PARENTERAL NUTRITION GUIDELINES

This guidance does not override the individual responsibility of health professionals to make appropriate decision according to the circumstances of the individual patient in consultation with the patient and /or carer. Health care professionals must be prepared to justify any deviation from this guidance.

INTRODUCTION

This guideline has been developed to advise all healthcare professionals on aspects of parenteral nutrition delivery to patients. This includes reasons for PN, access routes, monitoring, complications, supply and administration along with contents of PN bags.

THIS GUIDELINE IS FOR USE BY THE FOLLOWING STAFF GROUPS:

Qualified Doctors, Qualified Nurses, Pharmacists, Dietitians

Lead Clinician(s)

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Approved by Nutrition and Hydration committee on:	14th October 2025
Ratified by Medicines Safety Committee on:	12th November 2025
Review Date:	14th October 2028

This is the most current document and is to be used until a revised version is available

Key amendments to this Document:

Date	Amendment	By:
March 2011	Inclusion of Parenteral Nutrition referral form Reference to NCEPOD report: PN A mixed bag (2010) Updated information on the supply of PN outside of Pharmacy opening hours Additional options for managing PN patients with liver dysfunction	KH
April 2013	Reference to Critical Care Nutrition Guidelines WHAT-CRI006 Rewording of glutamine supplementation section Rewording of PN referral form	KH
May 2015	Additional reference to MDT assessment	
August 2017	Document extended for 6 months as per TMC paper approved on 22nd July 2015	TMC
December 2017	Sentence added in at the request of the Coroner	
December 2017	Document extended for 3 months as per TLG recommendation	TLG
March 2018	Document extended for 3 months as approved by TLG	TLG
June 2018	Document extended for 3 months as per TLG recommendation	TLG
November 2017	Additional information included from NICE guidance update 2017 • Inclusion of legal and ethical issues for consideration • Update to management of patients at risk of refeeding syndrome • Updated monitoring table	KH
March 2020	Document extended until the end of October whilst under review	KH
October 2020	Update to the procedure for the supply of PN outside of Pharmacy hours. Removal of statement ‘standard bags are kept on critical care units’ Addition of Smofkabiven 16 to standard regimen list Removal of information relating in WAHT Pharmacy Aseptic compounding service. Removal of glutamine supplementation information Additional information for the administration of PN Additional information for the management of Catheter related blood stream infections	KH
April 2021	Addition and rearrangement of appendices as follows: Addition of Appendix 1 “Guidance for daily cleaning, inspection and redressing the PN line insertion site and exit site” added. Step by step table added. Extension to Appendix 2 “Guidance for administering parenteral nutrition”. Step by step table added. Reference sources updated Updated section on standard regimens.	ML/KH
July 2021	Document reviewed and approved	MSC

September 2021	Change to the treatment of catheter related sepsis to bring in line with new trust guidance 'Antimicrobial treatment of vascular access device infections in adults'	KH
August 2022	Update to standard regimen table in response to change of preferred supplier	KH
October 2025	Review by Nutrition support MDT Role of clinician added Updated information regarding PICC use and role of IR Restricted use of peripheral access for PN administration Addition of position statement for palliative parenteral nutrition for patients with malignancy Additional requirement to infuse PN via a 1.2micron filter as required by PN manufacturers Updated clinical information	KH/TH/NT

CONTENTS

PARENTERAL NUTRITION GUIDELINES

INTRODUCTION

Parenteral Nutrition (PN) is the intravenous administration of nutrients: protein (as nitrogen), carbohydrate (as glucose) and lipid (fat) as well as electrolytes, trace elements, vitamins and water. PN is used in patients who have intestinal failure, that is a failure of gut function to a degree that prevents adequate gastrointestinal absorption of nutrients. The intestinal failure has either persisted for several days or is likely to persist for more than 5 days before significant improvement.

The administration of PN is a well-established technique providing nutrition support to patients who have intestinal failure. As such it is widely used in hospitals by many specialities. Whilst it is a vital method of providing nutrition, and its use potentially lifesaving, it can put patients at risk of life threatening and occasionally fatal complications. It should therefore never be given without appropriate forethought and planning.

For PN to be given safely it requires an accurate assessment of the patients' nutritional requirements, appropriate constitution and compounding of the PN, safe intravenous access (and subsequent line care), careful monitoring of the patients' electrolytes. This requires careful oversight of the trust nutrition team. (NCEPOD, 2010)

PURPOSE

The purpose of this guideline is to provide specific guidance and support on the assessment and management of individuals requiring PN. This is to ensure that healthcare professionals are using PN appropriately and safely.

The guidance applies to all health care professionals who deal with PN.

it is imperative that:

- The use of PN is rationalised.
- Unnecessary PN use is avoided
- Patients requiring PN are carefully selected
- Patients receiving PN are carefully monitored to avoid complications
- Up to date guidance is available on the safe administration of PN.

ASSOCIATED TRUST DOCUMENTS

- Guidelines for the management of refeeding syndrome WAHT-NUT-006
- Guideline for Malnutrition Screening of adult inpatients and its subsequent management – using the Malnutrition Universal Screening Tool – MUST. WAHT-NUR-076
- Guideline for the management of long-term catheter-related bacteraemia with antibiotic lock therapy WAHT-HAE-039

INDICATIONS FOR PARENTERAL NUTRITION (PN)

Parenteral nutrition (PN) should be used in patients with intestinal failure in order to maintain good nutritional health and prevent or treat malnutrition. PN should be considered as early as possible but please refer for specialist input by day 3 of no nutrition.

Intestinal failure is classified into three types.

- Type 1 – self-limiting. For example, post op Ileus, acute inflammation, acute obstruction.
- Type 2 – prolonged. For example, GI complications, EC fistula, abdominal sepsis, surgical complications (e.g. anastomotic leak)
- Type 3 – long term. Short bowel syndrome, high output stoma, chronic obstruction, motility disorders.

indications for PN:

- Short bowel syndrome
- Prolonged paralytic ileus
- Gastrointestinal obstruction and pseudo-obstruction
- Motility disorders such as scleroderma
- Gastrointestinal fistulae, adhesions
- Anastamotic leak
- Mucositis, oesophagitis or intractable vomiting secondary to chemotherapy
- Radiation gastroenteritis
- Severe malabsorbtion
- Severe acute inflammatory bowel disease
- Severe acute pancreatitis where enteral feeding has been unsuccessful.

If PN is indicated due to the need for gut rest (eg, ileus/leak) the patient should remain nil by mouth during the gut rest period. The length of time for gut rest should be decided by the parent team and monitored accordingly.

For critically unwell patients, trophic enteral feeding may be commenced to preserve the gut function.

If the indication for PN is high output stoma, the trust high output stoma guideline must be followed.

Contraindications:

PN is not indicated in patients who have a functioning GI tract (upper and or lower) capable of adequate nutrient absorption. **Lack of access for delivery of enteral nutrition to a functioning gastro-intestinal tract is not in itself an indication for PN. Every attempt must be made to gain access e.g. NG, NJ in a timely manner to prevent further malnutrition. PN should only be given when enteral nutrition has been considered and excluded as inappropriate (NCEPOD, 2010).**

PN may be considered alongside enteral nutrition in certain complex situations such as very low BMI – consideration of this must be discussed at the nutrition MDT meeting prior to commencing treatment.

