

# Navigating Home Care: Parenteral Nutrition—Part Two

by Gisela Barnadas

**Parenteral nutrition (PN) is often used for patients who are unable to absorb sufficient nutrition through the gastrointestinal tract. PN can be safely administered in the home setting with proper assessment and monitoring of the patient. An interdisciplinary team approach is used to identify and avoid potential complications, which may occur. This article provides the physician with specific guidelines for evaluating, ordering and monitoring PN therapy in the home patient. It also addresses financial and reimbursement considerations with emphasis on understanding the often confusing, Medicare guidelines.**

## CASE 1

JR is a 65-year-old female with vascular disease, hypertension, diabetes and history of a hysterectomy. She presents with severe abdominal pain, vomiting and diarrhea. A small bowel series documents a bowel obstruction, most likely due to bowel ischemia. Findings during surgical intervention included: twisted, gangrenous small bowel with multiple adhesions resulting in resection of her distal jejunum, ileum and right colon, leaving an intact duodenum, approximately 100 cm of the jejunum and most of her left colon. She will most likely require TPN for the rest of her life.

- *What needs to be considered to successfully manage her nutritional needs at home?*
- *How many calories? How many grams of protein?*
- *How much volume will she need?*
- *Should I use a standard solution, or does this patient require something special?*
- *Can the patient and /or caregiver and/or family manage this therapy at home?*

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- *What resources are available to help manage this patient in the home?*
- *What resources are there available for the patient?*
- *Will insurance pay for this?*

Providing total parenteral nutrition in the home (HPN) is by no means a new treatment option. The first record of a patient receiving HPN was a 36-year-old woman with extensive metastatic ovarian carcinoma in 1968.<sup>(1)</sup> While the exact number of people receiving HPN is not known, Dr Lyn Howard in the late 1980s and early 1990s in an attempt to establish a database, estimated approximately 45,000 were on HPN <sup>(2)</sup>.

Much has changed since the first patient received HPN thirty-five years ago. With the advent of newer technologies and greater clinical expertise, HPN can be safely administered in the home for many conditions. However, along with improvements in this therapy, a myriad of challenges to the managing physician and health care team have also arisen.

The majority of patients end up on HPN after a hospital admission, others may be a “new start up” at home (to be addressed later in this article). Regardless, successful HPN requires evaluating the patient for

**Table 1**  
**HPN Checklist: Is Patient A Suitable Candidate?**

- Risks and benefits of therapy have been discussed with patient.
- All attempts to use GI tract have failed unless patient is clearly not appropriate for enteral feedings.
- Modification of diet, use of feeding tube, special formulas, digestive enzymes, antiemetics, etc. have been attempted or considered.
- Use of therapy is consistent with level of medical care.
- Patient and/or caregiver assumes role of primary caregiver and is willing to administer therapy.
- Patient and/or caregivers are capable to perform the task. Must demonstrate sound judgment and motivation to learn.
- Patient and/or caregivers accept emotional requirements to administer therapy at home.
- Patient and /or caregiver meet physical requirement to provide care (manual dexterity, adequate vision, physical strength to carry >10 lbs).
- Patient is medically stable (requires labs no more than 1–2× per week, glucose is controlled while on TPN).
- Home environment is reasonably clean and has physical requirements needed to provide therapy (electricity, water, refrigeration, telephone).
- Financial considerations/insurance coverage and patient responsibilities have been explored and patient and caregivers understand (and accept) cost.

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HPN, coordinating their care with close follow-up and monitoring of clinical progress.

### Preparing the Patient for Discharge

#### *Is the patient appropriate for home therapy?*

Identifying appropriate patients for home therapy is the first step toward successful HPN (3). Planning should begin early in order to identify potential obstacles, which may arise. The medical condition should

be *relatively* stable. Vital signs, glucose, fluid and electrolytes are normal (or normal for the patient). Treatment and therapy options have been discussed and understood. See Table 1 for a suggested checklist to determine if patient is appropriate for HPN.

