A Guide to Home Parenteral Nutrition (HPN)

HomeMed

MICHIGAN MEDICINE
UNIVERSITY OF MICHIGAN
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Your Home Parenteral Nutrition Team

HomeMed

HomeMed is the home infusion service of Michigan Medicine. We will provide your home parenteral nutrition (HPN) solutions, supplies, equipment, and training before discharge. We will also monitor your progress once you are home. The HomeMed training team is based in the hospital and is responsible for your training before you go home. Once discharged, HomeMed pharmacists and nurses will continue to monitor your progress on HPN with you and your doctor. This is done by assessing your labs, checking on your progress over the phone, and coordinating care with your doctor and home care nurse. HomeMed pharmacy technicians organize the delivery of your supplies and will contact you weekly for your supply needs. Contact a pharmacy technician any time you need additional supplies. HomeMed patient account representatives are available if you have questions or concerns regarding your insurance billing.

How do I contact my care team?

- HomeMed is available during regular business hours at (800) 862-2731.
- **Outside of business hours, a clinician is available 24 hours a day, 7 days a week, including holidays.** A Michigan Medicine hospital operator will page the HomeMed clinician on call for you. They will ask for your name, date of birth, telephone number, and brief explanation of your medical concern. A HomeMed clinician (pharmacist or registered nurse) will call back as soon as possible. **If you do not receive a call back within 15 minutes, call again.**

Visiting nurse agency

A visiting nurse will assist you with your HPN therapy once you are home. A nurse from Care Management arranges this before you leave the hospital and will provide the name and telephone number of the visiting nurse agency.
Home nutrition support & advocacy group

The Oley foundation is a non-profit, independent, national group that has been serving patients on home tube feedings and/or HPN. They provide up-to-date information, outreach services, conference activities and emotional support for patients, their families, caregivers, and professionals. Oley programs include a twice monthly newsletter, regional adult support groups, and a support network for children on home nutrition therapy. All services and educational materials are free to patients and their caregivers. We encourage you to learn more about their services and to join this very important organization. For more information:

The Oley Foundation  
Albany Medical Center  
MC-28, 99 Delaware Ave  
Delmar, NY 12054  
Phone: (518) 262-5079  
Web page: http://www.oley.org/
The Basics

What is Home Parenteral Nutrition (HPN)?

The purpose of this manual is to help you safely give Parenteral Nutrition (PN) at home. Parenteral nutrition means nutrition provided by vein through a small, flexible tube called an intravenous (IV) catheter. Parenteral nutrition has the same nutrients the body would normally get from eating a well-balanced diet.

We need nutrients from each of the following:

- Protein to build and repair body tissues.
- Carbohydrates to provide energy.
- Fat to provide a stored energy source and promote healthy skin.
- Vitamins to help the body properly use fat, carbohydrate, and protein.
- Minerals to aid in a variety of bodily functions such as muscle contraction, blood clotting, and bone repair.
- Water to regulate body temperature, transport nutrients, and rid the body of waste.

The goal of the HPN program is to safely provide nutritional support for good health and improve your quality of life by decreasing the number of hospital stays. As you read this manual, write down any questions you have. We will answer them during the training period. We recommend you view HomeMed’s video, “Giving Total Parenteral Nutrition at Home” by searching the keyword “TPN” at the following website: http://careguides.med.umich.edu. You may also wish to turn to Appendix A, at the end of this manual, to read some of the most frequently asked questions by patients and their caregivers.

We want you to return to as normal a lifestyle as possible. With advance notice, we can help you return to work or take a vacation, but some modifications in your lifestyle will likely be necessary. We are interested in addressing all your questions and concerns, and understanding your own specific goals.
How will I learn about HPN?
Learning about HPN will require time, attention to detail, and a lot of practice. We are prepared to help you and your caregiver. The training period will allow you to learn how to safely infuse your HPN. The training time varies from person to person. Practicing and reading this manual between lessons will help you remember all the important steps. It is important to listen and be involved in learning your care. Even when you become familiar with HPN, always be careful to take your time so you do not miss any of the steps. Becoming forgetful or careless may lead to problems such as an infection, which can be very serious and result in coming back to the hospital.

Commitment and support
One of the most important parts of a successful HPN program is your commitment. Support from a family member or friend is also very important. If possible, this person should go through training with you so they can support you if you are sick or need help.

How long does it take to infuse my HPN solutions?
Your health status and nutritional needs will determine your infusion time.
- Try to infuse your HPN solutions at the same time every day.
- Do not “skip a day” of HPN unless directed to do so by your doctor or HomeMed.
- You may become dehydrated if you do not infuse your HPN.
Parenteral nutrition is usually infused at night with an infusion pump. This allows you to be free of the pump and tubing during the day, and is commonly called “cycling”. We will program the pump to give you the amount of nutrition and fluids over the time period ordered by your doctor. Once started, the pump gradually increases the rate of your HPN solution at the beginning of the infusion and gradually decreases it at the end. This will give your body time to adjust to the amount of sugar in your HPN solution.
Supplies

What are Parenteral Nutrition solutions?

