesium and Phosphate

Replacement of low calcium, magnesium and phosphate should be undertaken prior to commencement of PN. The IV route should be utilised for patients with intestinal failure. Refer to NHS Lanarkshire Guidelines Website and App: Electrolyte Disturbance | Right Decisions (scot.nhs.uk) for guidance on replacement of calcium, magnesium and/or phosphate.

Significant reduction in electrolyte levels should alert to the possibility of refeeding syndrome. Patients at risk of re-feeding should have potassium, calcium, magnesium and phosphate closely monitored and promptly replaced. Discuss with PN pharmacist before 11am for prescribing of additional electrolytes in PN bag.

Fluid Balance

Daily assessment of fluid status, presence or absence of AKI (which may lead to hyperkalaemia) and sources of fluid loss such as drains, wounds, NG aspirates, diarrhoea and overactive stomas is imperative.

Blood sugars

Capillary blood glucose levels (BMs) should be checked four times a day until established on full nutritional requirements – if stable at this point monitoring can be reduced to twice-daily checks, morning and night.

Patients who are insulin dependent and commenced on PN should be discussed with the local diabetic specialist team. Consider also involving the diabetic specialist team for patients on oral diabetic medicines who are hyperglycaemic and unable to absorb their regular diabetic medicines.

Weight

Weight should be checked at baseline, then weekly for most patients.

Dietitians may ask for twice-weekly weights in some situations. Dietitians will undertake anthropometrics.

Line sepsis

With the aid of the "central vascular catheter (CVC) maintenance and removal bundle" lines should be inspected daily with particular note to whether the line appears red, the appearance of the surrounding skin, whether pus is present and whether there is evidence that the line has moved.

Liver function

PN can contribute to abnormal liver function tests although it is rarely the main cause. Patients should have LFTs checked on daily basis until stable and thereafter checked on a weekly basis while on PN. If liver function tests become deranged screen for sepsis, review medications and seek a gastroenterology review.

Cholesterol and triglycerides [4]

Cholesterol and triglycerides should be checked weekly for evidence of hyperlipidaemia. Speak to the PN pharmacist, dietitian or medical staff if these become elevated.

Other tests

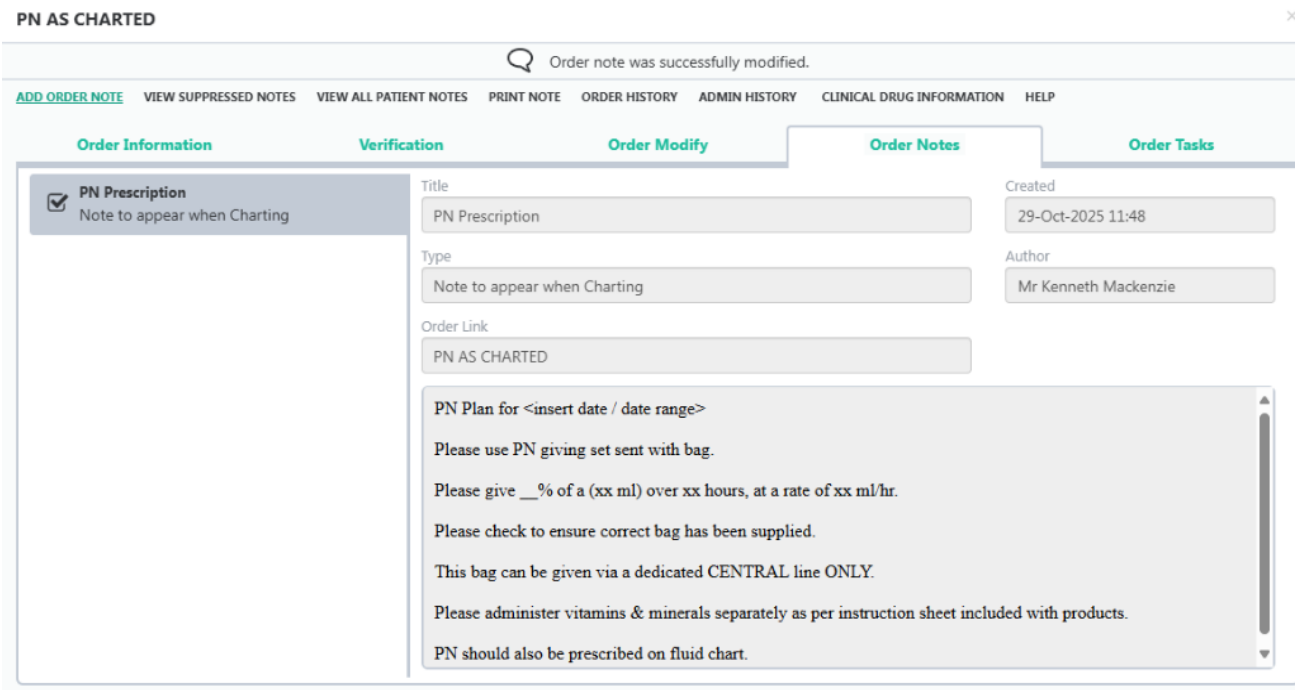
In malnourished patients, check a micronutrient screen [4] which encompasses checking for trace elements (zinc, manganese, selenium, copper) and vitamins (A, B1, B2, B6, D, E). Samples should be sent to the Scottish Trace Element & Micronutrient Diagnostic and Research Laboratory (STEMDRL) at Glasgow Royal Infirmary (the Duty Biochemist can be contacted via switchboard to advise on how this is done) at baseline. Please note zinc requires to be at the labs within 4 hours of sampling. Along with haematinics (B12, Folate, Ferritin).