#### *Who will administer the therapy?*

While care of the patient on HPN will be coordinated among an interdisciplinary health care team, the patients and/or their designated caregiver will ultimately be responsible for administering the therapy. Skilled IV nurses will be utilized initially to administer the therapy while the patient and/or their caregivers are taught. Typically it takes two-to three-days before the patient is expected to reach a point of self-sufficiency in the administration of the therapy. **(Note: the role of the home care nurse is to educate the patient and caregivers until they are independent to administer the therapy. A common misconception is that the nurse will be there to administer the therapy and stay with the patient during the entire**

**Table 2**  
**Nutrition Support Resources Available**

- Oley Foundation [www.oley.org](http://www.oley.org) 800-776-OLEY
  - Has a large patient network that allows patients and caregivers to communicate with others in similar situations
  - Provides website information
  - A free newsletter for patients
  - A toll free network
  - Equipment exchange
  - Strong parents support group
  - Annual national conference for patients, families/caregivers
- American Society of Parenteral and Enteral Nutrition (ASPEN) [www.nutritioncare.org](http://www.nutritioncare.org) (800) 727- 4567
  - Standards of Practice for Home Nutrition Support (5)
- Canadian Parenteral-Enteral Nutrition Association (CPENA) [www.cpena.ca/home.html](http://www.cpena.ca/home.html) 613-825-4341 (Ottawa)

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<b>Table 3 Medicare Guidelines for TPN</b>	
<i>Clinical Situation</i>	<i>Examples of ICD codes</i>
<p><b>A Severe short bowel syndrome</b> Surgery within past 3 months, leaving ≤5 feet of small bowel beyond the ligament of the Treitz</p>	579.3 Other and unspecified postsurgical nonabsorption
<p><b>B Severe short bowel syndrome</b> (&gt;3 months ago) that results in: evidence of electrolyte malabsorption <b>AND</b> fluid intake of 2.5–3 L/day results in enteral losses that exceed 50% of the oral/enteral intake <b>AND</b> Urine output less than 1 L/day</p>	579.3 Other and unspecified postsurgical nonabsorption
<p><b>C Bowel rest for at least 3 months</b> Symptomatic pancreatitis with or without pancreatic pseudocyst <b>OR</b> severe exacerbation of regional enteritis <b>OR</b> proximal enterocutaneous fistula where tube feedings distal to the fistula is not possible.</p>	555.0 Regional enteritis of small intestine 555.1 Regional enteritis of large intestine 555.2 Regional enteritis of small with large intestine 577.0 Acute pancreatitis 577.1 Chronic pancreatitis 569.81 Fistula of small intestine 998.6 Persistent postoperative fistula, complication of procedure
<p><b>D Complete mechanical small bowel obstruction</b> where surgery is not an option and where tube feedings distal to the obstruction is not possible</p>	560.81 Intestinal or peritoneal adhesions with obstructions 560.89 Specified intestinal obstruction, by mural thickening (i.e. Crohn's) 560.9 Unspecified intestinal obstruction 557.1 Chronic vascular insufficiency of intestine (superior mesenteric artery (SMA) syndrome) probably goes with 560.9 unspecified intestinal obstruction
<p><b>E Malabsorption and malnutrition</b> <b>Severe fat malabsorption</b> (fecal fat exceeds 50% or oral/enteral intake on a diet of at least 50 gm of fat per day as measured by a standard 72-hour fecal fat test). <b>AND malnutrition</b>, as evidenced by: 10% weight loss over 3 months or less <b>AND</b> serum albumin equal to or less than 3.4 gm/DL</p>	579.9 Unspecified intestinal malabsorption  <b>AND</b> 263.9 Calorie malnutrition <b>AND</b> 273.8 Hypoalbuminemia
<p><b>F Motility disturbance and malnutrition</b> <b>Severe motility disorder</b> of the small intestine and/or stomach, which is unresponsive to prokinetic medications and is demonstrated scintigraphically or radiographically. <b>AND malnutrition</b>, as evidenced by: 10% weight loss over 3 months or less <b>AND</b> serum albumin equal to or less than 3.4 gm/DL</p>	536.3 Gastroparesis 564.9 Unspecified functional disorder of intestine  <b>AND</b> 263.9 Calorie malnutrition <b>AND</b> 273.8 Hypoalbuminemia

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**Table 3 (continued)**  
**Medicare Guidelines for TPN**