The HPN solution is prepared by the pharmacist at HomeMed based upon an order by your doctor. It contains the appropriate amounts of amino acids (protein), dextrose (carbohydrates), lipids (fats), fluids, and other nutrients to meet your body’s needs. These solutions are similar to the parenteral nutrition solutions you received in the hospital. The difference is that home solutions usually have all the ingredients in a single IV bag instead of two separate bags. Lipids in your HPN bag give it a milky white appearance. The HPN bag contains all of the prescribed nutrients and are useable for up to 9 days when refrigerated.

How do I get my HPN supplies?

You will receive a packing slip in each of your deliveries so you can keep track of your orders (see Figure 1).

- Count your supplies when each delivery arrives.
- Make sure each item is sterile by checking for visible signs of contamination, such as an open package or cloudy fluid.
- Always check for an oily appearance and if the lipids are separating in the HPN bag. **When in doubt, throw it out!**

If you have any concerns or questions about the use of these products, contact HomeMed at (800) 862-2731. Report any differences between delivery slips (see Figure 1) and the contents of your delivery to HomeMed.
How do I store HPN solutions and supplies?

You will receive a refrigerator to store your HPN solutions and additives that need refrigeration. Only these items should be stored in this refrigerator. Do not store any food in this refrigerator. Store all other HPN solutions and supplies away from household items. Do not store urine test kits, ostomy supplies, or similar items with any HPN solutions or supplies.

Keep all HPN supplies, especially needles, syringes, and medications out of the reach of children and pets.
How do I double check my HPN prescription?

A copy of your HPN prescription will be delivered to your home with your supplies.

- Check your HPN prescription (see Figure 2) and bag labels (see Figure 3) upon receipt to ensure that they match.
- **Always read your label and prescription carefully.** If they do not match or if you have any questions, call HomeMed.
- Remember to also check the “Start By” date on the label of the HPN solution before infusing it.
- At home, you will add vitamins and occasionally other medications to the HPN solution as indicated on the prescription. These additives are not stable for long periods of time and cannot be added by HomeMed. The HPN mixing protocol sheet provides step-by-step directions for adding medications to your HPN solution. This will be reviewed in your teaching sessions.
- If for any reason your prescription changes, HomeMed will contact you. If necessary, a new HPN prescription and a new HPN mixing protocol sheet or pump program sheet will be sent to you.
- Throw away your old HPN prescription as changes are made.
- If you need help with reprogramming your pump, call HomeMed for assistance.
Figure 2. Sample HPN prescription
Check your information.

Start By: xx/xx/xxxx

Do not use beyond this date.

Compare bag contents with prescription.

Check what you need to add to the bag.

Compare directions with pump program.

Aseptically add the following drugs in the quantities chosen to each container prior to administration as directed by physician. Administer 2000 mL intravenously over 12 hours using the TPN taper mode of the infusion pump. Taper up 1 hour and taper down 1 hour.

Patient Adds: Adult Multi-Vitamins – Add 10 mL to each TPN Bag

Contents:
- FreAmine III 10%
- Dextrose 70%
- Intralipid 20%
- Sodium Phosphate
- Potassium Chloride
- Sodium Chloride
- Sodium Acetate
- Potassium Acetate
- Magnesium Sulfate
- Calcium Gluconate
- Multitrace-5 Concentrate
- Sterile Water for Injection

TPN Volume: 2000 ml Over Fill: 100 ml Quantity: 2

Flush: Saline – Medication – Saline – Heparin

See flush label(s) for additional flushing information

Store in the Refrigerator

Allow to warm to room temperature prior to use

Filled By:

Figure 3. Sample HPN bag label
Daily monitoring

You will need to keep a daily record of your weight, your temperature, and your intake and output. Below is information about how to monitor and keep track of these measurements with your HomeMed Daily Monitoring Forms in Appendix C, at the end of this manual. Refer to the section “Call HomeMed or your doctor” for concerns.

Intake and Output

You may be asked to measure your intake and output on a daily basis. This will help HomeMed and your doctor estimate the fluid balance within your body.

- **Intake** includes all fluids taken into the body, both IV and oral.
- **Output** includes urine, diarrhea, vomit, and any other measurable drainage, such as from a wound, ostomy, or fistula.

Procedure:

1. Measure all fluid intake, both IV and oral (by mouth), each day. Use the following table to help you convert from ounces (oz) to milliliters (mL). Record intake on the Daily Monitoring Forms.

   Fluid equivalents:
   
   1 ounce (oz.) ................ 30 mL
   Coffee cup (8 oz.)........... 240 mL
   Can of soda (12 oz.) .........360 mL
   Popsicle (whole).............100 mL
   Water glass (8 oz.) .........240 mL
   Small juice (4 oz.).......... 120 mL

2. Measure all fluid output, such as urine, diarrhea, vomit, and drainage from wound(s), ostomy, and/or fistula. Record output on the Daily Monitoring Forms.
3. Write the intake and output totals in their individual “total” columns of your Daily Monitoring Forms (see Figure 4). Your total intake should be close to the total output.

4. Bring all records of intake and output with you each time you come for a clinic visit.

**Daily weights**
Daily weights will help HomeMed and your doctor determine if you are receiving too much or too little fluid and calories.
- Weigh yourself at the same time each day wearing similar clothing.
- Weigh infants without clothes on an infant scale. Be sure your baby is weighed at every clinic visit.
- Record your weights on your Daily Monitoring Forms.
- Bring this information each time you come into the clinic so your doctor can review your progress.

