WORKSHOP ON PARENTERAL NUTRITION

FACILITATORS:
AMINA CHUGHTAI, RDN
SIDRA ARSLAN, RDN
OBJECTIVES

• Introduction to the basics
• Indications and contraindications
• Decision making algorithm
• Routes
• Nutrient recommendations
• Calculations and hands on practice
• Complications and PN in special disease states
What is parenteral nutrition?

_Infusion of nutrients through an intravenous line._
Nutrients?

- Dextrose
- Amino acids
- Vitamins
- Minerals
- Lipid
- Electrolytes
- Trace elements
Who is responsible?

- Physician
- Clinical Dietitian
- Pharmacist
- Nurse Manager
PN addresses factors that lead to malnutrition

- Impaired absorption or loss of nutrients
- Mechanical bowel obstruction
- Need to restrict oral or enteral intake: bowel rest
- Motility disorders
- Inability to achieve or maintain enteral access
PN can be used in a variety of settings

- Acute care
- Chronic care
- Home PN
## Indications & Contraindications

<table>
<thead>
<tr>
<th>Indication</th>
<th>Contraindication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severely malnourished patient in whom enteral feeding is not possible, or have non functioning gut or are not meeting nutrient target via enteral intake alone.</td>
<td>Well-nourished individuals who cannot maintain enteral intake for the first week.</td>
</tr>
<tr>
<td>Severe diarrhea or vomiting</td>
<td>Severe fluid or electrolyte disturbance</td>
</tr>
<tr>
<td>Massive bowel resection</td>
<td>Hyperosmolality</td>
</tr>
<tr>
<td>Diffuse peritonitis</td>
<td>Encephalopathy</td>
</tr>
<tr>
<td>Gut ischemia</td>
<td>Patients with functional gut</td>
</tr>
<tr>
<td>Enterocutaneous fistula with high output</td>
<td>Patients meeting 60% of nutrient needs enterally or orally in one week</td>
</tr>
<tr>
<td>Intestinal obstruction with failure for nutrient delivery for 7 days</td>
<td></td>
</tr>
<tr>
<td>Patients unable to meet 60% of their nutrient needs enterally or orally in one week</td>
<td></td>
</tr>
</tbody>
</table>
PN Decision Making Algorithm

START

Able to meet needs via the oral route?

No

Contraindication to use of gut? (see BLUE BOX - A)

Yes

Consider TPN (Individual assessment re appropriateness required)

Oral diet

Contraindication to use of gut? (see BLUE BOX - A)

No

Enteral Nutrition

Yes

Consider TPN (Individual assessment re appropriateness required)

Contraindication to gastric feeding (see PINK BOX - B)

No

NG tube

Yes

ND tube

Pending abdominal surgery?

No

Short term: ND tube. Place using a manual technique (see above). Place endoscopically or fluoroscopically if manual placement failed or contraindicated.

Long term: Gastro-jejunostomy tube. Place tube endoscopically or fluoroscopically.

Yes

Short term EN: ND tube. Place using an intra-operative placement technique.

Long term EN: Gastro-jejunostomy or jejunostomy tube. Place tube intra-operatively.

BOX - A: Contraindications to use of gut:

Absolute:
- Mechanical bowel obstruction
- Bowel ischemia

Relative:
- Hemodynamic instability
- Small bowel ileus
- Bowel anastomosis

BOX - B: Contraindication to gastric feeding:
1) Gastric residual volumes > threshold maximum (250 ml) despite prokinetic(s).
2) Chronic/acute gastroesophageal reflux.
3) High risk pulmonary aspiration (e.g. nursed in the supine or prone position).

Refer to resource entitled “ICU Guideline: Manual ND Feeding Tube Placement” for direction how to place ND tube.

Developed by: J. Greenwood, RD. Critical Care Program – Vancouver Coastal Health Authority (Update 7/4/2010). Used with permission.
This patient care pathway provides steps and online resources — from initial assessment of need to transition to home — for patients who may require parenteral nutrition (PN). Click on resources to pull up documents, checklists, and websites. Please note that, though the majority of these materials are open-source, some require a subscription in order to obtain access to full journal articles.

This pathway was developed by the ASPEN PN Safety Committee.

Overview of Pathway

Click on a title in the pathway below to jump directly to that section.
Special Considerations

• Hyperglycemia, Diabetes Mellitus or insulin resistance
• Decreased cardiac output/renal insufficiency
• Retention of Pco2 (respiratory diseases/infections)
• Severe electrolyte imbalance
• Patients with egg allergies should be given fat free TPN due to its phospholipid content.
• Patients with liver disease
• Hypochloremic metabolic acidosis
• Hyperosmolality
Routes

- Nasogastric tube
- Gastrostomy tube
- Jejunostomy tube
- Nasoduodenal tube
- Nasojejunal tube
- Intravenous alimentation
- PPN
- TPN
Internal Jugular Vein
Non-tunneled Central Venous Catheter (multiple lumen)
Subclavian Vein
Tunneled Central Catheter
Cephalic Vein
Basilic Vein
PICC (Peripherally Inserted Central Catheter)
Midline Catheter (PPN only)
Peripheral Intravenous Catheter (PPN only)
Femoral Vein (PPN only)
Nutrition Assessment

