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Department Policy  
Code: D:MM-5635

Entity: Fairview Pharmacy Services  
Department: Fairview Home Infusion  

<table>
<thead>
<tr>
<th>Category:</th>
<th>Home Infusion</th>
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</thead>
<tbody>
<tr>
<td>Subject:</td>
<td>Parenteral Nutrition - FHI</td>
</tr>
<tr>
<td>Purpose:</td>
<td>To provide guidelines for the safe administration of parenteral nutrition in the home environment.</td>
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<tr>
<td>Policy:</td>
<td>Parenteral nutrition (PN) will be administered in the home setting to ensure patient safety and facilitate the achievement of desired outcomes. PN is indicated for any patient who physically or metabolically cannot meet nutrition requirements via oral or enteral routes.</td>
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<tr>
<td>Definitions:</td>
<td>I. Nutrition Support Team (NST) - Home nutrition support is a multi-disciplinary, collaborative team effort with shared roles and responsibilities. Fairview Home Infusion (FHI) has defined our Nutrition Support Team as a multi-disciplinary team whose focus is to provide care to patients requiring nutrition therapy at home. Dietitians, nurses and pharmacists will collaborate with prescribers to provide care that utilizes best practice protocols. NST members or FHI clinicians will identify patients who are at high risk for complications related to PN or who are not responding well to current therapy. The NST will collaborate on identified patients on a scheduled basis and develop a plan to optimize therapy while meeting the needs of the patient. Additionally, NST members will communicate patient status, ongoing therapy plan and goals with the provider and other FHI clinicians.</td>
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<table>
<thead>
<tr>
<th>Procedure:</th>
<th>I. Initiating PN in the home</th>
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<tbody>
<tr>
<td>A. Patients referred for initiating PN in the home will be assessed</td>
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**II. Roles and responsibilities**

A. Provider: Overall responsibility for goals and any patient care rendered by the Nutrition Support Team

B. NST members:
   1. Clinical monitoring of fluid and electrolyte status
   2. Evaluating the effects of the disease process on metabolism
   3. Monitoring response to nutrition therapy
   4. Monitoring oral intake
   5. Evaluating labs results and adjusting PN formula
   6. Communicating with other disciplines and patient

C. Pharmacist unique role:
   1. Evaluating labs and adjusting micronutrients
   2. Evaluating PN formula compatibility and stability

D. Dietitian unique role:
   1. Evaluating labs and adjusting macronutrients
   2. Transitioning from PN to enteral and/or oral nutrition

E. Nurse: May include:
   1. Assessment of whether the patient is appropriate for home care
   2. Evaluation of central line access device
   3. Nutrition-focused physical assessment
by the NST for safety and appropriateness. All patients on PN require a central line access. PN must be administered on an electronic pump. Patients with the following diagnosis/clinical conditions may not be safe to start PN at home:

1. Poorly controlled diabetes
2. Acid-base imbalances
3. Abnormal electrolytes
4. Substance abuse
5. Eating disorders
6. Hepatic or renal failure
7. Fluid issues
8. High risk for refeeding syndrome

B. The following lab tests are required to be drawn within 48 hours prior to home initiation of PN: BMP (basic metabolic panel), magnesium, and phosphorus.

C. Abnormal electrolytes will be replaced as needed prior to PN initiation.

D. When electrolytes are stable, PN will be initiated with a formula as determined by the NST. Generally, this will be a 24-hour cycle with a low dextrose dose. Amino acids and lipids can generally be started at goal. If a patient is allergic to eggs, peanuts, broad beans (fava beans), or soybeans, initial lipid administration must be in a controlled setting. See FHI policy “Initiation of Parenteral Drug Therapy at Home”.

E. The NST will determine the initial lab monitoring schedule and frequency of nursing visits.
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<table>
<thead>
<tr>
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<th>F. The NST will advance PN to goal as quickly and safely as possible based on labs, weights, and patient tolerance.</th>
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<tbody>
<tr>
<td></td>
<td>G. For safety reasons, PN will be initiated at home Monday-Thursday only. Patients referred on Friday, Saturday, Sunday or on holidays may be started on IV fluids and/or electrolytes at the discretion of the provider until PN can be initiated.</td>
</tr>
<tr>
<td>II.</td>
<td>Monitoring of PN:</td>
</tr>
<tr>
<td>A.</td>
<td>Lab monitoring:</td>
</tr>
<tr>
<td>1.</td>
<td>Initial frequency of lab analysis will be determined based on clinical assessment by the NST and in collaboration with the provider at the time of referral.</td>
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<tr>
<td>a.</td>
<td>For patients discharging home from the hospital, frequency of lab analysis will typically be weekly.</td>
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<tr>
<td>2.</td>
<td>Once stable, labs can be decreased to every two weeks. If clinically stable for two months, decrease to monthly. Each patient will be evaluated and clinical judgment will be applied to further decrease lab frequency.</td>
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<td>3.</td>
<td>FHI Routine PN labs: sodium (Na), potassium (K), chloride (Cl), glucose, blood urea nitrogen (BUN), creatinine, calcium, Alk Phos, AST, total protein, albumin, d. bili, TBili, CO2, magnesium (Mg), phosphorus (Phos), triglycerides (TG), complete blood count with platelets and differential (CBCdp), and pre-</td>
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</table>
albumin. Zinc should be drawn at baseline if high gastrointestinal (GI) losses. Complete trace metal panel every six months to include CRP-inflammation, iron, zinc, copper, manganese, selenium, and ferritin. Check panel one month after PN initiated, then every six months (to help monitor for manganese accumulation with use of multi-trace element products). These may be checked more frequently if there is clinical suspicion of trace element deficiency or toxicity.