**Growth charts**
If your child is on HPN it is important to plot their weight, length, and head circumference (if less than 1 year of age) on a growth curve. These measurements are usually done at your clinic appointment. This will help your doctor and HomeMed provide the nutrients needed for your child to grow appropriately.

**Urine fractionals**
You may need to check a sample of your urine (a fraction from the entire amount urinated during a day) for sugar. If there is more sugar in the bloodstream than your body can handle, your kidneys will get rid of the extra sugar into the urine. You may also be asked to check your urine if you are experiencing signs or symptoms of high blood sugar (see Appendix B).
If you are asked to check your urine, do the following:

- Check your urine approximately **3 to 4 hours after you have started your HPN infusion.**
- Follow the directions printed on the bottle and/or package insert.
- Record your urine fractional (fx) test results and the approximate time you checked your urine on your Daily Monitoring Forms.
- If a test result is not negative, notify HomeMed or your doctor.
- **Bring this information each time you come into the clinic.**

**Blood sugars**

You may be asked to monitor your blood sugars. If so, ask your doctor for your specific instructions, such as when to check and what your blood sugar range should be.

- Record your blood sugar results and the time you checked on your Daily Monitoring Forms.
- If a blood sugar result is not within your specific range (too high or too low), notify HomeMed or your doctor.
- **Bring this information each time you come into the clinic.**

**Call HomeMed or your doctor:**

- For adults, if weight increases or decreases by 3 pounds or more for 2 days in a row.
- For adults, if urine output is less than 800 mL a day for 2 days in a row.
- For infants, if there has been no urine output for greater than 8 hours, or they have puffy eyes or no tears, or a bulging or sunken soft spot.
- If you have an increase in vomiting, diarrhea, ostomy or fistula output.
- If your urine test strip is not negative for sugar.
- If your blood sugar is not within your range (too high or too low).
## Figure 4. Sample Daily Monitoring Form

<table>
<thead>
<tr>
<th>Date</th>
<th>Temp</th>
<th>Weight</th>
<th><strong>Intake</strong></th>
<th><strong>Output</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>IV solution</td>
<td>Oral intake</td>
</tr>
</tbody>
</table>

**Call HomeMed or your doctor if:**

**Adults:** weight increases or decreases by 3 pounds or more for 2 days in a row.

**Your total intake should be close to your total output.**

**Call HomeMed or your doctor if:**

**Adults:** urine output is less than 800 mL a day for 2 days in a row.

**Infants:** no urine output for 8 hours, puffy eyes or no tears, bulging or sunken soft spot.

If urine fx is not negative.

**Call HomeMed or your doctor if:**

You have an increase in vomiting, diarrhea, ostomy, or fistula output.
Infusion pump guide

Many features are built into the pump to protect you during the delivery of your HPN solution.

- The display screen provides information to you.
- You may hear an occasional beep coming from the pump. This beep lets you know that a correction may be needed. You can read the display screen to see what is causing the alarm.
- You will also receive a pump manual, which gives you more detail about the pump.

How do I maintain and take care of my infusion pump?

- **Do not** place the pump in any fluids or cleaning solutions.
- **Avoid** dropping or hitting the pump. If the pump is dropped or hit, always recheck the program.
- HomeMed will check your pump once a year. Call if you believe it has been longer than a year without it being serviced.
- If the pump needs cleaning, use a soft cloth dampened with 70% isopropyl alcohol. Make sure the pump is disconnected from the person and power supply, and turned off before and during cleaning. Never use sharp objects to clean the pump.
- You may wash the backpack in regular detergent in your washing machine. After washing, dry under low heat in your dryer.
- **Never** use the pump in the presence of flammable or explosive vapors.
- **Always** avoid sources of high intensity electromagnetic radiation such as large electric motors or MRI machines.
- **Do not** shower or tub bathe when infusing your HPN with the pump.
How do I charge the battery?

The pump can operate while it is being charged. To preserve battery life, connect the pump to an electrical outlet using the supply cord whenever possible.

To charge the battery:

1. With the white arrows or red dot facing up, push the end of the power supply cord straight into the sapphire pump power socket (shown below).
   
   ➢ If you were supplied with a pump cradle, plug the cord into the bottom of the cradle.
   ➢ Do not twist the supply cord when plugging or unplugging it from the pump or pump cradle.

2. Plug the other end of the power supply cord into an electrical outlet.

3. On the front of the pump, verify that the charge LED status indicator is on (blinking yellow light). The yellow LED will remain lit when battery is fully charged.
   - An alarm is triggered when there are 30 minutes left until battery depletion. If the “battery depletion” alarm sounds, immediately connect the pump to an electrical outlet using the power supply cord.
Alerts, alarms, and troubleshooting

What do I do if the pump alarms?

