Keeping It Safe with HPN

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Objectives

• Learn what you can do to:
  – Maximize TPN benefits
  – Minimize TPN-related problems
• Learn how to monitor your therapy
• Learn how to read a TPN label
• Learn when to contact your healthcare provider
Common Misconceptions

• HPN is toxic
• Those receiving HPN are homebound
• All healthcare professionals are knowledgeable regarding HPN

Tell me your stories...
Maximize Benefits

• Set a target weight
  – Weight loss
  – Weight gain
  – Weight maintenance
• Maintain/improve energy level
• Supportive care for your primary disease
Minimize Complications

- Dehydration/overhydration
- High/low blood sugar
- Bloodstream infection
- Other IV catheter complications
- Electrolyte/mineral abnormalities
- Vitamin/trace element abnormalities
Dehydration: Signs and Symptoms

- Lethargy
- Rapid pulse
- Lightheaded
- Dry eyes, mouth
- Irritability
- Reduction in urine output
- Weight loss

- Decreased skin turgor
Over-Hydration: Signs and Symptoms

• Fluid retention in your ankles (when standing)
• Fluid retention in your face (when lying down)
• Difficulty breathing
• Weight gain
Monitor Hydration

Monitor intake/output

Monitor weight
# Intake/Output Record

<table>
<thead>
<tr>
<th>Date</th>
<th>Wt (lbs)</th>
<th>Goal Wt (lbs)</th>
<th>Temperature</th>
<th>INTAKE (mL)</th>
<th>Oral Fluid</th>
<th>TPN</th>
<th>IV Fluid</th>
<th>TOTAL INTAKE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td>Oral Fluid</td>
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<td>TPN</td>
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<td>IV Fluid</td>
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<td>TOTAL INTAKE</td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OUTPUT (mL)</th>
<th>Urine</th>
<th>Ostomy</th>
<th>Diarrhea</th>
<th>Vomit</th>
<th>Fistula</th>
<th>Other</th>
<th>TOTAL OUTPUT</th>
</tr>
</thead>
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</tbody>
</table>

1 ounce = 30 mL
1 cup = 8 ounces = 240 mL
1 quart = 32 ounces = 960 mL
Normal Fluid Requirements

- Average adult daily fluid intake:
  - 30-40mL/kg
  - Approximately 2200-2700mL
  - 75% from oral intake
  - 25% from metabolism of food
Normal Fluid Output

- Urine → 1200-1500mL
- Stool → 100-200mL
- Insensible losses (skin, lungs) → 500mL
Risk of Dehydration

• Vomiting (new onset) that lasts > 1 day
• Urine output <500mL/d x 2 days in a row
• Ostomy/stool increase by >500mL/d from usual x 2 days in a row
Low Blood Sugar
< 60 mg/dL

- Sweat
- Tremble
- Feel hungry
- Feel anxious

Leading to

- Weakness
- Difficulty walking
- Difficulty with vision
- Personality changes
- Confusion
High Blood Sugar
> 180 mg/dL

• Frequent urination
• Feeling thirsty
• Blurred vision
• Weight loss or difficulty gaining weight
• You may have no symptoms
• It may increase your risk for infection
• Acute increase may be a sign of infection
Monitor Blood Sugar

• Check fingerstick glucose 3 times daily:
  – 1 hour after starting TPN infusion
  – Mid-cycle
  – 1 hour after stopping TPN infusion

• When stable, routine fingerstick monitoring can be stopped
Monitor Urine Sugar

- Tests for the presence of sugar in the urine
- If sugar is high in the blood, it will “spill” over into the urine
- Useful screening tool
- If it tests positive (≥1/4%), you may need to monitor blood sugar
Monitor Your IV Catheter

- Infection
- Occlusion
- Blood clot
- Damage (leak, tear, rupture)
Laboratory Monitoring

- BMP: Sodium, potassium, chloride, bicarbonate, BUN, Cr, calcium glucose
- Magnesium
- Phosphorus
- CBC
- Liver function tests
- Albumin