NOTE – Albumin is not a good indicator of nutritional status or the effect of PN feeding. A low plasma albumin is *never* in itself an indication for parenteral nutrition.

Wherever possible enteral nutrition should be favoured over PN as it:

- Prevents development of intestinal atrophy
- Promotes gut motility
- Reduces translocation of bacteria from the gut
- Avoids infectious complications associated with PN

NUTRITIONAL ASSESSMENT

The requirement for nutritional support should be recognised early. Please refer to the Trust Nutrition Screening Tool for identification and recommended action for patients at risk / with poor nutritional status. For most patients, oral or enteral nutrition support will be adequate but, in some cases, PN is required. PN should only be given when enteral nutrition has been considered and excluded as inappropriate (NCEPOD, 2010).

The requirements for energy, nitrogen and most vitamins and minerals are quantitatively the same for both parenteral and enteral nutrition. These can be calculated on body weight and using the Parenteral and Enteral Nutrition Group (PENG) Guidelines. With PN, however, there are distinct differences in determining fluid and electrolyte balance. Consequently, the monitoring of these parameters is dependent on daily clinical opinion and biochemical monitoring.

REFERRAL FOR PN

All patients being considered for PN must be referred to the Nutrition team (via ICE or Sunrise when available) for advice on assessment and management. When it is anticipated that PN will be required, a referral should be made as early as possible so that PN can be planned for (e.g. line access arranged). It is expected that a patient is referred for PN by day 3 of no nutrition which allows time for arranging line placement.

Referrals must be received before 11am to ensure adequate time to complete patient assessment and supply of PN. Same day review and initiation of PN (Monday to Friday) is not guaranteed. If the ward team is concerned, they should also bleep a member of the nutrition team and discuss the patient.

The referral must include the following information:

- The indication for PN
- Expected duration of PN feeding). This information should include medical/surgical plans for the termination of PN feeding (if possible)
- IV access available for delivery of PN (see below) NB peripheral catheters are not appropriate for the delivery of PN
- Assurance that refeeding bloods have been recently checked and electrolytes supplemented where necessary.

The patient will be reviewed and the final decision regarding PN will rest with the Nutrition Team. The nutrition team will advise on the following:

- If PN is appropriate
- Most appropriate route
- Nutritional assessment and risk of refeeding syndrome
- Nutritional requirements
- Most appropriate rate of feeding solution and rate of infusion
- Supplementation of electrolytes and fluids
- Biochemical monitoring
- Additional medication which may improve gut function and reduce symptoms. If the nutrition team does not feel the referral is appropriate, then they will document the reasons in the patient's electronic notes (Sunrise)

Team members are available on the follow bleeps:

- Pharmacy (contact usual ward pharmacist)
- Dietetics (contact usual ward dietitian)
- Nutrition nurse 682

The nutrition team consists of a Consultant, Nutrition Nurse Specialist, Dietitian and Pharmacist (see separate SOP document). The nutrition team will have oversight of all Patients requiring PN, but the patient will remain under the named ward consultant on the ward.

PN is not an emergency treatment. The decision for PN should not be made in an emergency situation (NICE2017). To enable appropriate assessment and management, PN will not be supplied out of hours (5pm-9am Monday-Friday, weekends and bank holidays. After assessment the nutrition team will liaise with pharmacy to arrange an appropriate prescription of PN for the patient.

ORDERING OF PN

- The PN must be prescribed on the dedicated prescription chart (Service point order code WR1799) or automated prescription generated by Pharmacy.

- The decision on PN supply rests with members of the nutrition team. The regimen supplied will depend on:
    - Access for PN
    - Nutritional requirements
    - A patient should undergo a detailed nutritional assessment by a dietitian as soon as possible.
    - Electrolyte requirements from biochemical results.
    - Fluid requirements e.g. if fluid restricted.
    - Previous nutritional status, see re-feeding syndrome in complications of PN section (p16).

- The Nutrition Team will review the patient regularly and will meet on a regular basis as agreed between them to check requirements for the patient.

CHOICE OF ACCESS FOR PN

PICC (peripherally inserted central line) is the line of choice for patients who don't already have a CVC or are planned for a tunnelled central line.

If CVC (Central venous catheter) is placed, a lumen must be dedicated to PN feeding only. Non ICU patients requiring PN should have a PICC requested by day 7 to allow removal of the CVC by day 10.

If a patient requires PN, please refer to IR (WRH) via ICE or anaesthetics (AH) for PICC line placement. Once confirmed by a member of the nutrition team that PN is indicated, line placement will aim to occur within 48 hours of referral. If there are any issues with placement within this timeframe then IR to communicate the issue in order to contact anaesthetics for a PICC or CVC.

NB : Peripheral cannulas must not be used for PN.

WARD BASE FOR PN ADMINISTRATION

Patients must be on a designated PN safe ward for PN administration – the following areas are designated PN safe areas: ICU (both sites), Aconbury 4 (Gastroenterology), Beech A and B Alexandra Hospital, Ward 18 (Surgical wards), Laurel 2 and 3 (Oncology and haematology) and Vascular wards. Patients must be moved to one of these wards before PN can be started.

ESTIMATION OF REQUIREMENTS

- The patient's energy and nitrogen requirements will be calculated by the dietitian.
- At present, WAHT stock a refeeding regimen and B Braun all in one PN bags (see below). Alternative regimens may be available but require ordering from an external supplier (delayed availability).

To prevent refeeding syndrome, patients will usually receive approximately 50% of their nutritional requirements for the first 24 to 48 hours with the rate of infusion increased as appropriate. For patients at high risk of refeeding syndrome lower initial rates of feed delivery will be advised. Please refer to the 'Guideline for re-feeding syndrome' (WAHT-NUT-006).