1. When an alarm sounds, the pump will immediately provide a message with the error and suggested solution.
2. Press [Mute].
3. Follow the suggested solutions and then press [OK].
5. Keypad appears. Enter password “8880.”
8. Press [Request Continue] then [OK] to restart the infusion.
10. Contact HomeMed if you are not able to resolve the alarm.
### Troubleshooting guide:

<table>
<thead>
<tr>
<th>Error message</th>
<th>Solution:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cassette misplaced</td>
<td>The cassette on the IV tubing is not loaded correctly. Open the safety door, remove cassette, and reload the cassette.</td>
</tr>
<tr>
<td>Check for occlusion</td>
<td>Verify all catheter clamps are open and IV tubing is not kinked.</td>
</tr>
<tr>
<td>Downstream occlusion</td>
<td>To clear occlusions (blocks), check:</td>
</tr>
<tr>
<td></td>
<td>• All clamps are open</td>
</tr>
<tr>
<td></td>
<td>• Cassette on IV tubing is inserted correctly</td>
</tr>
<tr>
<td>Upstream occlusion</td>
<td>• IV tubing is not kinked</td>
</tr>
<tr>
<td></td>
<td>• No occlusion at the connection to your IV catheter</td>
</tr>
<tr>
<td>Occlusion</td>
<td>Once all occlusions are cleared press [OK] key to continue.</td>
</tr>
<tr>
<td>Flow error</td>
<td>Check that the cassette on the IV tubing is inserted correctly. Check if battery is sufficiently charged. If not, connect power supply cord to pump and charge. If alarm reoccurs contact HomeMed.</td>
</tr>
<tr>
<td>Internal error</td>
<td>Pump will automatically shut down in 3 minutes. Contact HomeMed to replace pump.</td>
</tr>
<tr>
<td>Mechanism error or pump fault</td>
<td>A pump fault has occurred. Contact HomeMed to replace pump.</td>
</tr>
<tr>
<td>Error message:</td>
<td>Solution:</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------</td>
</tr>
</tbody>
</table>
| Air in line   | • Press `[Mute]`. This silences the auditory alarm for 2 minutes.  
• Check to be sure all IV tubing connections are tight.  
• Check IV tubing for air bubbles. If there is air, disconnect IV tubing from person and press the `[Prime]` key to remove the air from IV tubing.  
• Reconnect the IV tubing to the person’s IV catheter.  
• Clean **bubble detector** with a damp cotton swab (use water only) (see below)  
• Press `[OK]` key to resume infusion. |
| Insufficient battery | Low battery voltage for current rate. Connect power supply cord to pump and charge. |
| Battery depleted | Pump will automatically shut down in 3 minutes. Connect power supply cord to pump and charge. |
| Battery reminder | End of battery life. Contact HomeMed to replace pump. |
Giving HPN

Step 1: Prepare

Set up your work area:

- Select a work area with good lighting, free of dust and drafts, and away from household traffic. Keep this area free of dust, lint, and clutter. Pets should not be allowed in these areas. **Do not use bathrooms.** They are likely to have a large number of germs. Your HPN work area should be used only for HPN procedures. You can use a stable tray, formica or similar product (e.g. metal, glass or plastic) placed over a dresser or end table.

- Clean your work surface with a household cleaner such as bleach, alcohol, or dish soap or you may place a clean paper towel on your work surface. Try not to touch the surface more than is needed after you have cleaned it.

Practice good hand washing:

- Use soap and **always** wash your hands thoroughly for 15 seconds before starting any procedure to decrease the risk of infection.

- You may use an instant hand sanitizer to wash your hands if they are not visibly soiled. Always check the label to be certain the gel contains alcohol in concentrations between 60% to 90%.

- **You must** do any wound, ostomy, or fistula care separately from HPN procedures. Germs normally live in your intestinal tract and in ostomy or fistula fluids. If these germs enter your bloodstream through the IV catheter or HPN solution, they could cause a severe blood infection (bacteremia).

- Washing your hands will clean them but not sterilize them, so you must still be careful when gathering and handling your IV catheter or supplies.

Gather and check your supplies:

- Take your HPN solution out of the refrigerator at least 8 hours before you start infusing it, to allow it to warm to room temperature. If you forget to remove your HPN bag from the refrigerator, call HomeMed for instructions.
Do not microwave your HPN solution. You must complete your infusion within 24 hours after the HPN bag reaches room temperature.

- Make sure each item is sterile by checking for visible signs of contamination such as an open package or cloudy fluid. Never use damaged supplies, such as protective coverings on medication vials or needle caps.

**How do I handle sterile supplies?**

Some pieces of the supplies are sterile. Sterile means that all germs have been removed by a special cleaning process. Parts of the supplies that must be kept sterile are protected with a cover.

- Never touch sterile parts with your hands or allow a sterile item to contact a non-sterile surface.
- If you are inserting a sterile needle through a non-sterile surface, always use an alcohol wipe to clean the surface. Never touch this area after cleaning it.