Cautious interpretation is required in the context of an inflammatory process or if CRP >10.

5. Prescribing on Hospital Electronic Prescription and Medicines Administration system (HePMA) and the fluid chart

- The required PN prescription details will be added to HePMA and the NST will document in the medical notes on a regular basis.
- The PN prescription details can be found under the "PN prescription" note on the patient's HePMA record.
- This note will provide the total volume to be infused, the rate of PN infusion and the energy, nitrogen and electrolyte content of the PN being prescribed to the patient on a daily basis.

An example of the HePMA note can be found below:

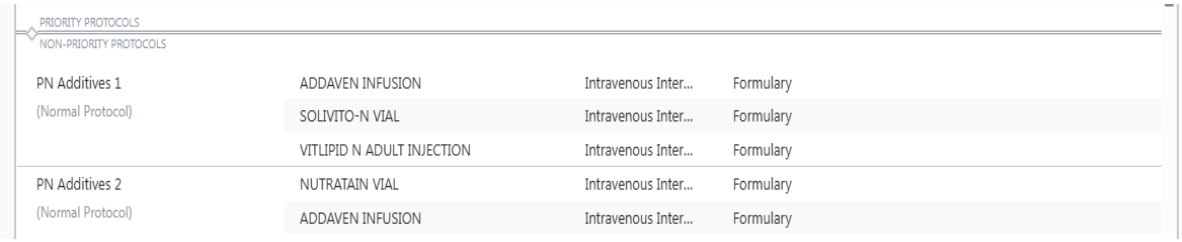


- The PN prescription requires transcription from the HePMA note to the fluid prescription chart daily. This should include the PN name, volume and rate and can be added by an appropriate prescriber.
- "PN as charted" should be prescribed on the patient's HePMA record as a "PRN" medication and the nursing staff should mark each PN bag as administered on HEPMA.

Prescribing of vitamins and trace elements for "off-the-shelf" PN

- Where patients are prescribed an aseptically prepared PN bag - essential vitamins and trace elements will be added to the bag by the Aseptic Unit within pharmacy at University Hospital Monklands.
- Patients prescribed "off-the-shelf" PN will be prescribed and supplied essential vitamins and trace elements separately.
- To prescribe these search "PN" under the **protocol** tab on HePMA. These should be charted on HePMA accordingly and administered as a single infusion as per the instruction sheet provided prior to administering PN.