Standard formulations

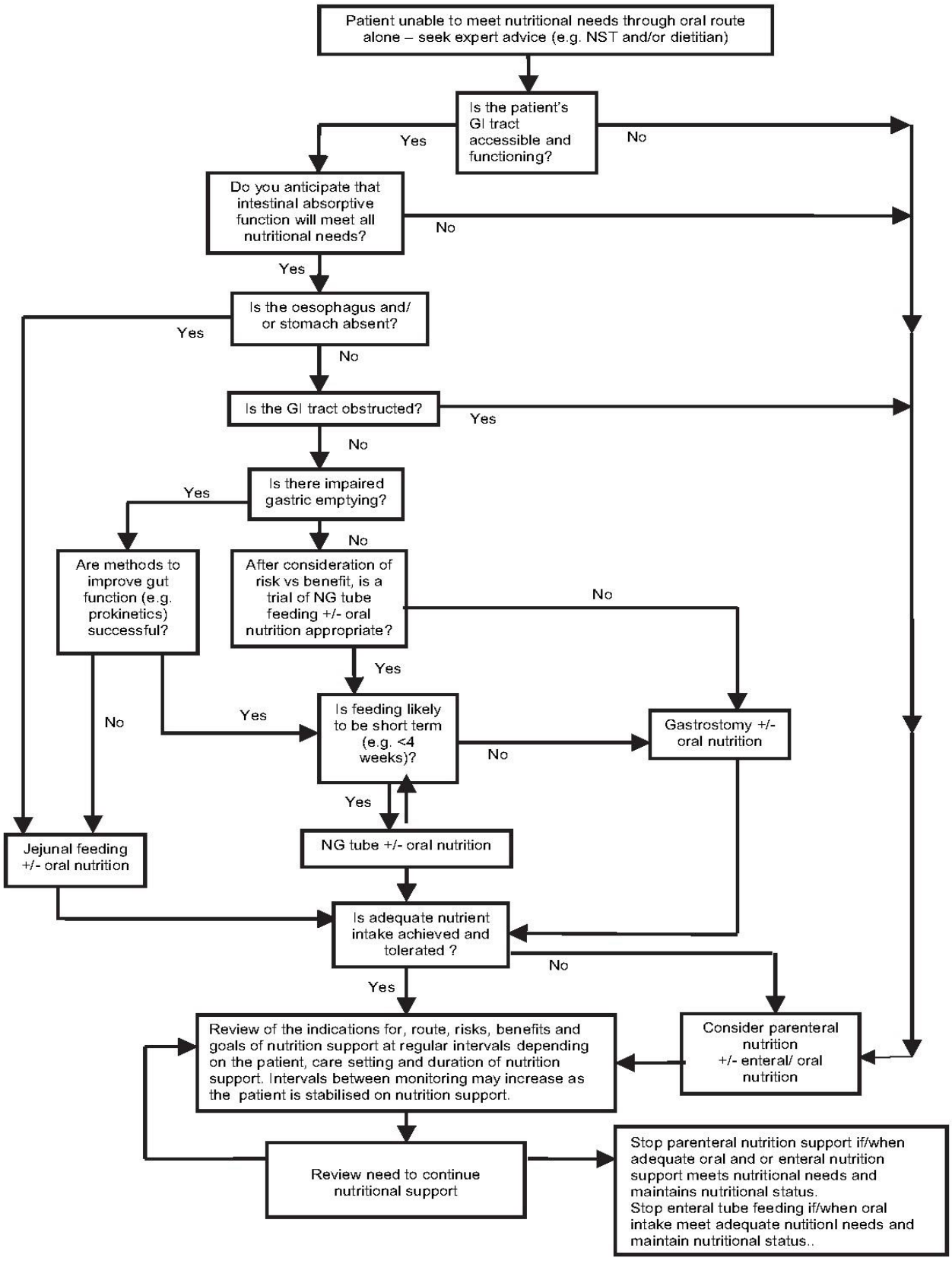
Constituent	Kabi refeeding	Peri Omeflex * 1875	Omeflex special 1250	Omeflex special 1875	Smofkabiven Extra nitrogen
Nitrogen (g)	5.14	8.6	10	15	21.2
Calories (total Kcal)	661	1435	1475	2215	1800
Volume (ml)	1065	1875	1250	1875	2045
Sodium (mmol)	52.9	75	67	100.5	82.6
Potassium (mmol)	40	45	47	70.5	61.9
Calcium (mmol)	3.3	4.5	5.3	7.95	5.2
Magnesium (mmol)	6.8	4.5	5.3	7.95	10.3
Phosphate (mmol)	18.15	11.25	20	30	25.9

*Peri Omeflex 1875 is not routinely stocked as the preferred method of delivery is via central IV access

Provision of Nutrients in PN solutions

- Energy, as carbohydrate (glucose) and fat (lipid emulsions) are used
- Nitrogen – a solution of essential and non-essential amino acids is used
- Micronutrients – these are included in PN solutions procured by Pharmacy
- Electrolytes – NB tailoring of electrolytes is only feasible for long term stable patients as these have to be bought from a licensed compounding units (WAHT Pharmacy is unable to provide this service)
- Fat soluble vitamins A, D2, E and K.
- Water-soluble vitamins B1, B2, B6, B12, nicotinamide, biotin. pantothenic acid, folic acid, ascorbic acid.
- Trace elements

PN decision tool



National Institute for health and Clinical Excellence: Nutrition support in adults Clinical Guideline 2006

ETHICAL AND LEGAL ISSUES

In patients with bowel obstruction. secondary to metastatic cancer, PN may be appropriate It is imperative that the patient has been assessed by both the oncology team and surgical team and treatment options decided as well as an idea of long-term prognosis. For those patients with a short prognosis and no treatment options, it is not appropriate to commence PN. For a select group of patients' short term PN is appropriate, but this needs to be carefully considered and a reasonable end point decided prior to commencing PN. it is usually appropriate to discuss in an MDT setting with both the nutrition team and palliative care. It is important the end goals are established. This requires very careful discussion with the patient and expectations managed prior to commencing PN.

For patients with malignancy where their prognosis spans several months it is sometimes appropriate to refer patients to a tertiary centre for home PN, but this would be a decision made on an individual basis after discussion with the nutrition team and usually with palliative care involvement.

PN is a treatment with complications, therefore this needs to be carefully discussed with a patient to gain consent prior to starting treatment and on withdrawal. Decisions on withholding or withdrawing of nutrition support require a consideration of both ethical and legal principles (both at common law and statute including the Human Rights Act 1998). The General Medical Council (2024) provides guidance on decision making towards the end of life regarding discussions to have with patients and family members about withdrawal of clinically assisted nutrition. The hospital palliative care team as well as the nutrition team can support parent teams if needed in complex cases.

TERMINATION OF PN

Parenteral nutrition should not be terminated until oral or enteral tube feeding is well established or if it has been deemed inappropriate to continue PN if the patient is dying. The patient needs to be taking a minimum of 50% of their nutritional requirements (as assessed by the dietitian) via the enteral route. It is important that all members of the multidisciplinary team are involved in the decision to terminate PN.

HOME PN

Patients who develop intestinal failure type 3 may require long term PN. If it is anticipated that the PN will be required long term and the patient may require this at home a referral to UHCW should be made as early as possible. The nutrition team will advise on the referral process but the referral forms need to be completed by the parent team.

ADMINISTRATION OF PN

Refer to Appendix 2 for full step by step guide on administration

All healthcare staff managing patients with PN must be aware of the importance of monitoring catheters to prevent infection related to the vascular device. Staff setting up PN administration must have completed the trust CVAD training. Hands must be decontaminated before accessing or dressing a vascular device. An Aseptic Non-Touch Technique (ANTT) must be used for vascular access device catheter care and when accessing the system.
A sterile transparent semipermeable membrane dressing must be used to cover the vascular access device insertion site and this must be changed every 7 days or sooner if no longer intact or moisture collects underneath it. Staff must check the PICC/CVC daily.
A sterile 0.9% sodium chloride injection should be used to flush and lock catheter lumens.

- PN must be prescribed before administration.

