

## ADULT PARENTERAL NUTRITION

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### Consultation process:

- Reviewed and updated by Nutrition team.
- Circulated to Nutrition Steering Group, Gastroenterology, Colorectal Surgery, ITU, Microbiology, Dietitians and Pharmacy.

### If review of existing guideline what has been changed:

- Policy rewrite to reflect changes in supplier, practice and team.

### What National Guidance has been incorporated:

- NICE guideline CG32 – Nutrition support for adults.
- ESPEN Guidelines on Parenteral Nutrition and other published best practice evidence (see references).

### Scope (who does the guidelines apply to or not apply to):

- Applies to all registered and non-registered healthcare staff, including Nutrition Team, Critical care/surgical wards, Ward staff involved in the management of TPN and Aseptic nurses who care for an adult patient being considered for, or receiving Parenteral Nutrition (PN).
- Registered nursing staff administering PN must have completed mandatory training and deemed competent to care for such patients.

## DOCUMENT CONTROL AND HISTORY

Version No	Date Approved	Date of implementation	Next Review Date	Reason for change (e.g. full rewrite, amendment to reflect new legislation, updated flowchart, etc.)
1	January 2014	January 2014	January 2017	New policy
2	December 2021	February 2022	February 2025	Guideline rewrite to reflect changes in supplier, practice and team. Reformat to new template.
2.1	November 2023	February 2022	February 2025	New Refeeding guideline reference and link added.

## CLINICAL GUIDELINE

### Management of Parenteral Nutrition (PN) and Total Parenteral Nutrition (TPN) in Adult Patients

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## 1. INTRODUCTION

### 1.1 Definitions & Indications

Parenteral Nutrition (PN) or Total Parenteral Nutrition (TPN) is the intravenous administration of an artificial nutrition therapy, containing macronutrients (*amino acids, glucose, fat*), trace elements and vitamins together with fluid and electrolytes.

PN should be considered if it is not possible to provide nutritional support via the oral or enteral route. An assessment of the degree of intestinal failure (IF) should be made. Where there is a functioning gastrointestinal tract, enteral feeding is preferred (NCEPOD, 2010).

### 1.2 Indications for Parenteral Nutrition

Healthcare professionals should consider PN in people who are malnourished or who are at high risk of malnutrition and meet either of the following criteria (*Nutrition support for adults: oral nutrition support, enteral tube feeding and parenteral nutrition, NICE 2017*);

- Inadequate or unsafe oral and/or enteral nutrition intake.
- A non-functional, inaccessible or perforated (*leaking*) gastrointestinal tract.

PN should be stopped when the patient is established on adequate oral and/or enteral support.

PN is expensive and an invasive form of nutritional support. Careful consideration needs to be taken when assessing who is suitable. Complications of parenteral nutrition can include risks associated with the central venous access device (CVAD) placement, catheter related blood stream infections (CRBSI), thrombosis and metabolic disturbances.

Common indications for short term PN;

1. Post-operative ileus, if gastrointestinal function is not improving within several post-operative days.
2. Small bowel obstruction.
3. Impaired gastro-intestinal function or severe malabsorption either peri-operative in nature or associated with critical illness and other multi-organ failure.

These patients usually have a short self-limiting illness needing PN until the GI tract improves and oral feeding can be commenced. This is classified as Type 1 intestinal failure

Indications for longer term PN (*Type 2 and 3 intestinal failure*);

1. Short bowel syndrome post resection (*can occur if small intestinal length is less than 200 cm, and the phenotype depends on the continuity with the large intestine*).
2. High output stoma.
3. Severe gastrointestinal dysmotility disorders.
4. Severe pancreatitis.

5. Patients with severe mucositis post chemotherapy or GvHD following bone marrow transplant.
6. Patients with intestinal obstruction secondary to palliative cancers which cannot be operated on.

Any patient with either Type 2 or 3 IF must be discussed at the nutrition MDT meeting. All patients on TPN for over 2 weeks will be discussed at weekly MDT meetings.

Decision to start PN requires authorisation from Nutrition team doctors or Gastro consultant of the week, following discussion with dietitian and TPN pharmacist.

## 2. SUPPLEMENTARY DOCUMENTS

- Policy for assessing mental capacity and complying with the mental capacity act 2005 (SWBH/PtCARE/002 – <https://connect2.swbh.nhs.uk/task/dols-application/attachment/mental-capacity-policy-ptcare-002/>).
- Insertion, management and removal of central venous access devices (CVAD) (SWBH/PtCARE/049 – <https://connect2.swbh.nhs.uk/central-venous-access-devices-cvadptcare-049/>).
- Tunnelled central line care with specific reference for indications of removing Hickman lines during infection (SWBH/C.HAEM/005 – <https://connect2.swbh.nhs.uk/index.php/cvc-care-hickman-line-removal-clinhaem-005/>).

## 3. GLOSSARY AND DEFINITIONS

<b>ANTT</b>	Aseptic Non Touch Technique
<b>COW</b>	Consultant of the week
<b>CRBSI</b>	Catheter Related Blood Stream Infection
<b>CRS</b>	Catheter Related Sepsis
<b>CVAD</b>	Central Venous Access Device. This is a catheter which has its tip located in the distal third of the superior vena cava.
<b>FBC</b>	Full Blood Count
<b>GI</b>	Gastrointestinal
<b>GvHD</b>	Graft versus host disease
<b>LFTS</b>	Liver Function Tests
<b>PICC</b>	Peripherally Inserted Central Catheter
<b>PN or TPN</b>	Parenteral Nutrition (PN) or Total Parenteral Nutrition (TPN) is the provision of a patient's nutrition by intravenous administration of aseptically prepared solution.
<b>SWB</b>	Sandwell and West Birmingham
<b>TPR</b>	Temperature, Pulse, Respiration

## 4. ROLES AND RESPONSIBILITIES

### 4.1 Nutrition Team

The Nutrition Team is a multi-disciplinary team that consists of Consultant Gastroenterologists, Metabolic Medicine Doctor, Dietitians, Pharmacists and Nutrition Nurse Specialists.

### 4.2 TPN Pharmacist

- Assess, order and prescribe PN on a rostered basis.
- Assess patients' suitability for parenteral nutrition alongside other members of Nutrition Team.
- Provide patient with information around parenteral nutrition as required.
- Review biochemistry results and liaise with other members of Nutrition Team to formulate PN prescription.
- Formulate PN according to patient requirements in conjunction with nutrition team.
- Take part in completing and signing daily PN prescriptions.
- Review patients daily until such time that PN is no longer needed.
- Provide pharmaceutical advice on any aspects relating to PN.
- Responsible for operational and stock management of PN.

### 4.3 Consultant Gastroenterologist and/or Speciality Doctor in Metabolic Medicine

- Discuss indications with other members of the Nutrition Team and Parent Team.
- Review biochemistry results and liaise with other members of Nutrition Team to formulate PN prescription.
- Sign daily PN prescription.
- Clinically assess patients' suitability for continued PN.
- Advise and liaise with parent team regarding potential complications.
- Offer advice/discuss with parent team discontinuation of PN.
- **Take overall clinical ownership / responsibility for the TPN prescription and of the care of a TPN patient.**

### 4.4 Nutrition Nurse

- Assess patients' suitability for parenteral nutrition alongside other members of Nutrition Team.
- Contact Nutrition Team lead / Consultant Gastroenterologist of the week for advice and authorisation as necessary.
- Provide patient with information around parenteral nutrition as required.
- Emphasise importance of dedicated parenteral nutrition CVAD.
- Support, educate and troubleshoot with ward staff and parent team in regard to care of CVAD.
- Overseeing the management and care of CVAD use for PN (*this includes training, assessing and supporting all staff members caring for patients on PN*).

- Link in with the Dietitian to review patient and contact pharmacy to place parenteral nutrition order by 10:30.
- Review patient daily until such time that PN is no longer needed.
- Advise and set standards for monitoring the safety and compliance with the safety of a CVAD at ward level.