<i>Clinical Situation</i>	<i>Examples of ICD codes</i>
<p><b>G Malnourished</b> as evidenced by: 10% weight loss over 3 months or less</p> <p>+ <b>AND</b> serum albumin equal to or less than 3.4 gm/DL</p> <p><b>H AND</b> Has a disease and clinical condition documented as being present and it has not responded to altering the manner of delivery of appropriate nutrients</p>	<p>263.9 Calorie malnutrition</p> <p><b>AND</b> 273.8 Hypoalbuminemia</p> <p><b>AND</b> Any non severe manifestation of above such as:</p> <ul style="list-style-type: none"> <li>• Mild to moderate exacerbation of Crohns</li> <li>• Distal enterocutaneous fistula</li> <li>• Partial bowel obstruction</li> <li>• Mild to Moderate fat malabsorption</li> <li>• Mild to Moderate GI dysmotility</li> </ul>

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**infusion.**) For most patients on HPN, nursing visits after the first week of therapy are often reduced to once per week to supervise compliance, provide site dressing care and obtain lab work. While the patient may wish to assume all the responsibility for the therapy, physical and medical limitations sometimes require a dependable caregiver to assume this responsibility. A certain amount of visual acuity, physical strength and manual dexterity is needed to administer the solution, operate the pump and care for the catheter. Caregivers are often very apprehensive when it comes to administering therapy. While they are anxious to get the patient back home, they also have fears they might harm their loved one in the process of providing care.

***Is there a safe home environment?***

A proper home environment is essential to safely provide the therapy and avoid infection or other complications. The home should be stable, safe, relatively clean and meet certain physical requirements. HPN therapy requires refrigeration of the solution and maintenance of a sterile field during catheter care and formula administration. If the home does not have electricity, running water and a telephone, alternative plans may need to be explored. For example, limited telephone service for medical emergencies can be arranged through the local telephone company, or

power can be restored under special funds available for patients receiving life-supporting therapies. Certain home environments are not safe or appropriate for the therapy and alternative plans must be investigated.

**Social And Emotional Considerations**

Food is a very important part of our social environment. It is a focal point at most gatherings and celebrations. Patients receiving HPN are often excluded from partaking in food at social events resulting in potential distress for the patient and their loved ones. Family and friends also have difficulty or feel guilty when they eat around someone who is not able to. Support groups and organizations such as the Oley foundation can help patients and families cope with such matters (see Table 2 for resources available).

***Will Insurance Pay For This Therapy At Home?***

**Private Insurance and Medicaid**

Private insurance and Medicaid criteria vary based on individual policies and state guidelines, but will usually cover HPN if it is medically indicated and all their required pre-authorizations and forms are completed. However, sometimes third party payers cover only 80% to 90%, leaving a significant share for the patient. Con-

**Table 4**  
**Supporting Documentation (required) for Medicare to Cover TPN at Home**

- **Completed CMN**
- **Objective evidence (“proof”) of medical condition** as documented in operative report, discharge summary, x-ray report, GI motility studies, consultant notes, clinical progress notes and/or detailed physician’s letter.
- **Attempts to feed** orally or enterally, modification of nutrients, use of medications to allow for oral/enteral feedings.
- **Motility studies** (Criteria F) (small bowel follow through, Sitz marker study)
  - Failed motility is defined as isotope failing to reach right colon by 6 hours after administration.
  - Must be performed when the patient is not actually ill and is not on any medication which would decrease bowel motility.
- **Documentation of malnutrition.** (Required for Criteria E–H)
  - 10% weight loss over 3 months or less.
  - Documentation of weight loss: current wt and wt 1–3 months prior to TPN.
  - Nutritional assessment (MD, RD or other qualified personnel) within 1 week prior to initiation of TPN.
    - Must include documentation of intake (oral and tube) during prior month.
  - Serum albumin equal to or less than 3.4 gm/dL.
    - Albumin must be within 1 week of TPN initiation.
- **Tube feeding trial** (see Table 5 for definition and when required)
- **Intake and output** (Criteria B and C)
- **Laboratory data**
  - To document malnutrition (Criteria E-H).
  - To document electrolyte disorder (Criteria B).
  - Fecal fat test document malabsorption, (Criteria D).
  - Fat malabsorption is defined as fecal fat > 50% of oral/enteral intake on a diet of 50g of fat/day as measured by standard 72 hour fecal fat test.
  - Malabsorption tests (Criteria B and H).
- **List of medications used to:**
  - Control diarrhea (pancreatic enzymes, bile salts, and meds that slow gut transit time) (Criteria B, E–H).
  - Bacterial overgrowth (broad spectrum antibiotics) (Criteria B, E–H).
  - Assist motility (Criteria F).
    - Unresponsiveness to prokinetic drugs is defined as presence of daily symptoms of nausea/vomiting while on maximal doses.