General Principles

ALWAYS USE A DEDICATED LINE WHICH MUST BE LABELLED FOR PN
ALWAYS OBSERVE STRICT ASEPTIC TECHNIQUE
ALWAYS FOLLOW TRUST PROTOCOLS FOR INSERTION AND CARE OF VASCULAR DEVICES

- When using single lumen parenteral nutrition catheters, use only for the PN i.e. no other fluids, drugs or blood sampling through the same line.
- For multi lumen catheters, use one designated port for PN and do not use for other fluids, drugs or blood sampling.
- Use a new or previously unused line for PN. If there are no new/unused lines available, insert a new line.
- Use single lumen catheters wherever possible.
- Do not use of three way taps on the line
- Administer the PN via a 1.2micron filter e.g. B Braun Intrapur Lipid FTC149

- Before attaching the PN to the patient, check the following:

    - Prescription
    - Patient name
    - The unit number and date of birth- if stated on the bag
    - The date of administration- if stated on the bag
    - The expiry date on the bag
    - Route of administration
    - Site and line for administration

- Gently shake the bag (the bag should look smooth i.e. no separation of the bag- if in any doubt, contact the pharmacist).
- Attach the bag to the dedicated feeding line using **strict aseptic non-touch technique.**
- Administer the PN via a 1.2micron filter e.g. B Braun Intrapur Lipid FTC149
- Always use a volumetric pump, setting the rate as detailed on the PN bag.

- Do not speed up the rate of the PN if the bag is running late, but do inform your ward clinical pharmacist on the next working day.
- On the intravenous infusion chart, record the time and date the PN started.
- Complete infusion rate on the fluid balance chart.
- The PN bag and giving set must be changed every 24 hours, unless otherwise prescribed.
- Do not detach the bag for washing/toileting/mobilising etc. Bags should only ever be detached if there is a problem with the line/feed/patient is showing signs of sepsis. If the bag is detached from the patient for any reason e.g. re-siting of a line, never re-attach the same bag. Prescribe intravenous fluids to maintain hydration until the next bag of PN is available. If a proportion of the bag is prescribed, discard the remaining feed after 24 hours.

MONITORING OF PATIENTS ON PN

- Regular observations must be recorded whilst on PN, including temperature checks 6 hourly as a minimum.
- See below for table of recommended monitoring of biochemical and other parameters.
- Where possible, take blood samples first thing in the morning to allow results to be available in time for supply of PN. Please mark these samples as urgent for new PN patients or those with any biochemical derangement. Blood samples should not be taken from the PN infusion port.
- Monitor blood sugars at least once every 8 hours for 24 hours then every 12 hours (2x day) for two days until stable.
  - If the patient develops hyperglycaemia (blood sugar persistently above 15, prescribe sliding scale of insulin.
  - If blood sugar reading is above 20mmol/l, stop PN until under control even if on insulin infusion.

Monitor and maintain good oral care whilst on PN
Weigh the patient before commencing PN and at least weekly whilst the patient is receiving PN support
All blood parameters should be taken at baseline.

It is not possible to change the content of PN bags. Monitor refeeding bloods when initiating PN and supplement electrolytes as needed via separate IV infusions.

Weekend Monitoring

The nutrition team are not available out of hours. Continue to monitor bloods as per above. If there are concerns over the weekend the parent team must manage this appropriately.

Monitoring Parameter	Frequency	Rationale	Interpretation
Sodium, potassium, urea, creatinine	daily until stable, then 3 times a week	Assessment of renal function, fluid status, and Na and K status	Interpret with knowledge of fluid balance and medication. Urine sodium may be helpful in complex cases with gastrointestinal fluid loss
Glucose	Baseline, every 8 hours for 24 hours then every 12 hours	Glucose intolerance is common	Good glycaemic control is necessary

Magnesium, phosphate	Baseline, daily if risk of refeeding syndrome, 3 times a week	Depletion is common and under recognised	Low concentrations indicate poor status
Liver function tests including International Normalised Ratio (INR)	2-3 x weekly	Abnormalities common during parenteral nutrition	Complex. May be due to sepsis, other disease or nutritional intake
Calcium, albumin	2-3 x week	Hypocalcaemia or hypercalcaemia may occur	Correct measured serum calcium concentration for albumin. Hypocalcaemia may be secondary to Mg deficiency. Low albumin reflects disease not protein status
C-reactive protein	3 x week	Assists interpretation of protein, trace element and vitamin results	To assess the presence of an acute phase reaction (APR). The trend of results is important
Zinc, copper	Every 2–4 weeks, depending on results. **NB** of limited benefit in patients with raised CRP	Deficiency common, especially when increased losses	People most at risk when anabolic. APR causes Zn ↓ and Cu ↑
Selenium	Baseline if risk of depletion, further testing dependent on baseline. **NB** of limited benefit in patients with raised CRP	Se deficiency likely in severe illness and sepsis, or longterm nutrition support	APR causes Se ↓. Long-term status better assessed by glutathione peroxidase
Full blood count and MCV	2 x week	Anaemia due to iron or folate deficiency is common	Effects of sepsis may be important
Iron, ferritin	Every 3–6 months	Iron deficiency common in longterm parenteral nutrition	Iron status difficult if APR (Fe ↓, ferritin ↑)
Folate, B12	Every 2–4 weeks	Iron deficiency is common	Serum folate/B12 sufficient, with full blood count
Manganese	Every 3–6 months	Excess provision	Red blood cell or whole

COMPLICATIONS OF PN & MANAGEMENT

Nutrition Related Complications

RE-FEEDING SYNDROME

Hyperglycaemia and electrolyte imbalances can occur in patients receiving PN following a period of malnutrition (>5 days without feed).

Action: Refer to 'Guideline for re-feeding syndrome' (WAHT-NUT-006)
Start feed at reduced rate e.g. give 50% of requirements for one or two days, then increase thereafter. (In extreme cases, the starting rate may need to be reduced to less than 50% of

requirements over 24 hours and the feed rate may need to be increased over a period of up to 7 days)
Supplement electrolytes as needed.
Ensure adequate vitamin B intake before starting feed (e.g. with IV Pabrinex or oral thiamine 200mg od and Vit B co strong 1 tds)
Prescribe sliding scale insulin for patients with diabetes or impaired glucose tolerance.

The reverse may also occur with hypoglycaemia being caused by stopping PN too quickly.
Action: Consider halving the rate of PN administration on the last day.

OVER FEEDING
This may occur when PN exceeds the patients' nutritional requirement. Signs of overfeeding include raised plasma glucose, LFT's and urea.
Action: Reduce the protein and glucose content of the PN regimen in discussion with a dietitian (dietitian to consider glucose oxidation rate).

PLASMA TURBIDITY/LIPAEMIA
This indicates that a patient's capacity to eliminate fat may be impaired.
Action: Reduce or delay the infusion of lipid and consider changing lipid formulation.

FLUID IMBALANCE
This is a common complication and can result in dehydration or fluid overload.
Action: Measure and record all fluid losses and/or weigh the patient daily. Allowing for insensible losses, balance fluid input with output.

ELECTROLYTE IMBALANCE
Action: Give separate electrolyte supplementation.

LIVER DYSFUNCTION
Rises in liver enzymes may occur, they are usually benign, reversible and self limiting.
Action: If liver enzymes continue to rise, one or more of the following may be adopted:
Cyclical feeding i.e. giving feed over 18 hours to allow a "feed free time"
Use of fat free PN regimen
Changing the lipid used within the regimen.

Catheter Related Complications

THROMBOPHLEBITIS
A common complication with peripherally administered PN. Signs and symptoms include pain and erythema at the site of infusion. Prevention of thrombophlebitis is addressed in section III Delivery Technique.
Action: Remove line and re-site a new catheter.
The application of a GTN 5mg patch distal to the catheter insertion site may be considered, but beneficial evidence for this is not conclusive.