**What supplies do I need?**

- One (1) HPN bag with patient additives, such as multivitamins (refer to “HomeMed Parenteral Nutrition Mixing Protocol”)
- One (1) Sapphire® IV tubing set (remove from package)
- One (1) 1.2 micron filtered extension set (remove from package)
- One (1) anti-siphon valve
- One (1) prefilled heparin flush syringe (remove from package)
- Two (2) prefilled saline flush syringes (remove from package)
- One (1) alcohol cap
- Alcohol pads
- Sapphire® pump
- Household disinfectant or alcohol
- Soap
- Paper towel
Step 2: Start HPN:

Prepare your work area

1. Place a trash can next to your work area.
2. Clean your work surface or laminate mat with household disinfectant. Let the area air dry.
3. **Wash your hands** as follows:
   a. Wet your hands and wrists under running water.
   b. Scrub vigorously with soap for 15 seconds.
   c. Work lather between fingers, under nails, over the palms, and back of hands.
   d. Rinse hands well by keeping your hands up with fingers pointing up towards the ceiling so that the dirty water runs toward your elbows.
   e. Dry your hands with a clean paper towel from tips of fingers down.
   f. Turn off the faucet with the paper towel.
4. Gather your supplies and place on your work area.
5. **Wash your hands again.**
Prepare the tubing

1. **Turn the pump on** by pressing the [ON/OFF] hard key in lower right corner.
2. Press [PreSet Programs] on the pump screen (see Figure 1).
3. Select desired preset program (TPN) on the screen and review the pump program with the medication label (see Figure 2).
4. Press [OK].

5. Attach the filtered extension set to the Sapphire® pump tubing as follows: Remove end caps from the Sapphire® pump tubing and the shorter end of the filtered extension set tubing, then twist together at the luer lock connection and secure cuff (shown below).
6. Attach the anti-siphon valve to the end of the filtered extension set as follows:
   a. Remove anti-siphon valve from package by holding clear center piece (see Figure 3).
   b. Take cap off the end of the filtered extension set.
   c. Remove short, round cap on the end of anti-siphon valve and connect to open end of the filtered extension set (see Figure 4).
   d. Twist cuff from filtered extension tubing onto the anti-siphon valve.
7. Open the safety door on the Sapphire® pump. Using your thumb, press safety door outwards (see Figure 5).

8. Insert the IV tubing cassette into the pump by placing the saddle on the round metal anchor (see Figure 6) and clipping the upper end of the cassette into the metal lock (see Figure 7).
9. Close the safety door and ensure that it clicks upon closure.

10. Spike the HPN bag with the pump tubing as follows:
   
a. Remove the tab on the HPN bag (see Figure 8).
   b. Keeping the spike sterile, remove the spike cover from the HPN tubing. **Do not touch the spike.**
   c. Hold the port of the HPN bag straight and insert the spike by pushing and twisting at the same time (see Figure 9).

11. Prime (fill with fluid) and remove the air from the IV tubing as follows:
   
a. Loosen the cap, being careful not to remove it, at the end of the anti-siphon valve.
   b. Press **Prime** in the lower left corner of the screen (see Figure 10). The pump will prompt you to be sure that the tubing is **not** connected to your IV catheter (see Figure 11).
c. Press [Prime] again and the pump will begin to prime (fill the tubing) with IV solution. Hold filter in an upward direction while priming until fully filled with fluid (see Figure 12).

d. Once the pump has stopped priming, check to be sure that the IV set is filled with fluid and no air remains. If air remains, repeat the priming steps.

12. Once you stop priming, the pump screen will prompt you to “Connect set to patient after prime”. Press [OK].
Give the HPN

1. Check your IV catheter cap to make sure it is on securely.
   - Valved IV catheter caps may be clear or blue (shown below).

2. Unclamp your catheter and remove alcohol cap.

3. **Vigorously** scrub the end of the cap on your catheter with an alcohol pad for 15 seconds (see Figure 13).

4. Flush your IV catheter with saline as follows:
   a. Hold the prefilled saline syringe upright.
   b. **Do not remove the cap.** Press forward on the plunger to break the seal. **Do not pull back on the plunger.**
   c. Gently tap the sides of the syringe so the air bubbles rise to the top.
   d. Remove the cap and push the plunger to remove all the air (see Figure 14).
e. Push and twist the saline syringe into your catheter cap to the right until secure.

f. Inject the saline solution (see Figure 15).

5. Remove and discard syringe in your trash.

- Always hold your catheter cap while disconnecting syringes and IV tubing, to prevent accidental removal from your IV catheter.

6. Remove and discard the protective cap from the end of the anti-siphon valve, which is attached to the Sapphire® pump tubing (see Figure 16).
7. Vigorously scrub the end of the cap on your catheter with an alcohol pad for 15 seconds (see Figure 17).

8. Push the end of the IV tubing into your catheter cap (see Figure 18).

9. Make sure all clamps on your catheter (see Figure 19) and IV tubing are open.

10. Press [Start] on the screen to begin the infusion (see Figure 20).

11. Press [Lock] then [Patient Lockout] on the screen (see Figure 21).

   - Screen will darken after 30 seconds.
   - The run light will continue to flash green.
➢ To “wake up” the screen, press the on/off button once, and after a brief pause the screen will light up.

12. Place the IV bag and pump into the backpack/fanny pack or use the IV pole.

Step 3: Complete the HPN Infusion

Follow these steps:

3. Keypad appears. Enter password “8880” (see Figure 22).
6. Turn pump off by pressing the hard [ON/OFF] key.
7. Screen will read “press OFF to turn off the pump”. Press [OFF].
8. Wash your hands.
9. Disconnect pump tubing from your IV catheter.
10. Vigorously scrub the end of the cap on your catheter with an alcohol pad for 15 seconds.