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sidering TPN can cost >\$200/day the patient may still have a \$20–\$40 per day co-pay (>\$7000–\$15,000/year).

### Medicare

Medicare part B will cover 80% of their approved cost for parenteral nutrition in the home under very specific **criteria** (6). Tables 3 and 4 outline clinical situations and required documentation needed for Medicare coverage of HPN. In addition to meeting the **test of permanence** (remember Medicare defines permanence as >90 days), there must be clear evidence that the **GI tract is non-functioning** and that **all** possible attempts have been made to utilize it. A completed certificate of medical

necessity (CMN), extensive justification and documentation are required. **Objective evidence** must convey the reason the GI tract is non-functioning and outline specific attempts which were made to improve the situation. Medicare requires an attempt at tube feeding whenever the condition allows (see Table 5 for more specific examples). Medicare **will not** cover intra-dialytic parenteral nutrition (IDPN) unless the patient meets above guidelines as well. Figure 1 provides an algorithm which will help to determine if your patient meets Medicare criteria for coverage of parenteral nutrition.

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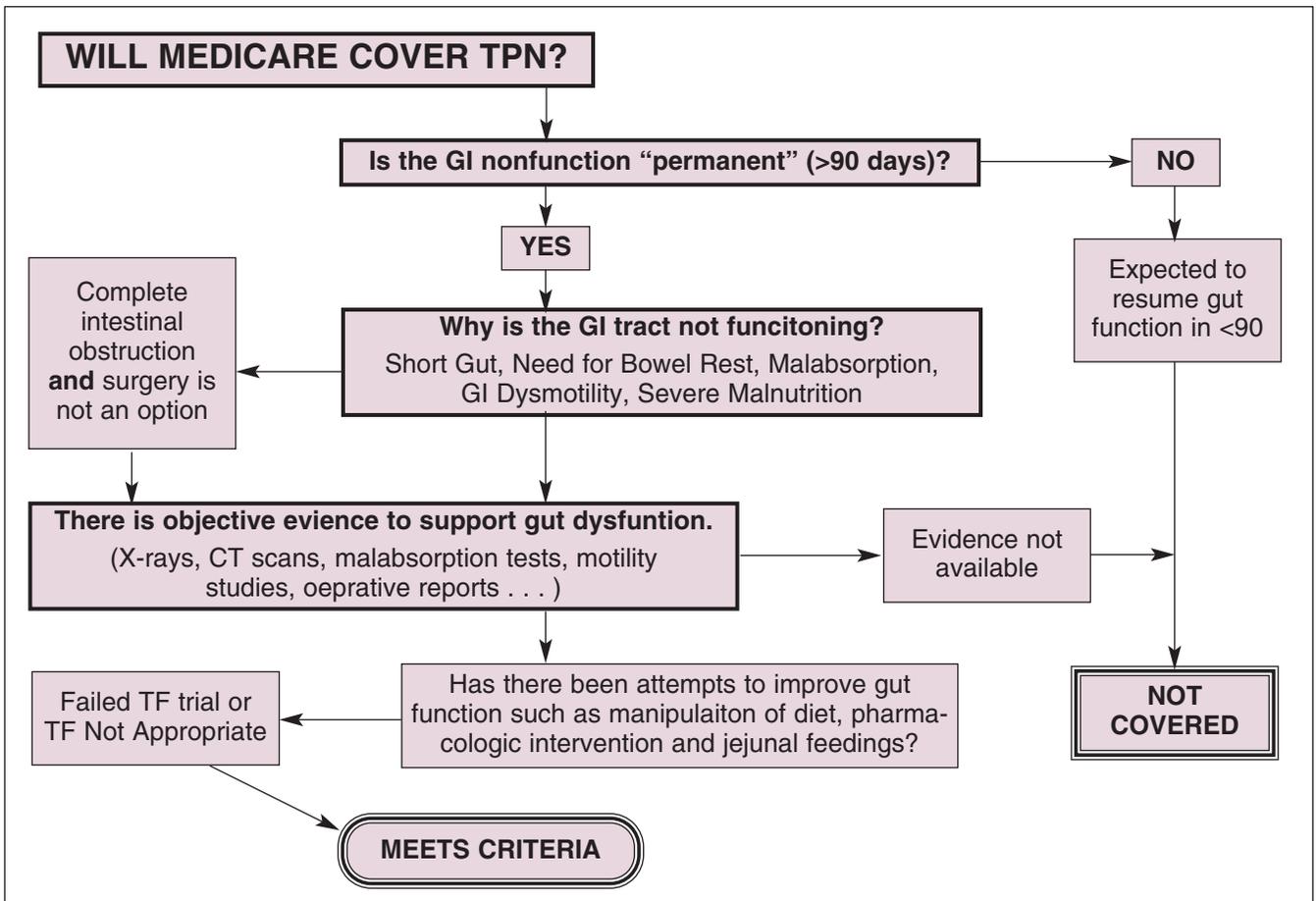