- Mandatory within 48 hours post admission.
- Dietitian consult mandatory once decision is undertaken to initiate PN.
- Check weight and height of all patients who are FC 1-2.
<table>
<thead>
<tr>
<th>Nutrient Recommendations</th>
<th>General</th>
<th>Obesity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calories</strong></td>
<td>25-35 kcal/day</td>
<td>11-14 kcal/kg body weight if BMI 30-50 km &lt; 350 22–25 kcal/kg ideal body weight per day if BMI &gt;50.</td>
</tr>
<tr>
<td><strong>Glucose</strong></td>
<td>Infusion ideal CHO infusion is &lt;0.25 g/kg/hour according to ASPEN and not exceed 7g/kg/d in adults.</td>
<td></td>
</tr>
<tr>
<td><strong>Protein</strong></td>
<td>1.2-2.5 g/kg/day</td>
<td>2 g/kg ideal body weight/day if BMI 30-40 and 2.5g/kg ideal body weight/day if BMI &gt;40</td>
</tr>
<tr>
<td><strong>Fat</strong></td>
<td>IVFE infusion rate should not exceed 0.11g/kg/hour (if SGPT and bilirubin are normal)</td>
<td></td>
</tr>
<tr>
<td>Electrolyte</td>
<td>Amount</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>10-15 mEq</td>
<td></td>
</tr>
<tr>
<td>Magnesium</td>
<td>8-20 mEq</td>
<td></td>
</tr>
<tr>
<td>Phosphorus</td>
<td>20-40 mMol</td>
<td></td>
</tr>
<tr>
<td>Sodium</td>
<td>1-2 mEq/kg</td>
<td></td>
</tr>
<tr>
<td>Potassium</td>
<td>1-2 mEq/kg</td>
<td></td>
</tr>
<tr>
<td>Chloride</td>
<td>As needed to maintain acid/base balance</td>
<td></td>
</tr>
<tr>
<td>Component</td>
<td>Dose</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>Ascorbic Acid</td>
<td>200 mg</td>
<td></td>
</tr>
<tr>
<td>Retinol</td>
<td>1 mg</td>
<td></td>
</tr>
<tr>
<td>Thiamin</td>
<td>6 mg</td>
<td></td>
</tr>
<tr>
<td>Riboflavin</td>
<td>3.6 mg</td>
<td></td>
</tr>
<tr>
<td>Pyridoxine</td>
<td>6 mg</td>
<td></td>
</tr>
<tr>
<td>Niacinamide</td>
<td>40 mg</td>
<td></td>
</tr>
<tr>
<td>Cyanocobalamin</td>
<td>5 mcg</td>
<td></td>
</tr>
<tr>
<td>Biotin</td>
<td>60 mcg</td>
<td></td>
</tr>
<tr>
<td>Folic acid</td>
<td>600 mcg</td>
<td></td>
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</tbody>
</table>
Line Access:
There should be a proper access for parenteral nutrition i.e. PICC line, central venous catheter or Hickman.

**DO NOT USE MEDICINE PORTS FOR PN**
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Initiation</th>
<th>Stable Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>HB, HCT, WBC, lymphocytes</td>
<td>-</td>
<td>Weekly</td>
</tr>
<tr>
<td>INR, PT, PTT</td>
<td>-</td>
<td>Weekly</td>
</tr>
<tr>
<td>Electrolytes (Na, K, Cl, Mg, Co2, Ca, Phosphorus, BUN, Cr)</td>
<td>Daily x3</td>
<td>1-2 times/week</td>
</tr>
<tr>
<td>Serum triglycerides</td>
<td>Day 1</td>
<td>Weekly</td>
</tr>
<tr>
<td>Serum glucose</td>
<td>Daily x3</td>
<td>1-2 times/week</td>
</tr>
<tr>
<td>Weight</td>
<td>Daily</td>
<td>2-3 times/week</td>
</tr>
<tr>
<td>Intake and output</td>
<td>Daily</td>
<td>Daily unless fluid status assessed by physical exam</td>
</tr>
</tbody>
</table>
Calculation and Hands on practice (1 hour)
Complications

• Hyperglycemia
  • Hypoglycemia
  • EFA deficiency
• Hypertriglyceridemia
  • Azotemia
  • Refeeding syndrome
• Deranged LFTs
  • Thrombophlebitis
  • Fluid and electrolytes
• Vitamins
  • Mortality
Special Disease States

• Geriatrics
• Hepatology (alcoholic steatohepatitis, liver cirrhosis and acute liver failure)
• Surgery
• Gastroenterology (crohn’s disease, ulcerative colitis, Short bowel syndrome)
• Cardiology and pneumology
• Panreatitis
Questions