- Iron studies
- Vitamin D, other vitamin levels
- Trace elements: zinc, selenium, copper, manganese
- Bone density (DEXA)
HPN Compounding

- Batch preparation (weekly)
- Beyond-use dating is 9 days at refrigerated temp
- Certain medications can degrade over time, so must be added just prior to administration
Monitor Your TPN Formula

• Nutrient content from the label
• Volume of bag and how long to infuse
• Expiration date
• Drug additives
Weight: 70 kg

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amino Acids</td>
<td>100 g/d</td>
</tr>
<tr>
<td>Dextrose</td>
<td>350 g/d</td>
</tr>
<tr>
<td>Lipid</td>
<td>50 g/d</td>
</tr>
<tr>
<td>Sodium chloride</td>
<td>150 mEq/d</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>80 mEq/d</td>
</tr>
<tr>
<td>Sodium phosphate</td>
<td>20 mmoL/d</td>
</tr>
<tr>
<td>Calcium gluconate</td>
<td>10 mEq/d</td>
</tr>
<tr>
<td>Magnesium sulfate</td>
<td>30 mEq/d</td>
</tr>
<tr>
<td>Multiple trace elements</td>
<td>1 mL/d</td>
</tr>
<tr>
<td>Multivitamins-13</td>
<td>10 mL/d (to be added prior to infusion)</td>
</tr>
<tr>
<td>Insulin</td>
<td>20 units/d (to be added prior to infusion)</td>
</tr>
</tbody>
</table>

Infusion Volume: 2000 mL
Compounded Volume: 2100 mL

Infuse over 12h, taper down over 1h

Central Line Use Only
Discard after: 4/9/17
Monitor Your TPN Formula

- Bags should be chilled upon delivery
- Circulate your supply with each delivery
- Verify that there are no leaks
- No “floaters” in bag
Cracked Emulsion
• Guidelines may vary depending on your TPN prescriber
• Fever
• High/low blood sugar
• Changes in weight, output
• Central line complications
• Missed bags
• ER visit or hospital admission
Who to call?

• TPN physician/team
  – Dietitian
  – Pharmacist
  – Nurse
• Home health nurse
• Home infusion pharmacy
• Primary care physician
• Other physician: surgeon, gastroenterologist, etc
Guidelines for Bathing/Showering
Tunneled Catheter

• You may take a bath for the first 2 weeks after placement as long as the dressing stays dry
• Wait 2 weeks before showering. It is best to remove the needle before showering if you have a port.
• Wait 4 weeks before submerging under bath water
Guidelines for Swimming
Tunneled Catheter

• Wait 4 weeks before swimming in a chlorinated pool
• Avoid swimming in any natural sources of water, such as lakes, ponds, or oceans
• Avoid using hot tubs and whirlpools
Many hospitals hesitant to use TPN bags prepared by another facility

Based on institution policy

Advantages of bringing a TPN bag when presenting to ED/hospital:

– Provides the clinician specific information regarding PN contents
– No interruption in therapy
– Prevents wastage
Use of HPN Bags When Hospitalized

- Disadvantages to bringing a TPN bag when presenting to ED/hospital:
  - Adjustments in contents may be required
  - Logistics of who adds multivitamins and possibly other additives
  - Staff may be unfamiliar with bag or formulation
- If using, ensure adequate storage conditions of PN bag in transit to hospital
- For elective admissions, notify home infusion provider and plan TPN delivery accordingly
Oley Foundation Resources
Oley.org

Tools

- Video Library
- Webinars
- HPN Awareness Week
- MY HPN – Interactive Online Education on IV Nutrition (Modules 1-4)
- Save My Line (poster to remind hospital staff to treat your central line properly)
- HPN Complication Chart