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**Coordination of Care: Starting the Transition To Home**

While a patient is being assessed for home care, and documentation is underway, coordination for discharge planning should begin . It is often during this early planning stage that issues are identified that might make provision of home therapy difficult or challenging. Methods of administration and access devices often utilized in the hospital setting may not be the most appropriate for the home. Sadly, for many patients, discharge planning does not start until the day before discharge at which time little can be done to address problems that may arise. This is the time for factors such as consolidation of IV fluids, total volume needed is determined and switching to nocturnal PN (or daytime as the case may warrant) should be addressed.

**Determining the Appropriate Nutrition Plan**

Nutritional requirements of patients during acute illness are very different from those with chronic illness. In anticipation of discharge, patient’s formula, method and rate of administration needs to be evaluated. Patients who are severely malnourished, including those with a history of anorexia nervosa or alcoholism, are at greater risk of “refeeding syndrome” if nutrition and fluid resuscitation occurs too rapidly (7). Patient’s considered at risk for this syndrome require aggressive evaluation and correction of serum glucose, potassium, magnesium and phosphorous. Severe deficiencies are repleted and patients are closely monitored as PN is progressed (8).

Goals of therapy are set using appropriate markers such as: weight gain, maintenance or loss, hydration, wound healing or to compensate for extraordinary losses, etc. The formula composition is adjusted

according to the medical condition, overall nutritional status, level of activity and stress. Standard multivitamin and trace mineral preparations available are designed to meet usual daily requirements of most patients. Extraordinary mineral loss such as zinc loss in the setting of diarrhea needs further consideration.

Total nutrient admixtures (3-in-1 solutions) are primarily used at home because they are easier for the patient to administer and require less manipulation of the line. **The total volume and electrolyte composition of the HPN fluid ordered should anticipate extraordinary losses from vomiting, diarrhea, fistula and ostomy in order to provide appropriate replacement.** The electrolyte composition of the HPN formula should mimic the fluid being lost. For example, gastric secretions and small bowel ostomy output are high in sodium and chloride, whereas colostomy

**Table 6**  
**Stepwise Approach to Insulin Dose/Glucose Control of the Diabetic Patient (10)**

1. Remove all insulin from PN.
2. Give insulin separate from PN for the first 24 hours in response to frequently measured glucose levels.
3. Calculate the amount of insulin used in 24 hours.
4. Two-thirds of the insulin given in the previous 24 hours is added to the next days PN prescription.
5. Patient continues to monitor glucose and receives insulin coverage as needed.
6. Further adjustments of insulin additions are made according to measured serum glucose levels.

output and diarrhea fluid loss would result in a greater loss of bicarbonate and potassium.