Examples of the HePMA prescriptions for the vitamins and trace elements can be found below:



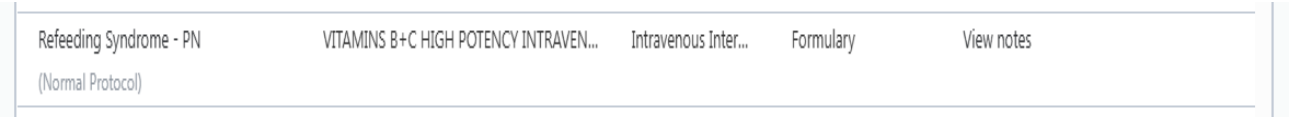
PRIORITY PROTOCOLS			
NON-PRIORITY PROTOCOLS			
PN Additives 1 (Normal Protocol)	ADDAVEN INFUSION	Intravenous Inter...	Formulary
	SOLIVITO-N VIAL	Intravenous Inter...	Formulary
	VITLIPID N ADULT INJECTION	Intravenous Inter...	Formulary
PN Additives 2 (Normal Protocol)	NUTRATAIN VIAL	Intravenous Inter...	Formulary
	ADDAVEN INFUSION	Intravenous Inter...	Formulary

Prescribing of vitamins for patients at risk of Re-feeding Syndrome

- Determining the risk of re-feeding syndrome in patients commencing on PN can be challenging
- Therefore, it is recommended that all patients commencing PN should be prescribed IV Vitamins B+C High Potency x ONE pair once daily on HePMA
- The first dose of Vitamins B+C must be commenced within 12 hours of commencing PN. This is because the malnourished patient is likely to be thiamine deficient at baseline and the reintroduction of glucose causes intracellular uptake of electrolytes which leads to increased utilisation of thiamine
- If thiamine is not promptly and sufficiently replaced, deficiency problems may occur

Continue Vitamins B+C High Potency for 3-5 days until the patient is receiving their full nutritional requirements. Courses may be extended in severe cases or on specialist advice from the NST up to a maximum of 10 days.

To prescribe these on HePMA search "**Refeeding Syndrome**" under the **protocol** tab on HePMA and select the "Refeeding Syndrome – "PN" prescribing bundle as demonstrated below:



Refeeding Syndrome - PN (Normal Protocol)	VITAMINS B+C HIGH POTENCY INTRAVEN...	Intravenous Inter...	Formulary	View notes

6. Safe Administration

PN should only be administered in specifically identified wards across the three NHSL sites.

These are:

- University Hospital Monklands – ICU, ward 4, 6 & 9
- University Hospital Hairmyres – ICU, ward 1, 4, 5, 8 & 11
- University Hospital Wishaw – ICU, ward 13, 17 & 18

This is to ensure that nursing staff are experienced in line management to minimise complications.

There may be a rare occasion that PN needs provided out with this setting. This can only be considered if nursing staff appropriately trained in line management are consistently available and after steps to address any barriers to transferring the patient to a PN delivering ward have been made.

Patients on Home PN (HPN), if admitted with a non-line issue may be managed on a ward relevant for their presenting complaint. The majority of patients on HPN manage their own lines and HPN administration in the community and can continue to do so in this situation, whilst in hospital. In circumstances where they cannot manage their line or PN care then the patient should be cared for in a designated PN ward with input from the speciality team.
Note: fridge storage will need to be provided for HPN bags.

Patients who are acutely unwell (e.g., sepsis not necessarily related to their line) may need reassessment of their nutritional requirements for their acute situation. Fluid management will also need re- assessed by ward team. Ensure input is sought from the Glasgow Royal Intestinal Failure Team as clinically appropriate, they can be contacted through switchboard.

Central venous access

- PN should be delivered through a dedicated, ideally single lumen peripherally inserted central catheter (PICC) line). The vascular access service, as standard, will insert BD lines but a single lumen line can be specifically requested when making the request for PICC line.
- PICC lines do not require Hepsal® locking as there is no evidence that this is beneficial.
- If more than one lumen is present then one lumen needs to be dedicated to PN and marked as such.
- Peripheral PN can be considered if unable to get dedicated central access established quickly enough and if the delay in starting PN would significantly affect the patient outcome.

- Peripheral PN should be seen as a short-term measure and should only be expected to be in place for a maximum of 5 days while definitive central access is established. **This should always be discussed with the NST** to ensure the best outcome for the patient.
- When the line is not use, a CUROS (3M) ® cap should be used to close off the line.