#### 4.5 Dietitian

- Assess patients' suitability for PN alongside other members of Nutrition Team.
- Contact Nutrition Team lead / Consultant Gastroenterologist of the week for advice and authorisation as necessary.
- Provide patient with information around parenteral nutrition as required.
- Emphasise importance of dedicated parenteral nutrition CVAD.
- Estimate nutritional requirements and formulate appropriate PN bag to meet nutritional requirements.
- Link in with Nutrition Nurse to review patients and contact pharmacy to place the PN order by 10:30.
- Review patients daily until such time that PN is no longer needed.
- Provide expert dietetic advice, support and clinical input on an individual basis to patients requiring artificial nutrition.

#### 4.6 Parent Team

The Parent Team are responsible for the overall management of a patient needing and receiving PN. Junior doctors should seek guidance from senior colleagues;

- Refer patient to the nutrition team in a timely fashion using [UNITY](#) referral form located in Requests / Care plans – Referral to Parenteral Nutrition Team.
- Arrange insertion of a suitable CVAD after liaising with the Nutrition team to confirm that PN is indicated.
- Take responsibility for safe insertion and post-insertion review and management of line.
- Act immediately and escalate to senior ward staff if the patient appears to show septic symptoms and becomes unwell.
- Take TPN bloods (*request forms located in Requests / Care Plans – TPN*), clotting profile.

Provide patient with information about PN and consent patient (*if the patient is unable to consent for CVAD line insertion and PN, please refer to Mental Capacity Trust Policy [SWBH/PtCARE/002](#)*).

Communicate any perceived issues with PN or plans to discontinue with Nutrition Team (*PN can only be commenced and discontinued once discussed and agreed with Nutrition team, discontinuing TPN requires weaning and can't be stopped abruptly unless there are line related complications e.g line sepsis / dislodgment / failure*).

**Responsible Consultant must review patient daily, ensuring the line is appropriate and is in date, be vigilant for line sepsis, daily check electrolytes and fluid balance, provide guidance to junior doctors about additional fluids** (*in context of patient already receiving fluids as part of PN*).

Where PN has been administered for >14 days/patient is on Home Parenteral Nutrition – the responsible consultant must refer patient to gastroenterology. The patient will be placed under joint care with gastroenterology and parent team. The patient will then be reviewed daily by the Gastroenterology Consultant of the week, and in weekly consultant nutrition ward rounds.

#### **4.7 Ward Nurse**

- Maintain competencies in PN, through completion of PN competency framework and study day (*rolled out from Q2 in 2022*).
- Ensure that Parent Team have referred patient to Nutrition Team for assessment.
- Remove PN bag from fridge 1 hour prior to use and allowing to increase to room temperature.
- PN trained nurse to check correct PN bag given as per prescription and to sign on UNITY.
- Connect PN bag using aseptic technique ([Appendix 6](#)).
- Should be competent in CVAD line care and management according to current trust procedures.
- Daily monitoring ([Appendix 3](#)).
- Replace PN bags (*usually at 18:00 unless alternative instructions given by Nutrition Team*).
- Act immediately and escalate to senior ward staff if the patient appears to show septic symptoms and becomes unwell.

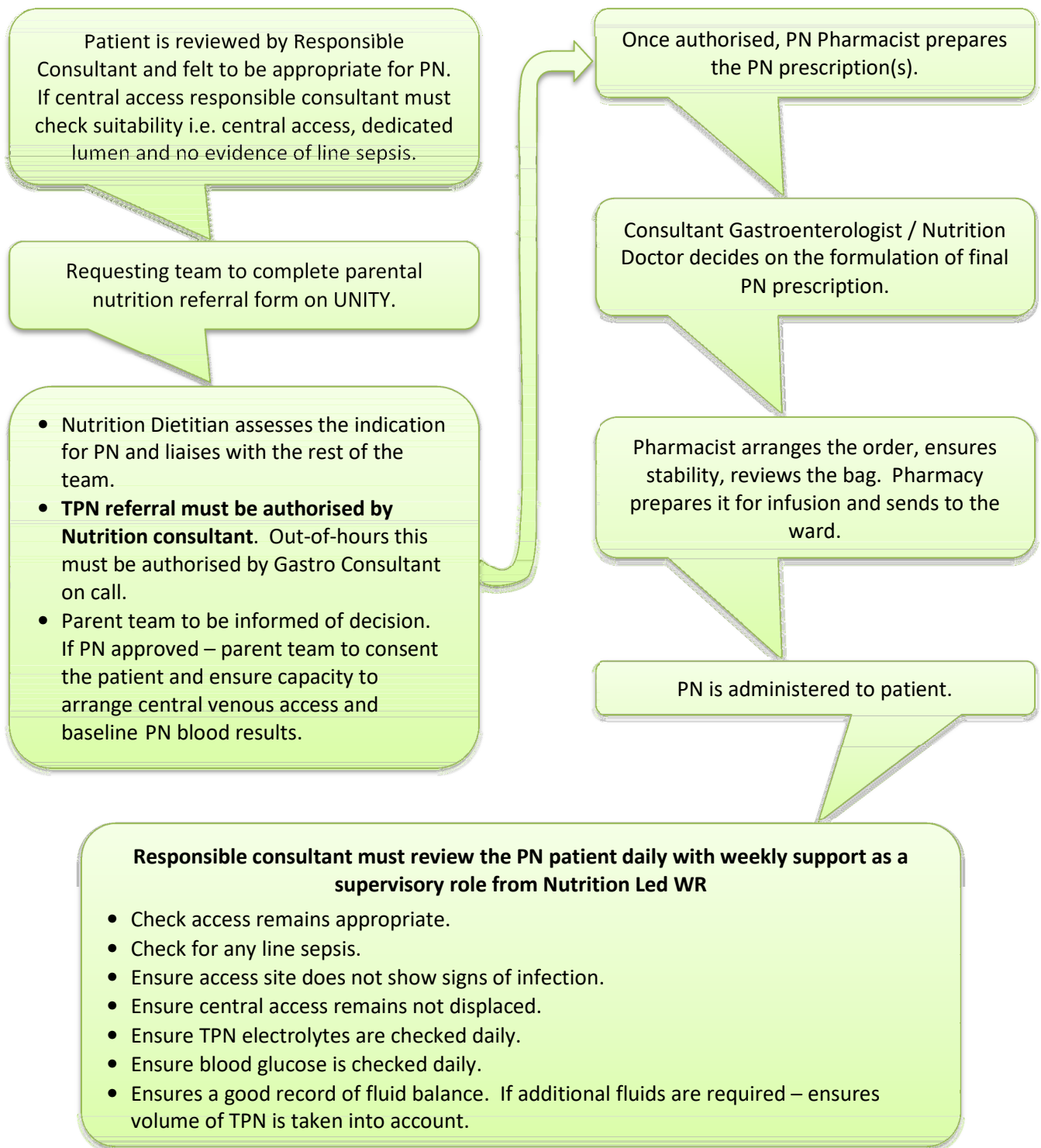
#### **4.8 Nutrition Steering Group**

- Align with trust governance.
- Risk and incident reporting in relations to PN.
- Quarterly review of rolling TPN audit – and action recommendations.
- Monitor size and scope of PN caseload and rate of complications.
- PN subgroup to report to general Nutrition Steering Committee.



## 5. REFERRAL TO THE NUTRITION TEAM

### 5.1 SWB Parenteral Nutrition Pathway



## 5.2 Parenteral Nutrition Referrals During Weekday Hours

Weekday hours are 09:00–15:00, Monday-Friday.

Referrals for PN MUST ONLY be made on EPR (*UNITY*) to the PN Dietitians by completing the electronic referral form (*Referral to Parenteral Nutrition Team*) which can be found in Requests / Care plans.

**The patient's responsible consultant is expected to identify who may require PN and refer to the PN team as above.**

Full consideration must be given to the ethical issues related to the provision of artificial nutritional support. Placement of a CVAD and its subsequent use for PN is not without risk and must be undertaken in the best interest of the patient. The Parent team will also take into consideration if the patient is able to give informed consent or if they are acting in the patient's best interest.