Patients with fluctuating or high fluid loss may be better managed with separate IV fluids or hydration fluids. For example, TPN is ordered with the volume appropriate to meet the usual fluid needs. Additional “shelf stable” hydration such as 0.45NS or Lactated Ringers, can be used to meet transient losses or when output exceeds a predetermined amount. These solutions can be infused at a much faster rate than TPN.

Example:

Patient gets 2400 mL TPN at night over 12 hrs and is told to infuse an additional liter of 0.45NS at 250–350 cc/hr over 2–4 hrs during the day. The patient is taught the signs of dehydration and is instructed to infuse an additional liter over 4 hrs whenever their GI loss is increased above normal, or if their urine output drops or if they start to feel dehydrated. The home care clinical team monitors usage and alerts the physician when significant deviations occur.

Hyperglycemia is the most common complication and is directly related to the amount of dextrose content of the solution. Patients (without diabetes) who received TPN with a dextrose rate >5mg/kg/min have been documented to have a 49% chance of developing hyperglycemia. In contrast, those who received an infusion at <4mg/kg/min had a substantially reduced

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**Table 5**  
**Criteria for Tube Feeding Trial**

- Effort must be made to place a tube.
- In situations of fistula or obstruction, feed distal if possible.
- For gastroparesis must be post-pylorus (preferably in jejunum).
- Placement in jejunum must be objectively verified (x-ray or fluoroscopy).
- Trial with enteral nutrition must be made with attention to dilution, rate and use of alternative formula.

Examples of failed trials:

- Patient continues to vomit after placement of tube post-pyloric.
- Tube fails to progress into jejunum after 5–6 hours. Feeding was attempted using a slow drip but patient vomited as rate was increased.
- Feeding tube is in jejunum but after 1–2 days of feeding patient has abdominal distention and vomiting.
- Over the course of a few weeks attempts to gradually advance formula results in diarrhea or other signs of intolerance and patient is unable to reach nutritional goal.

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<i>Lab parameter</i>	<i>Baseline</i>	<i>Weekly</i>	<i>Other</i>
Comprehensive metabolic panel (CMP) Electrolytes, BUN, Cr, Albumin, LFT's, Ca, PO <sub>4</sub> , Mg	✓	✓	Reduce to monthly or quarterly when appropriate
CBC with differential	✓	✓	Reduce to monthly or quarterly when appropriate
PT/PTT/INR	✓	—	✓ monthly or as indicated
Triglyceride level	✓	—	✓ monthly or as indicated
Iron studies, B <sub>12</sub> , Folate	—	—	✓ q 6 months or if deficiency suspected
Vitamin/minerals	✓ if deficiency suspected	—	Consider yearly assessment of Vitamin A, D, E Se, Zn, Mn, Cu
Essential fatty acids	—	—	✓ if deficiency suspected
Bone density	—	—	Consider yearly assessment

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risk of hyperglycemia (9). See Table 6 for a suggested approach to insulin dosing in the diabetic patient.

**CASE 2**

A 32-year-old male was admitted with intractable vomiting related to chemotherapy; he was unable to eat or drink and was experiencing copious amounts of emesis (> 3 liters/day). Unfortunately the patient was discharged home on only 2-liters of PN with standard electrolytes and additives. The patient became increasingly confused and had reduced urine output. He was hospitalized with dehydration and hyponatremia.

*Could this hospitalization have been avoided?*

**YES, with an interdisciplinary team approach!**

- Use of a standard formula containing 45 mEq NaCl and 2 L of fluid per day was not appropriate for this patient. Standard additives will not compensate for this patient's extraordinary GI loss.
- Nutrition assessment at the initiation of the therapy should have anticipated the need for higher volume

and sodium concentration to mimic the electrolyte content of the secretions lost.

- Home care nutrition support specialists (if the provider employs them) should have evaluated the therapy based on the clinical condition at the time of initiation of service and discussed concerns with the ordering physician.
- Health care team's ongoing evaluation of antiemetic therapy.

**Schedule of Infusion**

In the hospital setting most infusions of TPN are over 24 hours. For home, most (but not all) patients typically prefer to cycle the infusion at night. Ten to fourteen hours (although some infuse over 8 hours) is ideal for most home care patients. This means that the average flow rates for many home patients run ~150–350 mL/hour an amount not commonly seen in the typical hospital patient.