Safe Administration of PN via a central venous catheter (CVC) or PICC Line

Please follow the manufacturers guidelines for preparation of bag prior to administration e.g. when bursting/mixing contents.PN bags prepared by pharmacy aseptic or HPN bags must be removed from the fridge 30-60 mins before hanging.

For off-the-shelf PN bags ensure vitamins and trace elements have been infused via a separate lumen to the PN dedicated lumen as per the instruction sheet provided. These vitamins and trace elements should never be added to any PN bags by nursing staff on the ward.

Equipment Required:

- Metal Trolley
- Sterile Gloves
- Dressing Pack *
- Volumat Line with Filter
- 10ml syringe
- 10ml Sodium Chloride 0.9%
- Clinell® Wipe x4
- HEPMA prescription
- PN Bag (check patient name, solution, volume, expiry date and check the bag for any damage)

* (Tegaderm CHG I.V 1657R 8.5 x 11.5cm dressing, which are transparent and antimicrobial for PICC lines)

Procedure:

1. Perform hand hygiene with soap & water and put on apron & gloves
2. Empty dressing pack on to the top of the trolley.
3. Open out dressing pack and 10ml syringe from packet on to the sterile field.
4. Open and pour the sodium chloride into the sterile pot
5. Using a Clinell® wipe lift the Vadsite, place drape under central/PICC line.
6. Apply Sterile Gloves now

7. Clean Vadsite with Clinell® wipe for 30 seconds, clean clamp for 30 seconds and allow both to dry for 30 seconds.

8. Using 10ml syringe draw up 10ml of sodium chloride

9. Attach to clean Vadsite, open clamp and flush the line using a push/pause technique. Maintain positive pressure when removing syringe and close clamp.

10. Clean the port of the PN bag for 30 seconds break seal and allow to dry for 30 seconds

11. Insert administration set into port of PN bag

12. Prime the line ensuring there is no air in line and attach the administration set to the Vadsite

13. Prior to commencing the infusion two Registered Nurses should check prescription on HEPMA matches the bag supplied by pharmacy and the volume / infusion rate on the pump. The expiry date of the PN should be checked on the bag. Now open the clamp and commence the infusion

14. Two Registered Nurses should then "sign" prescription as administered on HePMA

General points on IV line and PN care

- The central vascular catheter (CVC) maintenance and removal bundle should be in place for all patients with a centrally sited line and completed daily.
- When hanging or disconnecting a bag of PN, aseptic technique according to NHSL policy must be followed.
- Administration sets and PN bags must be changed **every 24 hours**. The NST will never prescribe a bag to run longer than this.
- Ensure the PN specific giving set is used - VLPN00
- PN bags should never be altered at ward level. No additions should ever be made as this cannot only affect the stability of the PN but could lead to patient harm.
- While a PN infusion is ongoing, the feed should be covered with the "protect from light" bag provided, to protect the contents from light and help maintain stability.
- PN should never be infused faster than the rate on the bag without NST advice, even if an infusion has started late and will not be finished before the next one is due. The administration rate will be clearly detailed on the HePMA PN note.
- PN should not be disconnected, only in exceptional circumstances. In the rare case that disconnection is necessary (for example, if the patient is going to theatre), the same PN bag and giving set must never be re-attached. Instead, the bag must be discarded immediately.
- If there is a loss of central IV access, the PN bag should not be given peripherally.
- If the PN bag is burst/ damaged, for both of these circumstances fluids should be given peripherally as replacement for the fluid that should be in the bag.

- Electrolyte supplementation is also likely to be required. The HEPMA PN prescription note will have the electrolyte requirements for reference.
- PN should be stopped if the patient has a spike in temperature. Two peripheral cultures and two cultures taken from all lines in situ should be taken 30 minutes apart. If the patient is on HPN, Dr Fiona Leach's specialist nutrition team at Glasgow Royal Infirmary should be contacted as soon as possible via switchboard.