**PN must be authorised to commence by a Nutrition Specialist Consultant / Doctor. If no nutrition consultant is available then this decision must be made by Gastro Consultant of the Week. TPN should not be dispensed from pharmacy without documented permission from an appropriate member of the nutrition specialist team or Gastro COW.**

**Planned PN cessation should be with dietetic support. Emergency cessation of PN does not need any authorisation e.g. line sepsis, line fracture / displacement.**

On cessation of PN, patients will continue to get specialist dietetic input. Where possible PN should be anticipated and the referral should be made before 10:30 am in order for PN to commence on the same day. Where late referrals are received (*10:30–16:00*) if sufficient clinical information and PN blood results are provided, the Nutrition Team may issue standard bags for the same or next day to prevent undue delays in starting PN. The parent team will have the responsibility for checking and replacing electrolytes according to patient needs and liaising with the Nutrition Team.

## 5.3 Out-of-Hours Parenteral Nutrition Initiation

**Out-of-hours supply is not recommended unless exceptional circumstances, preceding or over a long (3 or 4 day) weekend which has been planned in advance.**

PN is not an urgent treatment and is best started following specialist review by the Nutrition team during normal working hours and Gastroenterology on-call consultant out of hours. For out-of-hours PN (*15:00 on the last normal working day until 08:00 first working day after weekend / bank holiday*), the following will apply.

Consultant responsible for patient to contact Gastro Consultant of the week / on-call gastroenterologist if they wish to access out-of-hours PN and if deemed appropriate to organise. Pharmacy will not issue TPN until approved authorisation by a consultant gastroenterologist.

Once deemed appropriate for parenteral nutrition, parent team to organise a CVAD or ensure that a dedicated lumen that has not been used previously is present.

Once a suitable route of central access is placed, the parent team should contact the on-call pharmacist who will arrange out of hours parenteral nutrition delivery to clinical area, and order the parenteral nutrition according to the prescription signed by the on-call gastroenterologist.

Out-of-hours the patient will usually be started on 5 g nitrogen (*in case of a high risk of refeeding syndrome – 2.5 g nitrogen on the first day and increased to 5 g nitrogen on the second day*) over 24 hours.

PN Prescription	Kabiven 5 g nitrogen	Screen 2	
Total bag volume (ml)	1460	Volume to be infused	1460
% to be administered	100	Rate	61
Volume to be infused (ml)	1460	Hours to be infused over	24
Total energy (Kcal)	1000	Day	
Non-protein (Kcal)	900	Date	
Nitrogen (g)	5.4	Infusion start time	18:00
Glucose (g)	97		
Lipid (g)	52		
Additrac (ml)	10		
Solivito (ml)	10		
Vitlipid	Yes		
Comments	61 ml/hr over 24 hours		
Sodium (mmol)	32		
Potassium (mmol)	24		
Calcium (mmol)	2		
Magnesium (mmol)	4		
Phosphate (mmol)	11		

Table 1: Standard Parenteral Nutrition Prescription (for out of hours PN)

- To provide 2.5 g nitrogen / 24 hours, use 50% of 5 g bag to run at 30 ml/hr.
- The on-call pharmacist will arrange delivery of the parenteral nutrition bags after ensuring the PN bag is intact and will provide a covering bag to protect the PN bag from light during infusion. The PN must be requested from pharmacy before 11:00 for that day's supply.
- Sufficient parenteral nutrition bags will be supplied and labelled with day/date dispensed and the day/date for infusion for each day to cover the out of hours period until the patient is seen by the Nutrition Team.
- The PN infusion will start at 18:00 daily.
- Parent team to monitor and supplement electrolytes as necessary.

## 6. ASSESSMENT BY THE NUTRITION TEAM

On receiving a referral for PN, the Nutrition Team will carry out a full assessment as detailed below;

- Patient's suitability for PN.
- Clinical history and current clinical condition including medical / surgical plan.
- Full nutritional history.
- Observations e.g. temperature, blood glucose levels.
- Assessment of refeeding syndrome risk (see [Refeeding Guidelines](#))
- TPN blood test (see *TPN test sets in Requests / Care Plans on UNITY*)
- Suitability for venous access ([Section 8](#)).

Specific information is required in order to carry out this assessment (*Table 2*).

Information required	Action required by:	
	Nursing	Parent Team
Measured Weight	✓	
Height	✓	
Recent food and fluid Intake	✓	
Accurate fluid balance Charts	✓	
Stoma / bowel output	✓	
Pulse, temperature, blood glucose levels	✓	
Blood biochemistry (TPN set on UNITY) and clotting ( <a href="#">Section 13/14</a> )		✓

*Table 2: Information to be available for the Nutrition Team prior to assessment*

- The Nutrition Team will advise on the most appropriate regimen based on calculations of the patient's requirements.
- If the Nutrition Team feel PN is not indicated, they will advise on alternative methods of nutrition.
- The Nutrition Team will liaise with the patient / carer and offer information and support as necessary.

## 7. PLACEMENT OF A CENTRAL VENOUS ACCESS DEVICE

After discussion with the Nutrition Team and PN being authorised, the Parent Team is responsible for the placement of the CVAD. The Nutrition Team will advise the most appropriate venous access device to be used. Clotting and FBC should be available in order for the PN line insertion to take place.

Refer to Central Venous Access Devices – Insertion, Management and Removal guideline ([SWBH/PtCARE/049](#)) for full guidance around placement, management and care of CVADs.

### 7.1 Patient with Existing Central Venous Access Device

If the patient already has a CVAD in situ this must be assessed by parent team prior to use for PN.

The following factors need to be considered before making the decision to use an existing CVAD. The referring team must liaise with the Nutrition Nurse / Consultant Microbiologist before a decision to use the existing line is made;

1. Check how many days the CVAD has been in place and the number of lumens.
2. Check if all the CVAD ports have been used and are patent.
3. Assess presence of infection at the catheter site or proven CRBSI. If there is evidence of infection at the exit site or evidence of CRBSI, refer to CVAD guideline ([SWBH/PtCARE/049](#)).

The **CVAD must have a dedicated lumen for PN only** and must not be/have been used for any other infusion (*NCEPOD 2010*). If the CVAD is not suitable for the infusion of PN or all lumens have previously been used then insertion of a new CVAD must be arranged prior to commencing PN. For further guidance please contact the Nutrition Nurse.

## 7.2 Appropriate Access for PN

Consistent with ESPEN guidelines (*Pittiruti et al, 2009*);

1. **Short term PN:** Many non-tunnelled central venous catheters (*CVCs*) as well as peripherally inserted central catheters (*PICCs*) are suitable for inpatient PN.
2. **Medium term PN:** PICC and tunnelled catheters are appropriate.

**FEMORAL LINE, PERIPHERAL LINE AND MID LINES ARE  
CONTRAINDICATED FOR TPN.**

## 8. CARE OF A CENTRAL VENOUS ACCESS DEVICE FOR PARENTERAL NUTRITION

The care of CVADs and infection control principles are described in detail in the Trust CVAD guideline ([SWBH/PtCARE/049](#)). In addition the following must be followed;

1. Only CVAD and PN competent staff to manage patients receiving PN infusion.
2. Strict aseptic no touch technique must be used when handling CVAD / PN
3. The administration set is changed every 24 hours when the PN is changed.
4. Each PN bag must be changed after 24 hours whether it is empty or not.
5. Any patient on PN must be closely monitored for any signs of infection around the insertion site, or for systemic signs of infection.
6. Patients' observations should be recorded 4-hourly and any pyrexia or significant change in vital signs reported to the medical team. CVAD exit sites should be observed for signs of infection and/or inflammation at least 8-hourly and documented on the CVAD monitoring form. Please review [Appendix 1](#) for the management of fever in TPN. The protocol for suspected catheter related sepsis can be found in the care of CVAD guideline.
7. For information on needle-free devices (see [SWBH/PtCARE/049](#)).

## 9. PLACING AN ORDER FOR PARENTERAL NUTRITION WITH PHARMACY

In order for **tailored PN** to be ordered, the Dietitian / Nutrition Nurse must contact Pharmacy by 10:00 am each day. A designated PN Pharmacist is responsible for the daily processing of the orders.

If a referral for PN is made later in the day, Pharmacy will not be able to order tailor-made PN, and a standard PN bag will be supplied. The parent team will be responsible for monitoring the patients' observations and blood results and will need to correct any deficiencies or excesses according to patient needs.