CATHETER OCCLUSION
May be due to line kinking, luminal deposits of lipid sludge or thrombosis.
Action: Perform chest x-ray to check line position. Providing the position is satisfactory, flush the line with 10ml of 20% ethanol solution. If lipid sludge is suspected, allow 3ml 70% ethanol injection to dwell in the catheter for one hour.

FIBRIN OCCLUSION

Action: Urokinase may be used to dissolve the occlusion.

CENTRAL VEIN THROMBOSIS

Central vein thrombosis may occur after several weeks of treatment.

Action: Confirm diagnosis by venography; refer to Trust policy on Central Venous Catheter line care management. Consider early use of thrombolytic therapy.

PN Related Infections

Sepsis is a severe complication with significant morbidity and mortality. Any patient receiving PN should be monitored for signs of sepsis and have temperature checked 6 hourly as a minimum. If the patient is pyrexic with a temperature of 38 degrees or above, line sepsis must be suspected and PN must be stopped Blood cultures should be taken from both the line and peripherally. PN should not restart until the blood cultures are available (see table for guidance). When CRBSI is suspected, antibiotic treatment should be commenced and reviewed in line with culture results and microbiology recommendations.

CATHETER RELATED BLOOD STREAM INFECTION (CRBSI)

Defined as clinical sepsis with positive blood cultures in the absence of infection elsewhere (e.g. chest, urinary tract etc.). CRBSI is difficult to diagnose, and all possible causes of sepsis should be considered. CRBSI is confirmed when blood cultures yield the same organism as culture from the tip of the removed central line.

Central line salvage may be attempted for patients with CRBSI providing the patient is stable and not critically ill – discuss with a microbiologist.

BAPEN (2019) recommend immediate line removal if the patient has septic shock. Other reasons not to salvage the line include the presence of fungus or septic thrombus.

Long-term catheters should be removed from patients with Catheter Related Blood Stream Infection associated with any of the following conditions: severe sepsis; suppurative thrombophlebitis; endocarditis; bloodstream infection that continues despite >72 h of antimicrobial therapy to which the infecting microbes are susceptible; or infections due to S. aureus, Pseudomonas aeruginosa, fungi or mycobacteria. Discuss with a microbiologist and the patient's parent team for PN (this may be a tertiary centre)

A cardiac ECHO (trans-thoracic or trans-oesophageal) should be performed in any patient with a prosthetic heart valve, pacemaker/ICD and persistent bacteraemia and/or pyrexia 72 hour after initiation of appropriate antibiotic therapy and also performed if there is S aureus infection. If back pain is present, a spinal MRI should be considered. If there is a fungal infection, a thorough ophthalmological examination must be performed in case of spread to the eye which, if untreated, can cause blindness (BAPEN 2019).

Empirical choice of antibiotics

Cover for gram positive and gram negative bacteria should be considered as first line therefore a combination of antibiotics should be commenced. The choice of antibiotics will be patient dependant. IV antibiotics may be administered as a 'line lock' (administered into the catheter fir 12-24 hours then flushed into circulation) (see EOLAS for dosage advice and monitoring recommendations). Review all antimicrobial prescriptions after 48-72 hours with the patient's parent team and microbiology.

EXIT SITE INFECTION

Defined as erythema around or pus exuding from the central line exit site. Blood cultures are negative and there are no signs of systemic sepsis.

Action: Confirm diagnosis by sending line swab and peripheral/through line blood for culture.
Treat empirically with flucloxacillin 1g (or vancomycin if penicillin allergic or MRSA infection suspected e.g. patient known to be colonised with MRSA). Give flucloxacillin IV initially then switch to oral 500mg to 1g QDS to complete a seven-day course. Amend therapy if required once culture results are available.
Clean daily with Chlorhexidine in 70% alcohol as in trust CVC policy (use povidone iodine solution for patients sensitive to chlorhexidine).
Remove the catheter if there is evidence of progression of infection. Removal may also be required to control infection with the following organisms:

- Staphylococcus aureus (including MRSA) ○ Co-agulase negative staphylococci ○ Pseudomonas sp. and other Gram negatives ○ Mycobacterium sp.
- Fungi (including Candida sp.)
- Glycopeptide-resistant enterococcus (GRE)

(NB the line may be salvaged by surgical incision and drainage)

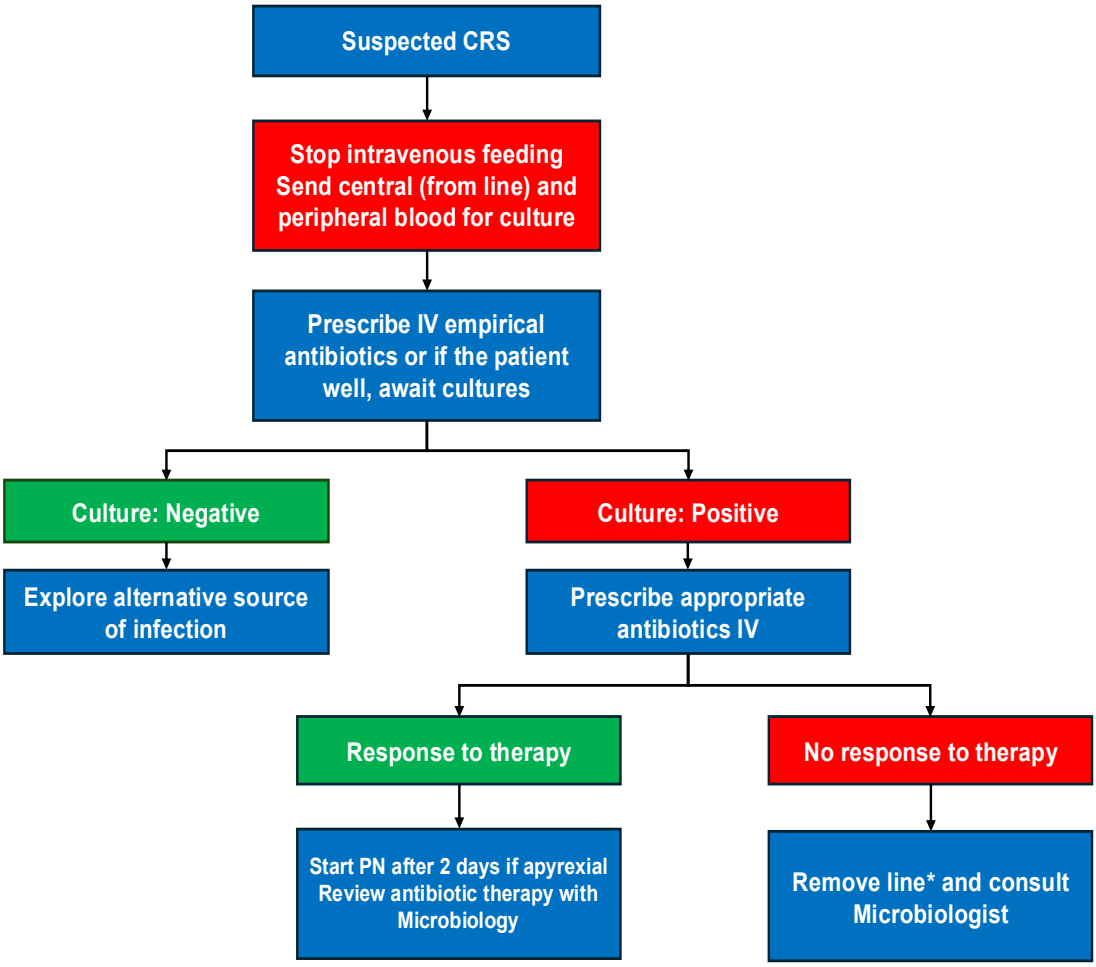
Intraluminal therapy (antibiotics “locks”) may be indicated for localised catheter related infection, which does not involve the above-mentioned microorganisms. They should not be used if there is evidence of progression to systemic sepsis, septic thrombophlebitis or septic emboli. In rare cases the salvaging of precious lines in patients with poor venous access may be indicated. The use of antibiotic “locks” must be discussed with the Antimicrobial Stewardship pharmacist or Consultant Microbiologist prior to use.