11. Flush your IV catheter with saline (see previous section; step 4).

12. **Vigorously** scrub the end of the cap on your catheter with an alcohol pad for 15 seconds.

13. Flush your IV catheter with heparin as follows:
   a. Hold the prefilled heparin syringe upright, press forward on the plunger, remove the cap, and push out the air.
   b. Push and twist the heparin syringe into your catheter cap to the right until secure.
   c. Inject the heparin leaving a small amount of solution in the syringe, clamp your catheter before removing the syringe, then discard in your trash (see Figure 23).

14. Attach the alcohol cap onto the end of your IV catheter cap.

15. Remove the pump, empty HPN bag, and tubing from the backpack.

16. Open the safety door on the pump.

17. Remove the tubing cassette by raising the metal lock that secures it to the pump (see Figure 24).

18. Throw away the bag and pump tubing.

19. Plug your pump into electrical outlet to charge the battery.

20. Remove a new bag of HPN from the refrigerator.
Summary of steps

Starting HPN

1. Obtain daily weight and temperature to record on Daily Monitoring Form
2. Clean work area
3. Wash your hands
4. Open supplies and place on work area
5. Check and compare HPN prescription and bag label
6. Mix additives in HPN bag (refer to HPN mixing instruction sheets)
7. Attach filtered extension set, then anti-siphon valve to pump tubing
8. Turn the pump on
   - Press [Preset Programs]
   - Select TPN (review pump program with the programming sheet)
   - Press [OK]
9. Place pump tubing into pump
10. Spike HPN bag with pump tubing
11. Prime pump tubing
12. Remove alcohol cap from end of your IV catheter cap
13. Scrub your IV catheter cap with alcohol
14. Flush your IV catheter with saline
15. Scrub your IV catheter cap with alcohol
16. Connect pump tubing to your catheter
17. Press [Start] on pump screen to begin infusion
18. Press [Lock] then [Patient lockout] on the screen
19. Place the IV bag and pump into the backpack or on IV pole
Stopping HPN

1. Clean work area
2. Wash your hands
3. Press [Press to unlock patient] key on the infusion pump
4. Enter “8880”
5. Press hard [ON/OFF] key, then [OFF] on screen
6. Disconnect pump tubing from your IV catheter
7. Scrub your IV catheter cap with alcohol
8. Flush your IV catheter with saline
9. Scrub your IV catheter cap with alcohol
10. Flush your IV catheter with heparin
11. Attach alcohol cap onto end of your IV catheter cap
12. Remove pump tubing and HPN bag from the pump and discard
13. Remove a new HPN bag from the refrigerator
14. Plug pump into electrical outlet to charge
Infusing extra IV fluids

Occasionally HomeMed or your doctor may direct you to infuse IV fluid other than HPN solution. You will receive a small supply of one or two IV bags of Sodium Chloride 0.9% in your first delivery. This fluid may be used in case of a pump failure as they can be given by gravity (see instructions below).

Key points:
- Check the syringes for expired dates, color changes, leaks and floating materials. If these occur, set aside and use another. Notify HomeMed.
- IV solutions do not usually need to be refrigerated. HomeMed will instruct you on whether or not your IV solutions need to be kept in the refrigerator. This information will also be included on the label.
- IV tubing used for IV fluids may be used for 3 days (72 hours) as long as you put a new sterile cap on the end of the tubing after using it.
- If you are using an infusion pump and the backpack (not using an IV pole), you must remove the air from the bag.
- Use the IV fluid bag only if instructed by HomeMed or your doctor.

What supplies do I need?
- One (1) IV medication bag
- One (1) gravity IV tubing
- One (1) flow regulator extension set
- One (1) luer lock cap (white cap to keep IV tubing sterile for reuse)
- One (1) prefilled heparin flush syringe (remove from package)
- Two (2) prefilled saline flush syringes (remove from package)
- Four (4) alcohol pads
- One (1) alcohol cap
- Household disinfectant or alcohol
- Soap and paper towel
Step 1: Prepare for the procedure
1. Place a trash can next to your work area.
2. Clean your work surface or laminate mat with household disinfectant. Let the area air dry.
3. Wash your hands.
4. Gather your supplies and place onto your work area.
5. Wash your hands again.

How do I prepare the tubing? (Figure 25)
1. Attach the gravity IV tubing to the flow regulator extension set.
   o Remove the cap from the end of the gravity IV tubing.
   o Remove the cap on the shorter end of the flow regulator tubing and attach it to the gravity IV set by screwing together (see diagram on the next page).
2. Turn flow regulator to “off” position.
3. Remove the tab from the IV bag.
4. Remove the spike cover from the IV tubing. Do not touch the spike.
5. Hold the port of the IV bag straight and insert the spike by pushing and twisting at the same time.
6. Hang the IV bag with the attached tubing on the IV pole.
7. Squeeze and release the drip chamber on the IV tubing until it is half full of fluid.
8. Turn arrow on flow regulator to “open” to fill the IV tubing with fluid.
9. When the fluid is at the end of the IV tubing, turn the arrow on flow regulator to “off”.
10. Hang the IV bag on the IV pole. Do not let the tubing fall on the floor.
11. Place the expiration label on the IV tubing to remind you to change it in 72 hours (3 days).
Step 2: Start giving the IV fluid

1. Check your IV catheter cap to make sure it is on securely.
2. Unclamp your catheter and remove alcohol cap.
3. **Vigorously** scrub the end of the cap on your catheter with an alcohol pad for 15 seconds.
4. Flush your IV catheter with saline.
5. **Vigorously** scrub the end of the cap on your catheter with an alcohol pad for 15 seconds.
6. Remove the protective cap from the flow regulator extension set.
7. Push and twist the end of the IV tubing extension set into your catheter cap to the right until secure. Then “lock down” the spin collar to assure a tight connection.