## **10. CESSATION OF PARENTERAL NUTRITION**

PN will be gradually reduced or discontinued once a patient is managing a sufficient amount of oral/enteral nutrition. This is to be assessed by the nutrition team.

It is recommended that patients should be meeting at least 50% of their nutritional requirements through oral/enteral nutrition before stopping PN. The patient will be monitored for several days by the TPN Dietitian to ensure that they continue to meet their nutritional needs.

The Nursing / Parent team must inform the Nutrition Team if the PN had to be discontinued for any reason i.e. line complications.

## **11. REFEEDING SYNDROME**

Refeeding syndrome refers to a group of biochemical shifts and clinical symptoms that can occur in the malnourished or starved individual, on reintroduction of nutrition. This can happen for patients fed orally but is more common in those receiving enteral or parenteral feeding. Refeeding syndrome results in severe fluid and electrolyte shifts causing metabolic (*potentially fatal*) complications.

For information on detection, management and prevention of refeeding syndrome please see [Refeeding Syndrome Guidelines](#). Intravenous route of electrolyte replacement in PN patients is recommended in view of malfunctioning gut.

## **12. BLOOD TESTS**

It is the responsibility of the Parent Team to ensure PN bloods are taken in a timely manner for the results to be available for the Nutrition team by 09:30. Use TPN blood sets when ordering blood tests on UNITY (*Under Requests / Care Plans – type "TPN" in the request box*)

Blood tests should be taken from a peripheral vein in patients receiving PN. Blood samples from CVAD should be avoided, as drawn incorrectly during the PN infusion can lead to sample contamination (*Ayers P et al 2013*), line infection or other complications.

Should it be necessary to take a sample from CVAD;

1. This should be taken by competent practitioners – nursing staff that have completed the PN competency framework and study day.
2. Sample should be taken using the aseptic technique.
3. The PN dedicated lumen should NOT be used.
4. The sample should be taken after the completion of a PN infusion and before starting the next one. Alternatively, if urgent, the PN infusion should be paused for 5–10 minutes.

5. Line should be flushed before and after collecting the sample with 20 ml sodium chloride 0.9% and discard 3–5 ml prior to the sample collection.

### 13. PRESCRIBING PARENTERAL NUTRITION

Parenteral nutrition will be prescribed only by one of the Nutrition Team doctors / consultant gastroenterologist / prescribing pharmacist with appropriate training.

### 14. DELIVERY AND STORAGE OF PARENTERAL NUTRITION

The Pharmacist will arrange the delivery of routine PN to the wards by 17:00 on each day.

PN bags must be stored in PN designated fridges until needed;

- At Sandwell Hospital these fridges are located on Critical Care and Priory 2.
- At City Hospital the designated fridge is located on Critical Care.

The PN bag should be removed from the fridge and left at room temperature for 1 hour prior to infusion. If there is a delay in connecting the PN then the PN bag should be stored in the designated fridge until needed.

### 15. REMOVING CENTRAL VENOUS ACCESS DEVICES

Refer to Central Venous Access Devices – Insertion, Management and Removal guideline ([SWBH/PtCARE/049](#)) for full guidance.

### 16. AUDITABLE STANDARDS/MONITORING EFFECTIVENESS

- Key Performance Indicators of the Parenteral Nutrition Service will be audited on a yearly basis.
- The NST will audit catheter related sepsis in all patients receiving PN, aiming for a rate of <3/1000 catheter days led by medical support from Consultant Gastroenterologist and Consultant Microbiologist

Element to be monitored	Lead	Method	Frequency	Reporting arrangements
Response times to PN referrals	Clinical Lead NST	Measure time period from referral to 1 <sup>st</sup> face to face contact	Quarterly	Reported to CSI Nutrition Steering Committee / Dietetic Meeting
CRBSI for inpatients	Nutrition Lead	Audit	Ongoing	Reported at the Nutrition Steering Committee meetings
Number of PN competent nursing staff	Lead Nutrition Nurse Specialist	Review	Ongoing	Reported at the Nutrition Steering Committee meetings
Review of clinical incidents	Clinical Lead NST		Ongoing	Reported at Nutrition Steering Committee meetings

Table 3: PN KPI's



## 17. TRAINING AND AWARENESS

This guideline will be circulated to all existing clinical staff during implementation and will be incorporated into future PN training days.

## 18. EQUALITY AND DIVERSITY

The Trust recognises the diversity of the local community and those in its employment. Our aim is, therefore, to provide a safe environment free from discrimination and a place where all individuals are treated fairly, with dignity and appropriately to their need. As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

## 19. REFERENCE DOCUMENTS AND BIBLIOGRAPHY

- NICE clinical guideline CG32 – *Nutrition support for adults: oral nutrition support, enteral tube feeding and parenteral nutrition*, Published: 22 February 2006 Last updated: 04 August 2017. <https://www.nice.org.uk/guidance/cg32>
- Simon Lal, Paul Chadwick, Jeremy Nightingale and the BIFA Committee (January 2019). British Intestinal Failure Alliance (BIFA) Recommendation; *Management of Catheter Related Blood Stream Infections (CRBSIs)*. <https://www.bsg.org.uk/wp-content/uploads/2019/12/Recommendations-on-management-of-CRBSI.pdf>
- Ashley Bond, Paul Chadwick, Trevor R Smith, Jeremy M D Nightingale, Simon Lal (Jan 2020). *Diagnosis and management of catheter-related bloodstream infections in patients on home parenteral nutrition*. *Frontline Gastroenterol*; 11(1):48-54. doi: 10.1136/flgastro-2018-101094. <https://pubmed.ncbi.nlm.nih.gov/31885840/>
- British Association for Parenteral and Enteral Nutrition (BAPEN); *Parenteral Nutrition Recommendations* (Last Updated August 2016). <https://www.bapen.org.uk/nutrition-support/parenteral-nutrition>
- NCEPOD (2010); *Parenteral Nutrition: A Mixed Bag – An enquiry into the care of hospital patients receiving parenteral nutrition*. Reported by the National Confidential Enquiry into Patient Outcome and Death. <https://www.ncepod.org.uk/2010pn.html>
- Pittiruti, M Hamilton, H Biffi, R MacFie, J Pertkiewicz, European Society for Clinical Nutrition and Metabolism (ESPEN) (2009); *Guidelines on Parenteral Nutrition: central venous catheters (access, care, diagnosis and therapy of complications)*. *Clin Nutr*. 2009 Aug; 28(4):365-77. doi: 0.1016/j.clnu.2009.03.015. <https://pubmed.ncbi.nlm.nih.gov/19464090/>