TUNNEL INFECTION

Defined as erythema and tenderness overlying a subcutaneous tunnelled catheter. Blood cultures are usually negative and there are no signs of systemic sepsis.

Action: Confirm diagnosis by sending central (through line) and peripheral blood for culture.
Treat empirically with flucloxacillin 1g (or vancomycin if penicillin allergic or MRSA infection suspected e.g. patient known to be colonised with MRSA) Administer intravenously for up to two days and then orally, if possible, with flucloxacillin 500mg to 1g qds (or doxycycline 200mg stat then 100mg OD PO) for 7-14 days or until resolution of the infection.
Modify antibiotic choice according to isolates.
If there is no clinical improvement within 7 days of treatment, treat as for catheter related sepsis.

Action:



*Consider each case on an individual basis. In patients with poor venous access, salvaging precious lines may be indicated through the use of 'line lock' and/or systemic antibiotic therapy, consult microbiologist. Refer to WAHT-HAE-039

PN CHECKLIST FOR NURSING STAFF

(For further detail refer to main PN policy)

Ensure ward is suitable location for PN administration (see list of PN wards)

Use dedicated feeding line only for PN (must be PICC/CVC).

Don't add anything to PN bags, put anything through same line or take blood samples through the dedicated line.

If the patient's condition has changed significantly since PN was ordered, contact Dr to check if still appropriate e.g. fluid balance or U&Es.

ADMINISTRATION

Check name, unit no, DOB, date of admin and expiry on bag.
Gently shake the bag before giving.
Use a volumetric pump to administer PN.
Write the time and date PN started on prescription chart.
DO NOT detach for toileting/hygiene needs
Keep the light protective cover over the PN bag

MONITORING

Monitor blood sugars minimum 8 hourly.
Keep accurate fluid balance.
Measure core temperature daily and respiration and pulse 6 hourly.

REMEMBER

Use strict aseptic technique. See Appendix 2 for step-by-step guide.
Monitor and record daily observations of exit site/tunnel for infection/inflammation as per trust policy.
Never speed up the rate of PN from that prescribed. (NB rate of infusion may be slowed with advice from pharmacy).
Change bag and giving set every 24 hours unless otherwise agreed.
If bag is detached, never re-attach the same bag.
Discard the remaining solution.
If pyrexic hold PN and start CRBSI treatment protocol

PN CHECKLIST FOR MEDICAL STAFF

Think about PN early and refer.
Indication must be stated on Sunrise

Wherever possible use the gastrointestinal tract for feeding.
Use dedicated feeding line only for PN.
Ensure that insertion details of line is recorded in the patient's medical notes
Don't add anything to PN bags or put anything through same line.
Don't take blood through the same line.

If patients condition has significantly changed since PN was ordered consider if PN is still appropriate e.g. fluid balance, U&E's, oral intake.

Assess the risk of refeeding syndrome and manage appropriately (refer to Trust guideline WAHT-NUT-006)

ORDERING

Refer to the nutrition team – ensure ICE referral (or Sunrise when available) is completed with PN need documented on referral

Ensure referral made before 11am
Request PICC (first line) or CVC
Remember out of hours PN will not be provided.

MONITORING

See table for monitoring needed before starting PN.
Mark all biochemistry requests as URGENT- PATIENT ON PN.
Request blood samples for the morning.
See attached table for suggested monitoring.
Hold PN if patient pyrexic and commence suspected CRBSI protocol

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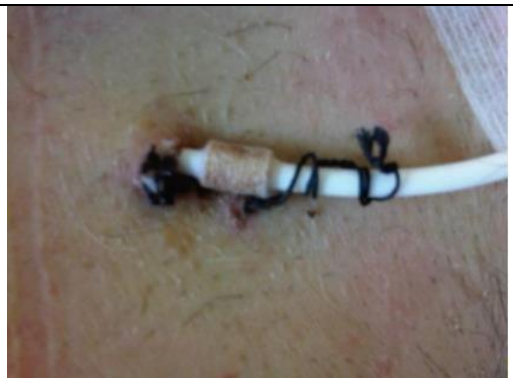
APPENDIX 1: GUIDANCE FOR DAILY CLEANING, INSPECTION AND REDRESSING THE PARENTERAL NUTRITION (PN) LINE INSERTION SITE AND EXIT SITE

This procedure is for observation and replacement of the dressing and applies to nursing staff caring for PN patients.

The insertion and exit site of the PN line should be inspected daily.

Type of dressing	
1.	Use a semi-permeable transparent dressing which should be changed every 7 days or when moist. Gauze based dressing should only be used if: - there is moisture and/or exudate, - a moist semi-permeable transparent dressing has been removed, - if clinical staff feel it is indicated after assessment. Gauze type dressing should be changed daily.
Cleaning, inspection and redressing	
2.	Gather the following equipment: Dressing trolley Equipment cleaning wipes to clean the trolley Disposable apron Clean gloves Basic sterile dressing pack including sterile towel Alcohol hand rub Sterile gloves (if not already in dressing pack) 2% Chlorhexidine gluconate in 70% isopropyl applicator Semi-permeable transparent or gauze dressing if indicated (large enough to allow line to be looped underneath) Microbiology wound swab if required. (If site dry, include sterile water to moisten swab)
3.	Explain the procedure to the patient, ensuring privacy and comfort.
4.	Clean the trolley with cleaning wipes.
5.	Assemble equipment tidily, as above and place on bottom shelf of trolley / bedside 'worksurface'.
6.	Clean hands. Put on apron.
7.	Open dressing pack onto work surface, touching only outside and corners. This is now your aseptic field. Open all other sterile items onto aseptic field using aseptic non-touch technique.
8.	Remove old dressing without touching the line or insertion / exit site. Inspect site for sign of redness, tenderness, swelling or exudate. If it is a PICC line - note the line marking, hold the line and peel the dressing upwards. Observe the external lumen of the catheter for kinks or damage. Ask patient, (if possible), if there is any pain at the insertion / exit site or if they are experiencing any loss of function in their arm. If exudate, swelling, and redness noted; - Stop PN immediately. - Refer to the medical team. - Swab the site.
9.	If patient has a Hickman line check that the Dacron cuff on a Hickman line is not visible. Inform medical staff immediately if the cuff can be seen.

