OBJECTIVES

- Definition
- Indications for TPN administration
- Composition of TPN solutions
- Access routes for TPN administration
- Monitoring TPN administration
- TPN administration practice guidelines
- Fluid management with TPN
- Complications of TPN
- Documentation
Understanding TPN
WHAT IS TPN?

- **Definition**: The administration of a nutritionally adequate hypertonic solution consisting of dextrose, amino acids, protein, minerals, fats, vitamins and trace elements through an intravenous catheter.
INDICATIONS FOR TPN ADMINISTRATION

- Small bowel ileus
- High output fistula >500 mls/day
- Mechanical small bowel obstruction
- Bowel infarction/bowel ischemia
- Inability to tolerate enteral feeding
COMPOSITION OF TPN SOLUTIONS

- Lipids
  - One solution – 20% at NYGH

- Electrolytes
  - Standard electrolytes: Na, K, Ca, PO4, Mg, Cl, Acetate

- Vitamins
  - MVI-12

- Minerals
  - Zinc, copper, manganese, selenium, chromium
TYPES OF TPN SOLUTIONS

- **LOW CONCENTRATION**
  - \( \leq 10\% \) dextrose, Amino Acids
  - A.k.a. Peripheral solutions
  - Usually through 18 gauge [pink] angiocath

- **HIGH CONCENTRATION**
  - \( > 10\% \) dextrose, Amino Acids
  - A.k.a. Central Venous solutions
  - Through PICC, CVC site ONLY
ACCESS ROUTES
FOR TPN ADMINISTRATION

Peripheral Lines

- Arm veins
- TPN expected to run < than 2 weeks
- For < 10% dextrose solution ONLY
ACCESS ROUTES
FOR TPN ADMINISTRATION

Peripheral Line complications:

- Phlebitis
- Thrombophlebitis
- Infiltration
- Extravasation
- Occlusion
- Pain
Central Venous Catheters

- The subclavian or internal jugular vein is catheterized
- Used when peripheral veins are unsuitable
- Used when patient requires high concentration solution for high energy requirements
ACCESS ROUTES FOR TPN ADMINISTRATION

Central Line complications:
- Sepsis
- Pneumothorax
- Embolism
ACCESS ROUTES FOR TPN ADMINISTRATION

Peripherally Inserted Central Catheters (PICC)

- Inserted into the basilic or cephalic vein then threaded up toward the heart into the right subclavian vein
- TPN expected to run > 1 wk
- Infuse either central or peripheral solution
ACCESS ROUTES FOR TPN ADMINISTRATION

PICC Line complications
- Catheter occlusion (frequent)
- Sepsis
- Pneumothorax
- Embolism
MULTIDISCIPLINARY TEAM APPROACH

- **Physician** orders TPN due to clinical presentation
- **Dietitian** recommends type of TPN or verifies TPN prescribed
- **Pharmacy** dispenses TPN ordered
- **Nursing** administers/monitors patient response
MONITORING TPN ADMINISTRATION

Before starting TPN…

- Obtain patient’s weight

- Obtain baseline blood work including blood sugar to establish hepatic and renal function

- Fax order to pharmacy before 11 am
During TPN therapy, monitor…

- **Standard TPN Bloodwork:**
  - Electrolytes, urea, creatinine, Ca, Mg, PO4, Alb, TG, glucose, ALP, AST, ALT, Cholesterol, Bilirubin, Platelets, INR, PTT
  - Glucometer BID until BS <7, then as ordered

- Patient’s Weight
- Intake and output
  - IV, PO, CT, NG tube, fistula, urine, BM, ostomy, surgical drains
TPN ADMINISTRATION PRACTICE GUIDELINES

- Double check physician’s orders with TPN pharmacy labels
- Document on eMAR record by scanning barcodes on TPN bags when hanging
- Practice aseptic technique for IV therapy
- Clean ports with 2% chlorhexidine gluconate with alcohol wipes
- Document volume infused on Intake and Output form every 8 hours
TPN ADMINISTRATION PRACTICE GUIDELINES

- Always infuse TPN with an **infusion pump**
- Change TPN tubing every 24 hours (daily at 1400)
- Monitor for signs & symptoms of complications
FLUID MANAGEMENT WITH TPN

Total Fluid Intake (TFI)
- Identified in a physician’s order
- Prescribed to prevent fluid overload
- The amount of fluids (continuous IV, Travasol, lipids, medications) received by the patient
- Described in mL/hour
How do you maintain the TFI ordered in the following scenario?

- Patient is post-op day 3 with an ileus and is prescribed TPN.
- This patient is receiving an IV R/L @ 80 ml/hr and is prescribed Travasol @ 1500 mL/24 hours and Lipids @ 250 mL/12 hours.
- The TFI ordered is 125 mL/hr.
FLUID MANAGEMENT WITH TPN

To get the TFI, manipulate the IV rate.