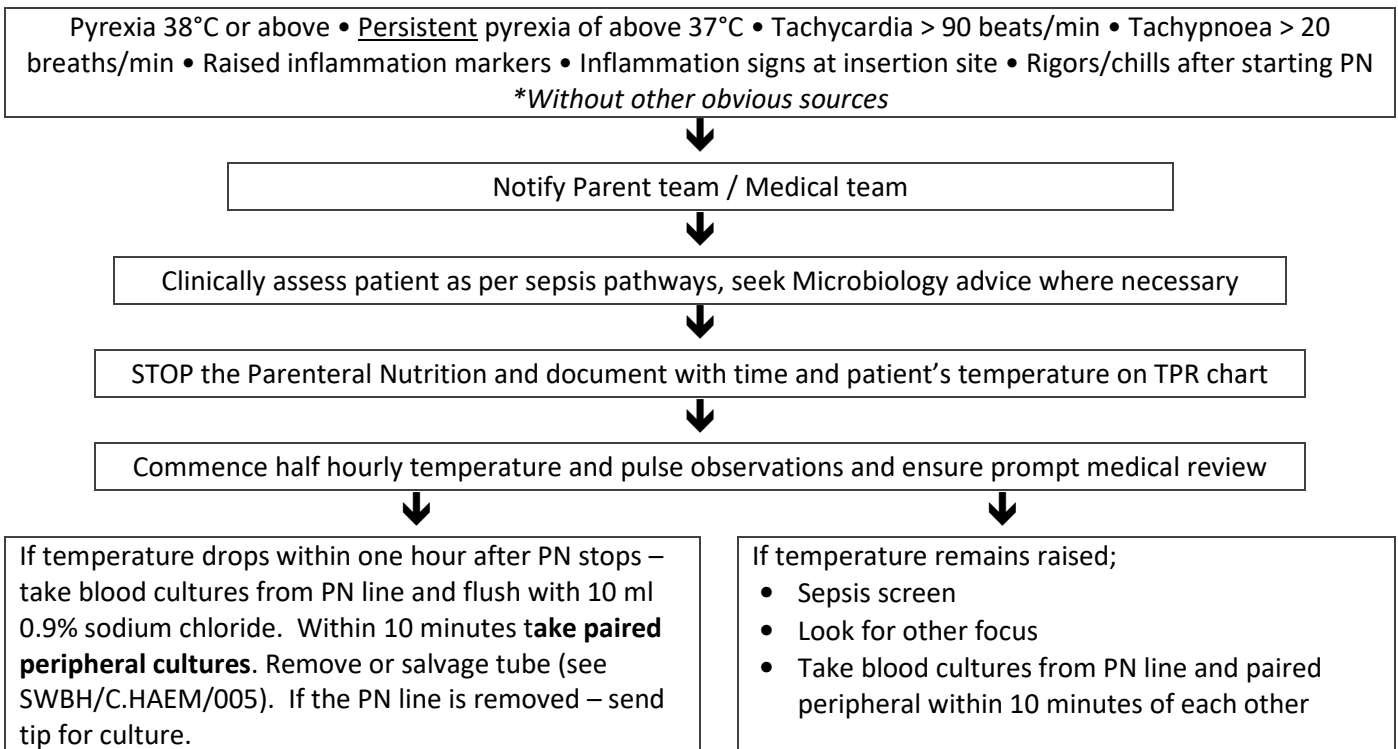
**APPENDIX 1**

**Sepsis Protocol for Suspected PN Catheter Related Blood Stream Infections**

A catheter-related blood stream infection commonly arises from a parenteral nutrition catheter hub. The diagnosis of CRBSI should be achieved by (a) quantitative or semi-quantitative culture of the catheter (when the CVC is removed or exchanged over a guide wire), or (b) paired quantitative blood cultures, or paired qualitative blood cultures from a peripheral vein and from the catheter with continuous monitoring of the differential time to positivity (if the catheter is left in place) (ESPEN guidelines).

Most frequently reported pathogens leading to CRBSI and their reported frequencies (Bond et al, 2020)	
Pathogen leading to CRBSI	Reported frequency
Coagulase-negative Staphylococcus	30–50%
Meticillin-sensitive <i>S. aureus</i>	4–10%
Klebsiella spp.	3.7–12%
Other Gram negative	5–20%
Multiple organisms	10–12%
Fungi	2.5–11%

**Management of Suspected PN Catheter Related Blood Stream Infection Flow Chart**



**Do not restart PN until PN related line sepsis has been excluded**

APPENDIX 2

**Complications of Central Venous Access Devices & Parenteral Nutrition**

Complication	Symptoms	Management
<b>Pneumothorax</b>	Usually associated with insertion of the central line. This is when air enters the pleural space between the pleural membranes that surround the lungs. The nurse must observe the patient for signs of respiratory distress, e.g. chest pain and/or breathlessness	Needs urgent medical attention – If severe may need chest aspiration or chest drain insertion.
<b>Haemorrhage</b>	The catheter entry site must be observed for signs of bleeding following insertion of catheter and blood pressure monitored at regular intervals.	Check clotting screen pre-placement and correct abnormalities. Pressure dressing over insertion site for 10–15 minutes. The needless connector may become dislodged or the lumen may be not clamped and left open to the air. The nurse must check all connections and security of the catheter on a regular basis
<b>Catheter related sepsis (CRS)</b>	Monitor TPR. Catheter related sepsis results in systemic bacterial infection, as a result of poor aseptic technique, amongst other factors. It can be fatal if not treated.	<ul style="list-style-type: none"> <li>• Follow sepsis pathway.</li> <li>• See CRBSI protocol (<a href="#">Appendix 1</a>).</li> <li>• Undertake PAIRED peripheral blood cultures (See Peripheral blood culture policy SWBH/COI/035) and central blood cultures (<a href="#">Appendix 4</a>).</li> <li>• If PN line is removed – send tip for culture.</li> <li>• BIFA recommendations for CRBSI.</li> <li>• Sputum specimen, MSU / CSU.</li> <li>• Output from fistulae / stomas / wounds.</li> </ul>
<b>Venous thrombosis</b>	Patients face or arm becomes swollen. May occur because; <ul style="list-style-type: none"> <li>• Catheter tip is situated high in the vena cava or in the subclavian vein.</li> <li>• Solution infused has a very high osmolality.</li> <li>• There is a catheter-related sepsis. patient is dehydrated.</li> </ul>	Diagnosis should be confirmed by ultrasound. Contact Vascular Access team.
<b>Catheter occlusion</b>	These can occur from debris, fibrin or lipids. The volume of fluid usually held by the catheter is 2 ml.	Try changing position of patient or elevate the arm, attempt a gentle flush with 5 ml of 0.9% sodium chloride which may remove debris.

Complication	Symptoms	Management
<b>Air embolism</b>	This can occur if the line becomes disconnected or breaks. If the patient becomes confused, restless and hypotensive then an air embolism should be considered.	In these circumstances the feed should be stopped, the line clamped above the break, the patient lain on their left side, and the foot of the bed elevated. The doctor should then be contacted urgently.
<b>Air in the line</b>	This may occur if the line is not primed sufficiently leaving air bubbles in the line.	See <a href="#">Appendix 5</a> for removal of air from the PN line.
<b>Hyperglycaemia / Rebound hypo-glycaemia</b>	Hyperglycaemia is common in diabetic patients and those with stress induced insulin resistance. It should be generally treated with insulin using a sliding scale.	All patients receiving parenteral nutrition should be monitored closely.
<b>Electrolyte imbalances</b>	Often caused by patients underlying medical condition; requirements vary depending on individual patient needs. Can be caused by inadequate or excessive administration of intravenous fluids.	Daily blood samples taken early in the day to detect electrolyte abnormalities and allow sufficient time for their correction whether by the parent team or via the PN solution. Review intravenous fluid requirements. Supplement electrolytes as required.
<b>Refeeding syndrome</b>		See <a href="#">Refeeding guidelines</a>
<b>Side effects of lipid Infusion;</b> Some patients suffer symptoms including headaches, nausea and vomiting, either during or after an infusion of lipid mix PN.	The exact cause is unknown.	Inform patient of potential side effects and treat mild symptoms. If tolerated the PN solution can be given without fat/ fat free days or reduce the number of days which PN is delivered. However some fat must be included in the regimen to prevent the development of fatty acid deficiency.
<b>Anaphylactic shock</b>	This is a rare complication but may occur as a reaction to the administration of lipid.	In severe cases call the arrest team. It may be necessary to administer adrenaline / steroids.
<b>Liver function tests</b>	May be attributable to hepatic steatosis with moderate hepatomegaly, patient may develop jaundice. LFTs often return to normal after stopping or cycling PN and with the resumption of enteral nutrition. Abnormal LFTs may not be due to PN, but because of an underlying medical problem.	Increase of LFTs may reduce when PN is stopped/ removed. Consider imaging to investigate biliary tree. Discuss with LIFT team. PN team to consider fat free bags, cyclical PN.