	 DO NOT USE THIS HICKMAN LINE
10.	Clean hands with alcohol and put on sterile gloves.
11.	Swab catheter exit site (if necessary) with culture swab before cleaning.
12.	Decontaminate the exit site with a single use application of 2% Chlorhexidine gluconate in 70% isopropyl applicators working away from the entry point. Allow to dry.
13.	Apply sterile dressing of choice with loop of PN line underneath to negate the need for further taping using an aseptic non-touch technique.

APPENDIX 2: ADMINISTERING PARENTERAL NUTRITION

ADMINISTERING PARENTERAL NUTRITION IS A FULL ASCEPTIC PROCEDURE

PN Administration should be commenced using a dedicated labelled port (used only for PN)
'FOR PN ONLY'

This procedure is used to change the PN feed bag. This applies to the nursing staff caring for a patient with PN.

Administration of PN bags should ideally be undertaken by staff who have completed PN training.

1.	**Gather equipment** Dressing Trolley Equipment cleaning wipes to clean the trolley Disposable apron Alcohol hand rub Basic sterile dressing pack including sterile towel Securing Tape (i.e., Micropore tape) Sterile gloves x 1 pair (if not in pack) 2% Chlorhexidine gluconate in 70% isopropyl wipe x 4 1x10 ml sodium chloride 0.9% ampoule/pre-filled syringe 2x10 ml syringe Alcohol hand rub Transparent / Gauze dressing if required (large enough to allow line to be looped underneath) PN prescription chart PN bag (must be checked against prescription which should be with the patient's bedside folder and the order form sent up with the PN bag, PN solutions should be removed from refrigeration two hours prior to infusion in order to reach approximate room temperature.) Giving set In line filter (1.2micron) Sharps bin Cleaned charged volumetric infusion pump (on separate drip stand not attached to drip stand at bed head as this can pull out the central line)
2.	Take patient's temperature prior to hanging PN to aid identification of feeding line sepsis
3.	Clean hands. Put on apron.
4.	Clean the trolley with equipment cleaning wipes.
5.	Assemble equipment tidily, as above and place on bottom shelf of trolley or bedside "work surface"
6.	Explain the procedure to the patient, ensuring privacy and comfort.
7.	Two trained nurses who are IV trained and competent; must check the PN bag details against the order form, PN prescription chart and patient wrist band at the patient's bedside.
8.	If previous bag still hanging, switch off pump and close roller clamp on giving set and remove bag from pump.
9.	Hang new PN bag (with light protection cover) on drip stand. Roll back light protective cover and expose bag connections. Snap off port cover.
10.	Remove gauze from patient's feeding line and **close clamp on double thickness part of line**, remove gauze flag and discard.

11.	Change apron and clean hands. Open dressing pack onto top of dressing trolley, touching only the corners. If a sterile waste bag is included in the pack, this may be pulled over one hand and used as a sterile glove to set out the contents of the tray. When the aseptic field is set the waste bag should be attached half way down the trolley for the clinical waste. Open all sterile equipment onto aseptic field using aseptic no-touch technique (ANTT). Using one 2% Chlorhexidine gluconate in 70% isopropyl wipe, clean the port of the PN bag for 30 seconds and leave to air dry for 30 seconds.
12.	Check 0.9% Sodium Chloride with another qualified nurse and then clean the whole ampoule with 2% Chlorhexidine Gluconate in 70% isopropyl wipe and leave in the sterile field without touching the sterile field.
13.	Open sterile gloves on a dry clean surface nearby – this should not be the aseptic field.
14.	Clean hands by applying alcohol hand rub and put on one pair of sterile gloves without touching outside of them.
15.	Pick up the new giving set on the aseptic field and close roller clamp space.
16.	Wearing sterile gloves pick up giving set chamber leaving most of the line on the aseptic field and insert giving set to the bag using ANTT principles, attaching the in-line filter
17.	Prime the line. (N.B. Ensure no air bubble are present in the line).
18.	Remove the sterile field from the pack and place near to patient's line.
19.	Scrub the hub and needle-less port of the PN line for 30 seconds with 2% Chlorhexidine gluconate in 70% isopropyl wipe using different parts of the wipe, using a second wipe at the same time to clean the Hickman line and clip and PN line using different parts of the wipe (if attached). Allow to air dry for 30 seconds.
20.	Without placing the line down, manoeuvre the sterile field under the line.
21.	Remove first set of contaminated gloves and discard. Clean hands by applying alcohol hand rub and put on second set of sterile gloves once hands dry.
22.	Draw up 10 ml 0.9% Sodium Chloride into 10 ml syringe.
23.	Remove air bubbles from syringes.
24.	Using a separate 10 ml syringe aspirate 5-10mls from the line to ensure there is good backflow of blood.
25.	Attach the 10 ml syringe to needle-less port and flush the line with 0.9% Sodium Chloride using a brisk push-pause technique i.e. flush briskly, pausing briefly between each 1ml of fluid. Clamp the catheter while injecting the final 1ml of solution to maintain positive pressure and prevent backflow.
	While holding clean giving set securely in your hand, disconnect existing line from patient and discard.
27.	Connect to the dedicated feeding line to needle-less port (firmly but not tightly).
28.	The needle-less access device should be changed once a week.
29.	Wrap single layer of gauze around hub connection and secure with hypoallergenic tape with ends folded over.
30.	Observe and change dressing as indicated in Appendix 1
31.	Insert the giving set into volumetric pump and close door. Set volume and rate of infusion as prescribed. Open roller clamp and the clamp on the feeding line.
32.	Discard clinical waste into yellow bag. Discard syringe and ampoule into sharps bin. Drain PN bag down sluice before discarding into yellow bag. Discard giving set intact into sharps bin.
33.	Clean the trolley with equipment cleaning wipe and return to storage.
34.	Clean hands.
35.	Document bag change on prescription form and record procedure in nursing notes.

Do:

- CHECK LABEL – PATIENT NAME, DATE, INFUSION RATE(S) □ CHECK PN PRESCRIBED ON PN PRESCRIPTION CHART.
- EACH BAG HAS ONE GIVING SET, ONE CONNECTION and ONE DISCONNECTION.
- USE ONLY A DEDICATED LUMEN FOR PN – LABEL THE LUMEN FOR PN
- DISCARD ANY REMAINING FEED AFTER ALLOTED TIME (MAX 24 HOURS)
- Check Temperature, Pulse, Respiration and Blood Pressure twice a day. Every 6 hours
- Check blood glucose every 8 hours for 24 hours then 12 hourly. Inform the doctor if 2 readings are greater than 12 mmol/l and consider commencing insulin therapy.
- Weigh twice weekly.