- Travasol rate/hour?
- Lipids rate/hour?
- TFI – (Travasol + Lipids)
- Change IV rate to equal TFI
- Document all rates and volumes on Powerchart

- $1500/24 = 62.5$
- $250/12 = 20.8$
- $125 – (63 + 21) =$
- $125 – 84 = 41$
- IV rate $\downarrow$
  from 80 to 41mL/hr when lipids are running
COMPLICATIONS ASSOCIATED WITH TPN THERAPY

Complications related to administration

- Sepsis
- Pneumothorax
- Embolism
- Catheter occlusion
- Fluid overload or pulmonary edema

Complications related to composition of the solutions

- Metabolic disturbances
- Hypo/hyperglycemia
- Hypo/hyperkalemia
- Hypo/hypercalcemia
DOCUMENTATION OF TPN

- Verify physician’s TPN orders
- Document TPN administration on eMAR by scanning with Caremobile
- Document TPN volumes on Intake and Output powerform
**eCARE DOCUMENTATION OF TPN VOLUMES**

<table>
<thead>
<tr>
<th>Intake And Output</th>
<th>24 July 2011 7:00 - 29 July 2011 6:59</th>
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<tbody>
<tr>
<td><strong>Intake</strong></td>
<td></td>
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<tr>
<td></td>
<td><strong>Continuous Infusions</strong></td>
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<tr>
<td></td>
<td><strong>Medications</strong></td>
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<tr>
<td></td>
<td><strong>Oral</strong></td>
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<tr>
<td></td>
<td><strong>Supplements/Enteral</strong></td>
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<td></td>
<td><strong>Transfusions</strong></td>
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<td></td>
<td><strong>Hx IV Bolus Infusions</strong></td>
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<td></td>
<td><strong>Hx IV Continuous Infusions (Medications)</strong></td>
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<tr>
<td></td>
<td><strong>Hx IV Medication</strong></td>
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<td></td>
<td><strong>Hx Parenteral Intake</strong></td>
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<tr>
<td></td>
<td><strong>Hx TPN/Supplements/Enteral Intake</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Hx Transfusions</strong></td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td></td>
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<tr>
<td></td>
<td><strong>Urine Output</strong></td>
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<tr>
<td></td>
<td><strong>Stool Output</strong></td>
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<td><strong>Other Output Sources</strong></td>
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<td><strong>Drains and Chest Tubes</strong></td>
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<td></td>
<td><strong>Hx Output</strong></td>
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**Intake Total**

<table>
<thead>
<tr>
<th>Time</th>
<th>13:00 - 13:59</th>
<th>12:00 - 12:59</th>
<th>11:00 - 11:59</th>
<th>10:00 - 10:59</th>
<th>9:00 - 9:59</th>
<th>8:00 - 8:59</th>
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<tbody>
<tr>
<td>Today's Intake</td>
<td>110</td>
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<tr>
<td>Yesterday's Intake</td>
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<td>2400</td>
<td>Balance</td>
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**Medications**

- **Intralipid IV 250 mL**
- **normal saline 500 mL**
- **TPN Amino Acid 6% Dextrose 16.6... mL**
- **Dextran 40 IV 250 mL**
- **dimenhydrinate**
- **pancreozide**

**Oral Intake**

- **Oral Intake mL**

**Hx Parenteral Intake**

- **Hx Parenteral Intake mL**
### eCARE DOCUMENTATION OF TPN ADMINISTRATION

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<tbody>
<tr>
<td><strong>Scheduled</strong></td>
<td><strong>2011-Jul-27 13:44</strong></td>
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<tr>
<td><strong>Unscheduled</strong></td>
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<tr>
<td><strong>PRN</strong></td>
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<tr>
<td><strong>Continuous Infusions</strong></td>
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**Medications**

<table>
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<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Fat emulsion, intravenous</td>
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<tr>
<td><em>Intralipid IV 250 mL</em></td>
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<tr>
<td>250 mL Bag, IV (PICC LN), Routine, Start date 07/27/11 14:00.00, Rate at 20.83 mL/hr, Infuse over 12 HR.</td>
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<tr>
<td>Administration Information</td>
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<tr>
<td>Fat emulsion, intravenous</td>
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<table>
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<tr>
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<th>Pending</th>
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<tbody>
<tr>
<td><em>Normal saline 500 mL</em></td>
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<tr>
<td>500 mL Bag, IV, Routine, Start date 07/10/11 1:24:00, Rate at 30 mL/hr</td>
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<tr>
<td>Administration Information</td>
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<tr>
<td>Sodium Chloride 0.9%</td>
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<tr>
<td><em>TPN Amino Acid 6%/Dextrose 16.6% Bag 1,700 mL + Multi-12 inj...</em></td>
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<tr>
<td>1,700 mL, 1,700 mL, IV (PICC LN), Rate at 94.44 mL/hr, Infuse over 18 HR, run total volume over 18hrs (start @ use...)</td>
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<tr>
<td>Administration Information</td>
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</tbody>
</table>
TPN is ordered to meet nutritional needs

Hypertonic IV solution consisting of glucose, protein, minerals, fats and vitamins given intravenously

Peripheral, CVC, PICC preferred

Monitor body’s metabolic status- glucometer, daily lab work

Documented on eCare
REVIEW QUESTION 1

What would happen if the $\leq 10\%$ concentration TPN solution was administered through a PICC or CVC site?

Is this safe or unsafe for the patient?
Administering \( \leq 10\% \) concentration TPN solution through a PICC or CVC site is safe. Sometimes it is preferred for patients with poor peripheral access.
The best route for TPN administration is through a PICC line.
REVIEW ANSWER 2

TRUE
REVIEW QUESTION 3

TRUE OR FALSE?

Bloodwork/monitoring is required only once TPN solution has started.
REVIEW ANSWER 3

FALSE
REVIEW QUESTION 4

TRUE OR FALSE?

In order to process a TPN order, the pharmacist must receive the order by 11 am.
REVIEW ANSWER 4

TRUE
QUESTIONS?

It's QUESTION TIME!!