8. Turn the arrow on the flow regulator to the rate noted on the bag label in order to infuse over the correct amount of time.

Step 3: Complete the IV fluid infusion

1. When infusion is done, roll down the roller clamp on the IV tubing to close it.

2. **Wash your hands.**

3. If the tubing has been used less than 3 days, disconnect the IV tubing from the cap on your IV catheter and place the white cap onto the end of the flow regulator tubing (this will keep the IV tubing sterile for reuse). Keep empty bag attached to tubing (see next section to learn how to reuse tubing).

4. **Vigorously** scrub the end of the cap on your catheter with an alcohol pad for 15 seconds.

5. Flush your IV catheter with saline.

6. **Vigorously** scrub the end of the cap on your catheter with an alcohol pad for 15 seconds.

7. Flush your IV catheter with heparin.

8. Attach the alcohol cap onto the end of your IV catheter cap.

**How do I reuse the tubing for the next dose?**

**Change your IV tubing every 3 days.** You will receive labels to help you keep track. If the tubing has been used for 3 days, throw it away and use a new tubing for the next dose. If your tubing has been used less than 3 days do the following:

1. Remove the empty medication bag by twisting and pulling out the spike. Keep the spike on the IV tubing sterile.

2. Replace the old empty medication bag with a new one.
Summary of steps:
These are the steps to follow when you give your IV fluids using a flow regulator extension set:

1. Wash your hands
2. Attach flow regulator to gravity IV tubing
3. Spike bag and prime tubing with fluid
4. Remove alcohol cap
5. Scrub your IV catheter cap with alcohol
6. Flush your IV catheter with saline
7. Scrub your IV catheter cap with alcohol
8. Connect gravity IV tubing to your IV catheter
9. Start infusion (set flow regulator to rate noted on bag label)
10. Stop infusion (keep tubing sterile for 3 day reuse)
11. Disconnect gravity IV tubing from your IV catheter
12. Scrub your IV catheter cap with alcohol
13. Flush your IV catheter with saline
14. Scrub your IV catheter cap with alcohol
15. Flush your IV catheter with heparin
16. Attach alcohol cap onto end of your IV catheter cap
Potential complications of HPN therapy

Complications can occur with HPN therapy. By following the instructions in this manual, you can prevent complications. The complications of HPN are classified as mechanical, infectious, and metabolic. Refer to Appendix B for a list of signs and symptoms of fluid, electrolyte and nutrient imbalances.

Mechanical complications

Clotting: occurs when fluids stop flowing through the IV catheter causing blood to backflow.

<table>
<thead>
<tr>
<th>Signs of clotting</th>
<th>What could be the cause?</th>
<th>How do I prevent it?</th>
<th>What do I do?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to flush your catheter.</td>
<td>Kinks in the tubing or catheter.</td>
<td>Avoid kinks in catheter when taping to your arm or chest.</td>
<td>Re-tape tubing and/or catheter.</td>
</tr>
<tr>
<td>Catheter is sluggish when you flush it.</td>
<td>Not attending to pump alarms.</td>
<td>Always flush your catheter whenever HPN solution is completed or interrupted, after blood is drawn, or if blood backs up into the tubing.</td>
<td>Notify HomeMed or your doctor if your catheter becomes difficult to flush or you are not able to flush it.</td>
</tr>
<tr>
<td>Multiple pump “occlusion” alarms and you are not able to resume infusion.</td>
<td>Interruptions during HPN infusions.</td>
<td>Clamp your catheter when infusion stops.</td>
<td>Do not use force when flushing your catheter.</td>
</tr>
<tr>
<td></td>
<td>Not clamping your catheter when infusion stops.</td>
<td>Flush your catheter after infusion complete.</td>
<td>Notify HomeMed if unable to troubleshoot pump alarms.</td>
</tr>
<tr>
<td></td>
<td>Not flushing your catheter after infusion complete.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Catheter displacement**: the tip of the IV catheter moved from the correct position in the vein.