Do Not:

DO NOT DISCONNECT THE PARENTERAL NUTRITION BAG

DO NOT RECONNECT A BAG IF IT HAS BEEN DISCONNECTED

APPENDIX 3:

MINIMUM MONITORING OF PATIENTS BEFORE STARTING AND DURING TPN ADMINISTRATION

BASE LINE- BEFORE STARTING TPN	MONITOR DAILY THROUGHOUT	MONITOR DAILY UNTIL STABLE	MONITOR TWICE WEEKLY THROUGHOUT	MONITOR WEEKLY THROUGHOUT	ONCE STABLE MONITOR 2-3 TIMES A WEEK
Sodium Potassium Urea Creatinine Phosphate Magnesium Calcium Glucose Liver function Serum albumin Total protein Full blood count Zinc Triglycerides Folate Vitamin B12	Fluid balance Enteral nutrition intake Temperature Pulse Respiration Glucose (8 hourly for 24 hours initially then BD for two days) STRICT Fluid balance	Sodium Potassium Urea Creatinine Phosphate Magnesium	Liver function Serum albumin Calcium Full blood count	Triglycerides Zinc Weight Other trace elements if on long term feeding-longer than 4 weeks (Selenium, Molybdenum, Chromium, Copper)	Sodium Potassium Urea Creatinine Phosphate Magnesium

CONTRIBUTION LIST

Key individuals involved in developing the document

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Rachel Bullock	Consultant Palliative Care

Circulated to the following CD's/Heads of dept for comments from their directorates / departments

Name	Directorate / Department
Mr Stephen Goodyear	Divisional Clinical Director Surgery
Dr Dave Raven	Divisional Medical Director Urgent care and Speciality Medicine

Circulated to the chair of the following committee's / groups for comments

Name	Committee / group
Tania Carruthers	Director of Pharmacy
Alison Smith	MSO
Alison Robinson	Deputy CNO and chair of the Nutrition and Hydration Committee

Monitoring Tool

This should include realistic goals, timeframes and measurable outcomes.

How will monitoring be carried out?

Who will monitor compliance with the guideline?

Page/ Section of Key Document	Key control:	Checks to be carried out to confirm compliance with the policy:	How often the check will be carried out:	Responsible for carrying out the check:	Results of check reported to: *(Responsible for also ensuring actions are developed to address any areas of noncompliance)*	Frequency of reporting:
	WHAT?	**HOW?**	**WHEN?**	**WHO?**	**WHERE?**	**WHEN?**
8, 14	Management of refeeding syndrome	Audit of compliance with trust guideline WAHT-NUT006	Once a year	Pharmacy/Dietetics	Nutrition and Hydration Steering committee	Once a year
15-17	Complications relating to intravenous catheters	Survey/audit	Once a year	Nutrition support team	Nutrition and Hydration Steering committee	Once a year

Herefordshire & Worcestershire STP - Equality Impact Assessment (EIA) Form
Please read EIA guidelines when completing this form

Section 1 - Name of Organisation (please tick)

Herefordshire & Worcestershire STP		Herefordshire Council		Herefordshire CCG	
Worcestershire Acute Hospitals NHS Trust	✓	Worcestershire County Council		Worcestershire CCGs	
Worcestershire Health and Care NHS Trust		Wye Valley NHS Trust		Other (please state)	

Name of Lead for Activity	

Details of individuals completing this assessment	**Name**	**Job title**	**e-mail contact**
	Keith Hinton	**Pharmacist**	**keith.hinton1@nhs.net**
Date assessment completed	**14.10.2020**		

Section 2

Activity being assessed (e.g. policy/procedure, document, service redesign, policy, strategy etc.)	**Title:** Parenteral Nutrition guidelines			
What is the aim, purpose and/or intended outcomes of this Activity?	This guideline is designed for Healthcare Professionals to select and manage adult patients receiving Parenteral Nutrition (PN) appropriately.			
Who will be affected by the development & implementation of this activity?	✓ ✓ ❑ ❑	Service User Patient Carers Visitors	✓ ❑ ❑ ❑	Staff Communities Other _____

Is this:	✓ Review of an existing activity ❑ New activity ❑ Planning to withdraw or reduce a service, activity or presence?
What information and evidence	
have you reviewed to help inform this assessment? (Please name sources, eg demographic information for patients / services / staff groups affected, complaints etc.	See references
Summary of engagement or consultation undertaken (e.g. who and how have you engaged with, or why do you believe this is not required)	Circulated to key stakeholders including the relevant governance committees
Summary of relevant findings	

Section 3

Please consider the potential impact of this activity (during development & implementation) on each of the equality groups outlined below. **Please tick one or more impact box below for each Equality Group and explain your rationale**. Please note it is possible for the potential impact to be both positive and negative within the same equality group and this should be recorded. Remember to consider the impact on e.g. staff, public, patients, carers etc. in these equality groups.

Equality Group	Potential positive impact	Potential neutral impact	Potential negative impact	Please explain your reasons for any potential positive, neutral or negative impact identified
Age		✓		
Disability		✓		
Gender Reassignment		✓		
Marriage & Civil Partnerships		✓		
Pregnancy & Maternity		✓		
Race including Traveling Communities		✓		
Religion & Belief		✓		
Sex		✓		

Sexual Orientation		✓		
Other Vulnerable and Disadvantaged Groups (e.g. carers; care leavers; homeless; Social/Economic deprivation, travelling communities etc.)		✓		
Equality Group	**Potential positive impact**	**Potential neutral impact**	**Potential negative impact**	**Please explain your reasons for any potential positive, neutral or negative impact identified**
Health Inequalities (any preventable, unfair & unjust differences in health status between groups, populations or individuals that arise from the unequal distribution of social, environmental & economic conditions within societies)		✓		

Section 4

What actions will you take to mitigate any potential negative impacts?	**Risk identified**	**Actions required to reduce / eliminate negative impact**	**Who will lead on the action?**	**Timeframe**
		.		
How will you monitor these actions?				
When will you review this EIA? (e.g in a service redesign, this EIA should be revisited regularly throughout the design & implementation)				

Section 5 - Please read and agree to the following Equality Statement

1. Equality Statement

1.1. All public bodies have a statutory duty under the Equality Act 2010 to set out arrangements to assess and consult on how their policies and functions impact on the 9

protected characteristics: Age; Disability; Gender Reassignment; Marriage & Civil Partnership; Pregnancy & Maternity; Race; Religion & Belief; Sex; Sexual Orientation

1.2. Our Organisations will challenge discrimination, promote equality, respect human rights, and aims to design and implement services, policies and measures that meet the diverse needs of our service, and population, ensuring that none are placed at a disadvantage over others.

1.3. All staff are expected to deliver services and provide services and care in a manner which respects the individuality of service users, patients, carer's etc, and as such treat them and members of the workforce respectfully, paying due regard to the 9 protected characteristics.

Signature of person completing EIA	Keith Hinton
Date signed	14.10.2020
Comments:	
Signature of person the Leader Person for this activity	
Date signed	
Comments:	

Supporting Document 2 – Financial Impact Assessment

To be completed by the key document author and attached to key document when submitted to the appropriate committee for consideration and approval.

	Title of document:	Yes/No
1.	Does the implementation of this document require any additional Capital resources	No
2.	Does the implementation of this document require additional revenue	No
3.	Does the implementation of this document require additional manpower	No
4.	Does the implementation of this document release any manpower costs through a change in practice	No
5.	Are there additional staff training costs associated with implementing this document which cannot be delivered through current training programmes or allocated training times for staff	No
	Other comments:	

If the response to any of the above is yes, please complete a business case and which is signed by your Finance Manager and Directorate Manager for consideration by the Accountable Director before progressing to the relevant committee for approval