Resources

- Adjusting to IV Nutrition/Tube Feedings (Resources/suggestions for coping/living with home parenteral nutrition)
- Bright Ideas/Products (Suggestions from Oley members to make IV nutrition easier)
- Equipment/Supply Exchange (Connects families in need of formula, pumps, tubing and other supplies to families who have those items to donate)
- Diet, Hydration, Diarrhea (Includes articles, presentations and short videos)
- FAQs: HPN
- Meet Consumers/Patients
- Omegaven and Other Alternative Lipids
- Restaurant and Bathroom Cards (to easily explain why you cannot order a full meal or to help quietly and privately gain access to public restrooms)
- Swimming with IV Nutrition/Tube Feedings (Resources/guidelines for tube-fed consumers)
- Travel/Hospital Packet (to help consumers communicate medical history and needs during travel or in unfamiliar hospitals)
- Travel Tips (Suggestions and services available to make traveling easier for IV nutrition consumers)
Poster to remind hospital staff to treat your line properly.
# HPN Complication Chart

**Infection A. Systemic Infection:**

**Symptoms:** Temperature one degree or more above baseline/normal temperature; chills, especially occurring with infusion; sweating; lethargy; body aches; urine spot checks may show glucose levels greater than 1/2%.  

**Cause:** Poor aseptic technique during connection/disconnection procedures; contaminated tubing or heparin or saline flushes; contaminated IV solution; exposure to illness outside body (flu, cold, chicken pox, etc.) or inside body (urinary tract infection, dental abscess/caries, fistulae, illecostomy/colostomy/gastrostomy sites, etc.); routine dental work without prophylactic antibiotic coverage.  

**Immediate Action:** Call MD immediately. If MD unavailable, go to local emergency room.  

**Prevention:** Use proper aseptic technique at all times, including meticulous handwashing. Inspect all solutions beforehand for cloudy/particulate matter. If possible, avoid individuals with known illnesses or possible exposure to communicable diseases. Schedule routine dental checkups; inform dentist of indwelling central venous access (catheter) and follow protocol for prophylactic antibiotic coverage for dental work as prescribed by primary MD (call Oley for suggested protocol if needed).  

**Infection B. Exit Site/Tunnel Infection or Inflammation:**

**Symptoms:** Redness, pain, swelling or drainage at insertion site or along the catheter tract.  

**Cause:** Poor aseptic technique during site care; retained sutures in skin.  

**Immediate Action:** Call your physician/nurse. If unavailable, go to local emergency room.  

**Prevention:** Use proper aseptic technique during site care, including meticulous handwashing. Change dressing if loose, wet or soiled.  

**Hyperglycemia**

**Symptoms:** Nausea; weakness; thirst; headache; urine spot checks show glucose levels greater than 1/2%; anxiety spells, nightmares.  

**Cause:** Fluids infused too fast; too little insulin in infusion solution if diabetic; improper mixture of HPN solution; infection (hyperglycemia can be a very early warning sign, even before fever is present); certain medications (steroids and some chemotherapy agents).  

**Immediate Action:** Call MD immediately; may need to decrease infusion rate or add insulin as directed by MD.  

**Prevention:** Maintain prescribed drip rate – never try to “catch up” if rate slows. Maintain aseptic technique at all times. Inspect labels of all HPN bags closely for consistency in formula; changes in formula should be indicated to you by your primary MD/Pharmacist/RN prior to shipment of new bags, any questions call MD; if requested, return bag to MD for analysis of solution. Monitor temperature; Alert nutrition MD if started on any new medications by other physicians, or if you start any over the counter medications or herbal supplements.  

**Hypoglycemia**

**Symptoms:** Sweating; pale facial color; heart palpitations; nausea; headache; shaky feelings; blurred vision; hunger pains; lightheadedness.  

**Cause:** HPN fluid stored abnormally without adequate period of warming; HPN bag finishing early due to malfunction of pump.
Summary

• Know what you can do to monitor your response to therapy
• Monitoring will help minimize complications
• Keep your healthcare provider updated
• You can take an active role to improve outcome!