APPENDIX 3

**Ward Nurse Monitoring of PN**

Parameter	Rationale	Frequency	Action
<b>Fluid balance</b>	To monitor hydration, ensure optimal hydration, monitor losses	Hourly or more frequently as required.	Measure daily input / output. Observe for thirst, lethargy, low urine output, ankle oedema / postural hypotension or breathlessness.
<b>Weight</b>	To monitor hydration state. Assess ongoing nutritional status.	Twice-weekly Monday and Thursday or daily if concerned about fluid balance.	Weigh twice weekly (in similar clothing, at same time of day, on same scales). Record weight.
<b>Blood Sugar</b>	To detect hypo/hyperglycaemia. To ensure patient tolerates glucose load of feeds	4-hourly for first 72 hours then twice daily if stable and on long term PN.	Check blood glucose level 4-hourly for first 72 hours. If patient stable, reduce frequency. Consider sliding scale insulin if blood glucose >10 mmol consistently.
<b>Temperature, pulse respiration and blood pressure</b>	To detect signs of infection / line malposition and Circulation	4-hourly or more frequently if required.	Monitor 4-hourly whilst on PN. <b>If temperature &gt;38°C alert parent team.</b>
<b>CVAD entry and dressing sites</b>	To detect signs of localised infection. (warmth, redness, tenderness, exudate and swelling)	Observe catheter entry / exit site daily.	Observe site/s daily for discharge. Review as part of full clinical condition review and document as per CVAD monitoring charting. Change dressing weekly (see <a href="#">CVAD Guidelines</a> ).
<b>Biochemical</b>	To prevent under and over provision of electrolytes and nutrients. To address abnormal results.	Daily or twice weekly, as per nutrition team.	UE, LFT, magnesium, phosphate, bone, glucose, trace elements.
<b>CVAD Care</b>	Prevention and early detection of complications associated with CVAD's.	Insertion, Management and Removal Policy ( <a href="#">PtCARE/049</a> )	Insertion, Management and Removal Policy ( <a href="#">SWBH/PtCARE /049</a> )
<b>Oral hygiene</b>	Prevention of oral infection.	Hourly or as needed.	Ensure good mouth care is provided particularly if patient is NBM.
<b>Bionector</b>	To ensure a closed system and prevent an air embolism.	Weekly	Change weekly if intact or immediately if cracked.
<b>CVAD</b>	To ensure no visible cracks thus preventing potential air embolism.	Daily	

## APPENDIX 4

## Taking Blood from CVAD

**GATHER EQUIPMENT**

1. Dressing Trolley
2. Equipment cleaning wipes (e.g. Chlor-clean / Distell wipes) to clean the trolley Disposable apron
3. Alcohol hand rub
4. Basic sterile dressing pack including sterile towel
5. Securing tape (e.g. Micropore tape)
6. Sterile gloves (if not in pack)
7. 2% chlorhexidine gluconate in 70% isopropyl alcohol wipe x5
8. 2 x 10 ml Luer-lock syringe
9. 1 x 10ml 0.9% sodium chloride
10. 1 x20ml syringe
11. 1 x pink blunt-fill needle
12. 10 ml 0.9% sodium chloride blood bottles (as needed for relevant test)
13. Sharps bin

**STERILE NON-TOUCH TECHNIQUE FOR TAKING BLOOD FROM CVAD**

1. Clean hands. Put on apron.
2. Clean the trolley with equipment cleaning wipes.
3. Assemble equipment tidily, as above and place on bottom shelf of trolley / bedside 'work-surface'.
4. Explain the procedure to the patient, ensuring privacy and comfort.
5. Switch off pump and close roller clamp on giving set and remove from pump.
6. 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).
7. Check 0.9% sodium chloride against prescription with another qualified nurse then scrub with 2% chlorhexidine gluconate in 70% isopropyl alcohol wipe for 30 seconds using different parts of the wipe. Leave it in the sterile field.
8. Expose end of the patient's feeding line and close clamp on double thickness part of line (only for Hickman line), remove gauze flag and discard.
9. Open 1 pair of sterile gloves on a dry clean surface nearby – this should not be the aseptic field.
10. Clean hands and apply alcohol hand rub put on one pair of sterile gloves without touching outside of them.
11. Remove sterile field from pack and place near to patient's line.
12. Scrub the hub and needless port of the PN line for 30 seconds with 2% chlorhexidine gluconate in 70% isopropyl alcohol 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).
13. Without placing the line down, manoeuvre the sterile field under the line.
14. 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.
15. Draw up 0.9% sodium chloride. Replace syringes on aseptic field in order of usage.
16. Disconnect feeding line, withdraw 10 ml blood in 10 ml syringe and discard.
17. Withdraw further 20 ml in 20 ml syringe and lay on work surface.
18. Flush with 10 ml 0.9% sodium chloride. Ensure needle-less port is free from blood and reconnect feed.
19. Wrap single layer of gauze around hub connection and secure with hypoallergenic tape with ends folded over.
20. Discard 'paper' waste into yellow bag. Discard filter needle, green needles, syringes and ampoules into sharps bin.
21. Clean the trolley with Chlor-clean / Distell wipes. Return to storage.
22. Clean hands.
23. Document procedure.

**APPENDIX 5****Connecting the Continuous and Cyclical Parenteral Nutrition Infusions**

- Parenteral Nutrition is a good medium for bacterial growth; therefore it is an independent risk factor for sepsis.
- The safe accessing of CVADs is vital in reducing the risk of catheter related infections. Contamination of the hubs of CVADs has been shown to contribute to intra-lumen microbial contamination.
- All hubs / needle-free connectors should be decontaminated using 2% chlorhexidine gluconate with 70% isopropyl alcohol prior to and post accessing the CVAD (EPIC 3 / DOH 2014).
- In order to reduce the risk of sepsis, all PN regimens need to be administered using aseptic non-touch technique (ANTT).
- The nurse should be IV / CVAD / and PN trained and competent.
- The PN infusion should be removed from the fridge and left at room temperature for 1 hour prior to infusion, ensuring it is away from direct sunlight or heat (e.g. radiators).

**GATHER EQUIPMENT**

1. PN infusion ( correctly labelled for the patient)
2. Prescription charts (EPR system)
3. Clean trolley
4. Alcohol hand gel
5. 2% chlorhexidine gluconate in 70% isopropyl alcohol sanitising wipes x 8 sachets
6. Dressing pack (includes sterile gloves and towel)
7. Sterile giving set
8. Clean volumetric pump and drip stand
9. Sterile towel
10. Equipment / medical device cleaning wipes eg Clinell wipes

If needle-free device needs replacing;

- Needle-free device
- 10 ml syringe
- 10 ml 0.9% sodium chloride or 1 x 10ml pre-filled 0.9% sodium chloride syringe

**STERILE NON-TOUCH TECHNIQUE FOR CONNECTING AND DISCONNECTING CONTINUOUS PN INFUSION**

1. Correct patient identification.
2. Explain and discuss the procedure with the patient. Obtain informed consent where possible. Establish if the patient has any known allergies.
3. Wash your hands using liquid soap and dry hands, put on clean apron.
4. Clean the trolley, with soap and water, dry and clean again with 70% isopropyl alcohol wipes. Ensure drip stand, volumetric pump and hand gel bottle are clean.
5. Gather equipment required, check expiry dates and place on the bottom shelf of the cleaned trolley.
6. Check PN infusion against prescription and patient's identity, with a second trained nurse.
7. Switch off the pump, close the roller clamp on the giving set , release the giving set from the pump and close clamp on the CVAD (if applicable).
8. Wash and dry hands again.
9. Open sterile towel on the top of the trolley.
10. Remove PN bag from packaging. Wipe with 2% chlorhexidine and 70% isopropyl alcohol wipes. Put PN bag on top of the trolley, under the sterile dressing towel. Ensure all ports are under the sterile dressing towel.