For some, infusing large volumes at night, especially those who are bed bound, may prove difficult. Others, with excess losses, feel better when fluid and

**Table 8**  
Starting TPN at home, sample progression (Pt weight = 66 kg)

Nutrient	Goal/kg	Total Goal	Day 1	Day 4	Day 7
Fluids (cc)	~35cc	2300	1500	2300	2300
Hours		12	12	12	12
Dextrose (g)	~4.5g	300	150 (10%)	250 (11%)	300 (13%)
Protein (g)	~1.2g	80	80	80	80
Lipids (g)	~1g	65	65	65	65
Calories	~30–35 kcal	2000–3000	1480	1820	2000

*Monitoring*

**Total Goal:** Baseline labs done prior to start of therapy and abnormalities addressed

**Day 1:** Pt checks glucose fingerstick. Day 3 Check: BMP+Mg+PO<sub>4</sub>; If OK adjust/advance formula → →

**Day 4:** Day 6 Check: CMP+Mg+PO<sub>4</sub> CBS; If OK adjust/advance formula → →

**Day 7:** Monitor tolerance

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nutrition are dispersed throughout the day and night. Ideally, transition patients to the planned home regimen as early as possible to “work out the kinks” a few days prior to discharge.

**MONITORING**

**Lab Work**

At home, patients are more stable than in the hospital. Labs are initially checked 1–2 times during the first week, then weekly thereafter. **“STAT labs” are not possible at home.** The turnaround time for lab work is usually 24 hours. Once lab results are received, they are reviewed by the home care staff and ordering physician. The TPN formula is adjusted if need be, and the following weeks shipment is compounded and sent. After a stable pattern is established, the frequency of lab work can be reduced to every two weeks, then every month. Long-term patients, who are stable may need labs checked only once or twice per year. The pharmacist or nutrition specialist at the home care company should be trending the labs and anticipating when a change in frequency or other parameters are needed. A sample schedule of lab work for HPN patients can be found in Table 7.

Long-term patients may need other tests such as vitamin and mineral determinations and bone density

studies. Special tests such as prealbumin with its short half life of 2–3 days are often used in acute settings but are of little benefit in the long term patient. These tests are expensive and because of the longer turnaround time, the results may cross your desk a few days after the TPN has been compounded, (and the value is now questionable).

**Nutritional Assessment and Monitoring Should be Ongoing**

Systematic evaluation should be conducted to determine if the nutrition plan continues to be consistent with needs. Records of intake and output, body weight and overall status are desirable. Assessment should consider more subjective parameters such as appearance, strength and endurance, skin integrity, improved mental and physical status or an overall feeling of well being which offer insight to nutritional well being. Through monitoring, the risks of complications can be minimized and the nutritional status can be maintained or improved.

**CAN TPN BE STARTED AT HOME?**

Most patients who receive PN in the home started out in the hospital setting and transitioned to the home.

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However, with some patient populations who are more stable, therapy has been successfully initiated in the outpatient setting without the need for hospitalization (exclusions might be: patients with diabetes mellitus, renal failure, cardiac problems, high refeeding risk, etc). The patient will require the same initial scrutiny for appropriateness of therapy and will need a suitable central access. The TPN solution is typically begun at a lower concentration of dextrose and advanced over the first week. Protein, lipids and electrolytes do not need the same gradual increase and can usually be started at the goal amount. Labs are drawn and **evaluated** before therapy is started and at intervals during the progression. Close attention is placed on serum levels of K, Mg and PO<sub>4</sub> as they may drop due to “refeeding syndrome” as the glucose is advanced. The patient is instructed to check glucose using a glucometer or glucose reagent strips at least once during infusion and 1 hour after PN is disconnected. See Table 8 for a sample progression of HPN for a home start up.

In this example, the patient has advanced to goal and is receiving full nutrition support by the end of the first week.

your patients in the management of HPN and ensure the patient achieves the maximum benefit from their therapy. ■

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#### CONCLUSION

HPN is a complex medical therapy, but one that can be safely and effectively achieved at home. Early identification of the potential home candidate and good communication between healthcare providers is important. Choosing a home care company that provides ongoing nutrition monitoring will assist you and



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