B. Glucose monitoring:
   1. Glucose monitoring is important during initiation of PN to assure adequate glucose control.
   2. For PN infusions over 18 – 24 hours, drawing lab specimens during the PN infusion (pump must be stopped for lab draw), is preferred to assess glycemic control and assist in determining if fingerstick monitoring is necessary. Serum glucose goals are based on past medical history, current diagnosis, and provider preference.

III. Guidelines for cycling PN:
   A. PN is typically initiated as a continuous infusion over 24 hours. Once the patient is clinically stable, the infusion should be changed to a cyclic regimen. This allows the patient a period of time off the PN each day.
B. Cyclic regimens may taper up and/or taper down to allow the body time to adjust to changes in glucose load. A 1-hour taper is most common although some patients benefit from longer taper times.

C. The cyclic regimen may be decreased in a step-wise fashion based on continued clinical stability to a shorter infusion time, generally 10-14 hours. This allows a period of time off PN for daily activities and may help reduce the risk of PN associated liver complications.

IV. Medication additives to PN:

A. Insulin Protocol: (See FHI PN Resource binder under “Additives”.)

B. Additives: Medications may be added to PN based on compatibility and stability. Pharmacist will review each medication to determine compatibility and stability. Safety and efficacy must also be considered based on PN administration time. Insulin may be added by patient to PN just prior to administration.

V. Transitioning patients from parenteral to enteral therapy and/or oral nutrition

A. The goal for patients with a functioning gut and no symptoms of malabsorption is to transition to enteral and/or oral nutrition. The transition will occur in
collaboration with the provider while the patient is closely monitored to assure tolerance and adequacy of enteral and/or oral nutrition to meet nutritional needs as the PN is weaned.

B. Once PN is stopped, it is reasonable to maintain the central venous access for 1-2 weeks while continuing to monitor labs, oral intake/enteral therapy tolerance. This is beneficial to minimize risks of infection as well as metabolic complications and overfeeding while transitioning off PN.

C. Pediatric specific considerations:
   1. Discontinuation of PN is a more gradual process than in adults.
   2. PN is tapered gradually as enteral feedings are advanced.
   3. Ideally, the combination of PN and enteral feedings will meet 100% of estimated needs during the transition period.
   4. PN is generally continued until 75-80% of energy needs are being met enterally.

D. Adult specific considerations:
   1. Once an adult patient is taking 60% of energy and protein goal orally, PN may be stopped or held per the recommendation of the NST in consult with the
ordering prescriber.

2. For adults with a functioning gut who do not achieve acceptable oral intake within a few days, enteral feedings may be considered.

VI. Potential Complications of PN and Management of:

A. Hypo / Hyperglycemia: (See FHI PN Resource binder)

B. All patients with central lines are at an increased risk for bloodstream infections. PN increases this risk via fluctuating glucose levels, use and frequency of pro-inflammatory omega-6-rich lipid emulsions, lab sampling from IV catheter and the nature of the PN formulation itself, as it is an excellent growth medium for bacteria and yeast. Electrolyte abnormalities: Alterations in electrolytes and minerals can occur at any time during PN therapy but are most commonly seen early in therapy. Potential causes include fluid imbalance, GI losses, medications, organ dysfunction and drug interactions. Ongoing monitoring of serum electrolytes, organ function, fluid status and medications are essential to minimize resulting complications.

C. Refeeding syndrome: Refeeding syndrome is a complex and adverse body response that occurs with the initiation of nutrition after an extended period of starvation. It involves a metabolic alteration in serum electrolytes, specifically changes in serum phosphorus, potassium, and magnesium,
with the initiation of nutrition in malnourished patients. Refeeding syndrome is characterized by, but not limited to, symptoms of generalized fatigue, lethargy, muscle weakness, edema, cardiac arrhythmia, and hemolysis. For patients who are at risk for refeeding, calories should be initiated and advanced slowly and labs drawn frequently until stable.

D. Altered GI and Liver function:
PN-associated liver disease (PNALD) is a relatively common complication for patients dependent on PN. These disorders include steatosis (fatty liver), cholestasis, and gallbladder sludge/stones which cause elevations in alk phos, GGT, and conjugated (direct) bilirubin. (See FHI PN Clinical Resource Book for management of PNALD).

E. Metabolic bone disease: Long term PN patients (>6 months) are at risk for osteoporosis and osteomalacia. (Screening, prevention, and management of PN patients at risk are addressed in FHI PN Resource binder)

**External Ref:**
The ASPEN Nutrition Support Practice Manual, c. 2005
The ASPEN Nutrition Support Core Curriculum, A Case-Based Approach—the Adult Patient. c. 2007
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| Date Effective: | 1/5/1990 |
| Date Revised: | 8/2013, 8/2015 |