## STERILE NON-TOUCH TECHNIQUE FOR CONNECTING AND DISCONNECTING CONTINUOUS PN INFUSION

1. Check the integrity of the infusion, i.e. check for separation of liquid, precipitation and discolouration. DO NOT INFUSE IF ANY CONCERNS, contact the Pharmacist.
2. Open sterile dressing pack.
3. Clean hands with hand gel.
4. Carefully open the pack from the outer corners. Do not touch or contaminate the inside of the dressing pack.
5. Open all other equipment onto the sterile field.
6. If using 0.9% sodium chloride ampoules: pour 0.9% sodium chloride into the gallipot in the sterile pack.
7. Clean hands with hand gel.
8. Slide the sterile towel underneath the CVAD, touching only the edges of the towel.
9. Clean hands with hand gel allow drying and putting on sterile gloves.
10. Loosen the cover on the spiked end of the sterile giving set and close the clamp.
11. If using 0.9% sodium chloride, draw up 10 ml 0.9% sodium chloride in a 10 ml syringes. Flush the sterile needle-free device to be changed with the 0.9% sodium chloride or prefilled 0.9% sodium chloride syringe.
12. Take 2 x 2% chlorhexidine and 70% isopropyl alcohol wipes (1 in each hand).
13. On the sterile / unused PN bag: Take the port that is to be spiked in one hand, with the other hand clean the port and remove the cover of the port. Discard this wipe and cap / cover.
14. Continuing to hold the port in one hand, remove the cover of the spiked end of the sterile giving set with the free hand.
15. Carefully insert the spike into port of PN infusion, taking care not to puncture the bag, and that the giving set does not move off the sterile field.
16. Half fill the chamber of the sterile giving set, gently loosen the cap end and carefully prime the line, keeping the end of the giving set on the sterile field. Ensure the solution does not run out of the line. Close the clamp of the sterile giving set.
17. Take 2 x 2% chlorhexidine and 70% isopropyl alcohol wipes (1 in each hand). Hold the CVAD in one hand and with the other hand, clean the connection between the CVAD / needle-free device and used PN giving set with a 2% chlorhexidine and 70% isopropyl alcohol wipe. Disconnect used giving set and discard with the wipe.
18. From the sterile pack take a piece of gauze and place under the cleaned CVAD. Rest the CVAD on the gauze. Discard the wipe used to anchor the CVAD.
19. If a new needle-free device is required (refer to local policy), clean the connection with a 2% chlorhexidine and 70% isopropyl alcohol wipe, detach the previous needle-free device and discard both the wipe and the connector. Attach the sterile pre-primed needle-free device.
20. If a new needle-free device is not required, clean the existing needle-free device with a 2% chlorhexidine and 70% isopropyl alcohol wipe. Discard wipe and allow connector to dry. Ensure all connectors and hubs are free from dried blood and debris etc.
21. Take the sterile PN primed giving set and remove the cap. Attach the giving set to the needle-free device. Clean the connection with a 2% chlorhexidine and 70% isopropyl alcohol wipe.
22. Hang PN infusion on drip stand and cover with the bag provided.
23. Insert giving set correctly into the volumetric pump, set the rate according to the prescription (2 Nurse checks). Open roller clamp on the giving set, unclamp CVAD if applicable and commence infusion.
24. Remove gloves and apron, discard all rubbish appropriately and wash hands.
25. Ensure patient is comfortable and dignity maintained.
26. Sign the prescription, record on fluid balance chart and document in patient notes.
27. Monitor for complications as per PN and CVAD guidelines.



## Connecting a Cyclical PN Infusion

A cyclical PN infusion is one that does not run continuously for 24 hours. In these cases the CVAD will need flushing prior to commencement and after the infusion ends. The same procedures can be followed for attaching the first PN infusion.

### GATHER EQUIPMENT

As above but include;

1. 2 x 10 ml 0.9% sodium chloride for injection
2. Or 10 ml pre-filled 0.9% sodium chloride syringes

If needle-free device needs replacing;

- 10 ml syringe
- 10 ml 0.9% sodium chloride or 1 x 10ml pre-filled 0.9% sodium chloride syringe

### STERILE NON-TOUCH TECHNIQUE FOR CONNECTING CYCLICAL PARENTERAL NUTRITION INFUSION

1. Correct patient identification.
2. Explain and discuss the procedure with the patient. Obtain informed consent where possible. Establish if the patient has any known allergies.
3. Wash your hands using liquid soap and dry hands, put on clean apron.
4. Clean the trolley, with soap and water, dry and clean again with 2% chlorhexidine and 70% isopropyl alcohol wipes. Ensure drip stand, volumetric pump and hand gel bottle are clean.
5. Gather equipment required, check expiry dates and place on the bottom shelf of the cleaned trolley.
6. Check PN infusion against prescription and patient's identity, with a second trained nurse.
7. Switch off the pump, close the roller clamp on the giving set, release the giving set from the pump and close clamp on the CVAD (if applicable).
8. Wash and dry hands again.
9. Open sterile towel on the top of the trolley.
10. Remove PN bag from packaging. Wipe with a 2% chlorhexidine and 70% isopropyl alcohol wipe (used for medical devices). Put PN bag on top of the trolley, under the sterile dressing towel. Ensure all ports are under the sterile dressing towel.
11. Check the integrity of the infusion, i.e. check for separation of liquid, precipitation and discolouration. **DO NOT INFUSE IF ANY CONCERNS**, contact the Pharmacist.
12. Open sterile dressing pack.
13. Clean hands with hand gel.
14. Carefully open the pack from the outer corners. Do not touch or contaminate the inside of the dressing pack.
15. Open all other equipment onto the sterile field.
16. Clean hands with hand gel.
17. Slide the sterile towel underneath the CVAD, touching only the edges of the towel.
18. Clean hands with hand gel allow drying and putting on sterile gloves.
19. Loosen the cover on the spiked end of the sterile giving set and close the clamp.
20. If using 0.9% sodium chloride, draw up 2 x 10 ml 0.9% sodium chloride in 2 x 10 ml syringes. Flush the sterile needle-free device to be changed using one of the filled syringes or 1 of the pre filled syringes.
21. Take two 2% chlorhexidine and 70% isopropyl alcohol wipes (1 in each hand).
22. On the sterile / unused PN bag: Take the port that is to be spiked in one hand, with the other hand clean the port and remove the cover of the port. Discard this 2% chlorhexidine and 70% isopropyl alcohol wipe and cap / cover.
23. Continuing to hold the port in one hand, remove the cover of the spiked end of the sterile giving set with the free hand.
24. Carefully insert the spike into port of PN infusion, taking care not to puncture the bag, and that the giving set does not move off the sterile field.



## STERILE NON-TOUCH TECHNIQUE FOR CONNECTING CYCLICAL PARENTERAL NUTRITION INFUSION

25. Half fill the chamber of the sterile giving set, gently loosen the cap end and carefully prime the line, keeping the end of the giving set on the sterile field. Ensure the solution does not run out of the line. Close the clamp of the sterile giving set.
26. Take 2 x 2% chlorhexidine and 70% isopropyl alcohol wipes (1 in each hand). Hold the CVAD in one hand and with the other hand clean the connection between the CVAD / needle-free device and used PN giving set with a 2% chlorhexidine and 70% isopropyl alcohol wipe. Disconnect used giving set and discard with the wipe.
27. From the sterile pack take a piece of gauze and place under the cleaned CVAD. Rest the CVAD on the gauze. Discard the wipe used to anchor the CVAD.
28. If a new needle-free device is required (refer to local policy), clean the connection with a 2% chlorhexidine and 70% isopropyl alcohol wipe, detach the previous needle-free device and discard both the wipe and the connector.
29. If a new needle-free device is not required, clean the existing needle-free device with a 2% chlorhexidine and 70% isopropyl alcohol wipe. Discard 2% chlorhexidine and 70% isopropyl alcohol wipe and allow connector to dry. Ensure all connectors and hubs are free from dried blood and debris etc.
30. Take the sterile empty unused 10 ml syringe and attach to the CVAD. Aspirate 3–5 ml of blood and discard (to confirm patency and remove dead space blood from the line).
31. If a new needle-free device is required, attach the new pre primed needle-free device now.
32. Take the syringe filled with 0.9% sodium chloride (or a 10 ml pre- filled 0.9% sodium chloride syringe), attach to the CVAD with the sterile needle-free device and flush using a push pause technique. Discard the syringe.
33. Take the sterile PN primed giving set and remove the cap. Attach the giving set to the needle-free device. Clean the connection with a 2% chlorhexidine and 70% isopropyl alcohol wipe.
34. Hang PN infusion on drip stand and cover with the bag provided.
35. Insert giving set correctly into the volumetric pump, set the rate according to the prescription (2 Nurse checks). Open roller clamp on the giving set, unclamp CVAD if applicable and commence infusion.
36. Remove gloves and apron, discard all rubbish appropriately and wash hands.
37. Ensure patient is comfortable and dignity maintained.
38. Sign the prescription, record on fluid balance chart and document in patient notes.
39. Monitor for complications as per PN and CVAD guidelines.