Safe disposal of PN bags after use

Please dispose of PN as per Section 8: Disposal of Medicines in NHS Lanarkshire Code of Practice for Medicines Governance NHSL Code of Practice for Medicines Governance

7. Nursing competency around safe administration of PN

Only Nursing staff who have completed the following should access any Central Venous Access Device (CVAD):

- Learnpro / NES TURAS module
- CVAD face to face training
- Competency document from CVAD training

Nursing staff must be compliant with the NHSL clinical guideline "Flushing a Central Venous Access Device (CVAD) peripherally inserted Central Catheter (PICC) & Tunnelled Central Venous Catheter (TCVC)" available on the NHSL Right Decisions site.

Please be aware that knowledge of these documents and this guideline alone do not deem you competent. It is the responsibility of each Registered Nurse supported by their line manager to ensure their own safe practice and ongoing competency in all associated areas.

8. Troubleshooting

Loss of IV access

If IV access is lost preventing the administration of PN, it is essential to continue fluid and electrolyte replacement to meet the patient's ongoing needs. Appropriate fluid and electrolyte support should be prescribed in accordance with NICE intravenous fluid therapy guidelines [5].

Need for supplementary fluids

Patients receiving PN may also require supplementary fluid replacement alongside their PN. This need should be assessed on an individual basis, with careful consideration given to each patient's specific clinical condition and fluid requirements. Any additional fluids prescribed must adhere to the NICE intravenous fluid therapy guidelines [5].

9. References

1. National Institute for Health and Care Excellence (NICE). Nutrition support in adults: Oral nutrition support, enteral tube feeding and parenteral nutrition, 2006. Available from: Nutrition support for adults: oral nutrition support, enteral tube feeding and parenteral nutrition

2. Klek. S, et al. Management of acute intestinal failure: A position paper from the European Society for Clinical Nutrition and Metabolism (ESPEN). *Clinical Nutrition* 35, 1209-1218. 2010

3. National Confidential Enquiry into Peri-operative Deaths. (NCEPOD) A mixed bag: an enquiry into the care of hospital patients receiving parenteral nutrition, 2010. Available from NCEPOD - Parenteral Nutrition: A Mixed Bag Report (2010)

4. British Association for Parental and Enteral Nutrition. (BAPEN) Parenteral Nutrition Monitoring, 2016. Available from Parenteral Nutrition Monitoring | BAPEN

5. NICE. Intravenous fluid therapy in adults in hospital: clinical guideline CG174. Section: Principles and protocols for intravenous fluid therapy. Dec 2013 [last updated May 2017; cited 2025 Oct 27]. Available from: https://www.nice.org.uk/guidance/cg174/chapter/Recommendations#principles-and-protocols-for-intravenous-fluid-therapy-2 nice.org.uk+1

Adult Parenteral Nutrition (PN) Guideline

1. Governance information for Guidance document

Lead Author(s):	Ruth Waters, clinical pharmacy manager UHH & Morag McMaster, consultant gastroenterologist UHM
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Responsible Person (if different from lead author)	

CONSULTATION AND DISTRIBUTION RECORD	
Contributing Author / Authors	Amna Aslam, senior clinical pharmacist, Surgery & ICU Kirsten Jack, senior clinical pharmacist, Surgery & ICU Karen Cashin, senior clinical pharmacist, Surgery & ICU Linda Thomson, Dietetic team lead Mairead Keegan, Dietetic team lead Hannah Weir, dietitian Mahua Chakrabarti, consultant surgeon UHW Alistair Brown, consultant surgeon UHH Pedro Cuhna, consultant surgeon UHM Megan McGowan, fluid specialist nurse Selina Lamont, consultant gastroenterologist Pamela Miller, clinical pharmacist surgery & ICU Lorna Murphy, charge nurse Nicola Bell, dietitian Nadia Bowley, Clinical lead – Acute Dietetics Margaret Watson, ERAS nurse
Consultation Process / Stakeholders:	Neil Syme, consultant clinical biochemist NHSL Practice Development Team – Maire McCormack (clinical educator)

Distribution	Via Right Decisions website – available to all acute hospital sites, NHS Lanarkshire

CHANGE RECORD

Date	Lead Author	Change	Version No.
		e.g. Review, revise and update of policy in line with contemporary professional structures and practice	1
			2
			3
		.	4
			5