## APPENDIX 6

### Disconnecting the PN

PN must never be routinely disconnected and then reconnected. You may be required to disconnect PN under the following circumstances;

- When PN is no longer required.
- When suspecting line sepsis, split or leak from the PICC / Hickman line or other complications.
- When a line not used frequently will need to be flushed with 10 ml of 0.9% sodium chloride twice weekly.

The following procedure needs to be followed if the patient is receiving cyclical PN or if the PN is being discontinued.

#### GATHER EQUIPMENT

1. Clean trolley
2. Alcohol hand gel
3. Sanitising wipes / solution
4. 2% chlorhexidine gluconate in 70% isopropyl alcohol sanitising wipes / 2% chlorhexidine and 70% isopropyl alcohol wipes x 3 sachets
5. Dressing pack (includes sterile gloves and towel)
6. 10 ml syringe x 2
7. 0.9% sodium chloride for injection
8. Sterile bung (if needle-free device not used)

#### STERILE NON-TOUCH TECHNIQUE FOR CONNECTING CYCLICAL PARENTERAL NUTRITION INFUSION

1. Correct patient identification.
2. Explain and discuss the procedure with the patient. Obtain informed consent where possible. Establish if the patient has any known allergies.
3. Wash your hands using liquid soap and dry hands, put on clean apron.
4. Clean the trolley, with soap and water, dry and clean again with 2% chlorhexidine and 70% isopropyl wipes. Ensure drip stand, volumetric pump and hand gel bottle are clean.
5. Clean hands with alcohol hand gel and allow to dry.
6. Switch off the pump, close the roller clamp on the giving set and close clamp on the CVAD (if applicable).
7. Gather equipment required, check expiry dates and place on the bottom shelf of the cleaned trolley.
8. Wash and dry hands again.
9. Open sterile dressing pack.
10. Clean hands with hand gel.
11. Carefully open the pack from the outer corners. Do not touch or contaminate the inside of the dressing pack.
12. Open all other equipment onto the sterile field.
13. If using 0.9% sodium chloride ampoules: pour the 0.9% sodium chloride into the gallipot in the sterile pack.
14. Clean hands with hand gel.
15. Slide the sterile towel underneath the CVAD, touching only the edges of the towel.
16. Clean hands with hand gel allow drying and putting on sterile gloves.
17. If using 0.9% sodium chloride ampoules: Draw up the 0.9% sodium chloride into one of the syringes.
18. Take 2 2% chlorhexidine and 70% isopropyl alcohol wipes (1 in each hand). Hold the CVAD in one hand and with the other hand clean the connection between the CVAD / needle-free device and used PN giving set with a 2% chlorhexidine and 70% isopropyl alcohol wipe. Disconnect used giving set and discard with the wipe.

## **STERILE NON-TOUCH TECHNIQUE FOR CONNECTING CYCLICAL PARENTERAL NUTRITION INFUSION**

19. From the sterile pack take a piece of gauze and place under the cleaned CVAD. Rest the CVAD on the gauze. Discard the wipe used to anchor the CVAD. Clean needle-free device or end of lumen with a 2% chlorhexidine and 70% isopropyl alcohol wipe and discard (ensure all hubs and connectors are free from dried blood and debris).
20. Take the syringe filled with 0.9% sodium chloride (or a pre-filled 0.9% sodium chloride syringe), attach to the CVAD and flush using a push pause technique. Discard the syringe.
21. Clean needle-free device or end of lumen with a 2% chlorhexidine and 70% isopropyl alcohol wipe and discard the wipe (ensure all hubs and connectors are free from dried blood and debris). If needle-free device not used, cap the end of the CVAD with a sterile bung.
22. Ensure patient is comfortable and dignity maintained.
23. Remove gloves and apron, discard all rubbish appropriately (as per Trust Guideline).
24. Wash hands.

## APPENDIX 7

# Written Information for Patients / Carers

## Parenteral Nutrition

### What is parenteral nutrition?

Parenteral nutrition (sometimes abbreviated to PN or TPN) is a method of feeding where you are given all the nutrition you need through a small plastic tube into a large vein in your neck or chest (central venous catheter / central line). The nutrients are delivered directly into your bloodstream.

### What are the benefits of parenteral nutrition?

At the moment your digestive system is not working as it should be and is unable to absorb adequate nutrients that your body needs to keep healthy. The benefit of parenteral nutrition is that it will provide all the nutrients your body needs to stay healthy whilst you are unable to eat, essentially providing you with a balanced diet.

### What are the risks of parenteral nutrition?

- The main risk is infection of the line through which the nutrition is given. To reduce this risk it is important to avoid touching or handling the line unnecessarily. If the dressing becomes dirty, wet or loose, please ask your nurse to change it as soon as possible. Your temperature and the site where the line is inserted will be checked regularly for any signs of infection.
- High blood glucose (sugar) can also occur. This will be monitored regularly by testing urine samples or finger prick blood samples and will be treated if needed.
- There is a risk that the function of your kidneys or liver could change. For this reason you will have regular blood tests whilst receiving parenteral nutrition so any changes can be monitored and treated as needed.

### What are the risks of not having parenteral nutrition?

If you are advised to have parenteral nutrition, the risk of declining it is that your body will not receive the nutrients it needs to function properly. This can impact on aspects of your health such as mobility, muscle strength and activities of daily living.

### Are there any alternatives?

There are no alternative ways of providing the nutrition your body needs whilst your digestive system is not functioning as no other methods bypass the digestive system.

### How is the nutrition given?

A small plastic tube called a central venous catheter, or central line, will be inserted through your skin into a large vein in your neck or chest. This will be done by a trained radiologist or anaesthetist.

### What does the parenteral nutrition contain?

- Glucose – provides energy
- Proteins – essential for growth, healing and maintenance of tissues
- Fats – maintain energy stores
- Vitamins – keep the body healthy and functioning correctly
- Minerals – help to make blood cells and important for healing and muscle function
- Fluid – to maintain hydration

### **Can I still eat or drink whilst on parenteral nutrition?**

Whether you can eat and drink or not will depend on your medical condition; your doctors or the nutrition team will discuss this with you.

Parenteral nutrition usually satisfies the appetite for most people however your mouth may feel dry so it is important to clean your teeth regularly. Mouthwashes can also help.

### **How long is the parenteral nutrition attached for?**

To begin with, parenteral nutrition will be given continuously over 24 hours. Once you are stable on it, the amount of time it needs to be given for may be altered to give you more freedom.

### **Will I still be able to move around?**

You will still be able to move around and your movement should not be restricted too much but you will need to keep the feed connected throughout the day. The pump and feed will hang on a mobile stand, and the pump will have a battery facility that will last for several hours.

### **Will I be able to take a bath or shower?**

You will be able to have a bath or shower but do not get the catheter or dressing too wet. If the dressing does get wet you must ask the nurse to change it as soon as possible.

### **Will my bowel habits change?**

Parenteral nutrition goes straight into the bloodstream but you will still produce bowel movements (poo) from mucus, cells and bacteria. Parenteral nutrition should not cause diarrhoea or pain.

### **How will I be monitored?**

Whilst receiving parenteral nutrition we will monitor your progress carefully to make sure that your body is tolerating it and you have not developed an infection.

The Nutrition Team will visit you each working day to monitor your progress, ensure things are running smoothly and answer any questions you have about this treatment. The team consists of a specialist nutrition nurse, dietitian, pharmacist and consultant.

- You will have daily blood tests which will help to ensure that you receive any extra nutrients that you may require.
- Your temperature, pulse, blood pressure and blood glucose levels will be checked regularly throughout the day.
- The nurses will keep a strict record of your fluid intake and output so that we can ensure you are receiving the correct amount of fluid.
- You will be weighed regularly.
- The Nutrition Team will work closely with your ward team to ensure that we can monitor any changes that are relevant to your nutritional intake.

### **How long will I need parenteral nutrition for?**

The length of time you need parenteral nutrition for will depend on your specific condition. Your nutrition team will be able to give you an idea of how long you may need it for.