<table>
<thead>
<tr>
<th>Signs of catheter displacement</th>
<th>What could be the cause?</th>
<th>How do I prevent it?</th>
<th>What do I do?</th>
</tr>
</thead>
</table>
| • Pain in the neck or shoulder when infusing HPN.  
  • Swelling or puffiness at catheter site when infusing HPN.  
  • Increase in external length of IV catheter. | • Catheter flexibility can lead to change in tip position.  
  • Pulling or tugging on catheter.  
  • Loose dressing. | • Avoid pulling or tugging on catheter.  
  • Change dressing if loose or wet.  
  • Use catheter securement devices such as Grip-lok®. | Stop the HPN infusion, flush your catheter and call your doctor immediately. A chest x-ray may be needed to check the catheter location. |
Catheter breakage: the IV catheter leaks or breaks

<table>
<thead>
<tr>
<th>Signs of catheter breakage</th>
<th>What could be the cause?</th>
<th>How do I prevent it?</th>
<th>What do I do?</th>
</tr>
</thead>
</table>
| Leaking of HPN fluid or blood. | - Cut or tear in the catheter from scissors, pins, or other sharp objects.  
- Using a clamp on the catheter with teeth or rough edges.  
- Clamping the catheter in the same spot repeatedly. | - **Never** use sharp objects near the catheter.  
- Always use a catheter clamp for clamping.  
- Rotate the sites where you clamp your catheter. | Clamp the catheter as close to your body as possible. Call your doctor immediately. Your catheter will most likely need to be replaced. |
**Thrombosis:** blood clot formation

<table>
<thead>
<tr>
<th>Signs of thrombosis</th>
<th>What could be the cause?</th>
<th>How do I prevent it?</th>
<th>What do I do?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arm (on the same side as your catheter) becomes painful, swollen or cool to touch. May also cause pain or swelling in neck or chest.</td>
<td>Catheter may cause blockage of blood flow around the catheter.</td>
<td>Follow catheter care instructions.</td>
<td>Stop the HPN infusion, flush the catheter and call your doctor immediately.</td>
</tr>
</tbody>
</table>
**Air embolism:** a large amount of air enters the blood system.

<table>
<thead>
<tr>
<th>Symptoms of air embolism</th>
<th>What could be the cause?</th>
<th>How do I prevent it?</th>
<th>What do I do?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Shortness of breath and coughing</td>
<td>• The catheter is not clamped when the cap is removed.</td>
<td>• Always clamp the catheter whenever the catheter is opened to air.</td>
<td>• If you see large amounts of air in the tubing, clamp the catheter, stop the infusion, clear the tubing of air and restart the infusion.</td>
</tr>
<tr>
<td>• Chest pain</td>
<td>• The IV tubing becomes separated at a connection or the cap falls off the end of the catheter.</td>
<td>• Tighten all tubing, connections and caps.</td>
<td>• For symptoms of an air embolism: clamp the catheter, call 911 and do the following:</td>
</tr>
<tr>
<td>• Loss of consciousness</td>
<td>• The IV tubing or filter is not correctly filled with fluid.</td>
<td>• Fill the IV tubing carefully so air is not left in the tubing or filter.</td>
<td>1. Take small breaths only.</td>
</tr>
<tr>
<td>Infants may have:</td>
<td></td>
<td></td>
<td>2. Lie on your left side with feet and legs elevated and your chest and head slightly lower than your feet.</td>
</tr>
<tr>
<td>• A higher than usual breathing rate</td>
<td></td>
<td></td>
<td>3. Attach a syringe to your catheter and withdraw any air until you get blood in the syringe. Then flush with heparin.</td>
</tr>
<tr>
<td>• A bluish coloring to lips or skin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Loss of consciousness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Nasal flaring</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Infection complications**: symptoms of infections may occur either at the IV catheter exit site (local) or within the bloodstream (systemic).

**Local**: infection at the catheter exit site.

**Systemic**: an infection within the bloodstream. Systemic symptoms may be caused by another source of infection such as a “flu” virus, bladder infection or pneumonia.

<table>
<thead>
<tr>
<th>Symptoms of systemic infection</th>
<th>What could be the cause?</th>
<th>How do I prevent it?</th>
<th>What do I do?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fever</td>
<td>• Sloppy technique.</td>
<td>• Take your time.</td>
<td>• Take your temperature. If your temperature is greater than 100.4°F, call HomeMed or your doctor as soon as possible.</td>
</tr>
<tr>
<td>• Chills</td>
<td>• Not following procedures.</td>
<td>• Do not rush through procedures.</td>
<td>• If you are infusing your HPN and begin to experience a fever or shaking chills, save your bag and tubing and call HomeMed. It may need to be checked for contamination.</td>
</tr>
<tr>
<td>• Sweating</td>
<td>• Not washing hands before sterile procedures.</td>
<td>• Follow procedures as shown to you during training.</td>
<td>• If you think you contaminated any supplies or solutions, throw them out.</td>
</tr>
<tr>
<td>• Weakness</td>
<td>• Using contaminated supplies or HPN solution.</td>
<td>• Wash hands with soap before sterile procedures.</td>
<td>• If you are infusing your HPN and begin to experience a fever or shaking chills, save your bag and tubing and call HomeMed. It may need to be checked for contamination.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do not use expired supplies.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If you think you contaminated any supplies or solutions, throw them out.</td>
<td></td>
</tr>
</tbody>
</table>
**Metabolic complications:** blood tests will be done periodically and any changes in the HPN will be based on these lab reports.

**Hyperglycemia:** a higher than normal level of sugar in the blood.

<table>
<thead>
<tr>
<th>Symptoms of hyperglycemia</th>
<th>What could be the cause?</th>
<th>How do I prevent it?</th>
<th>What do I do?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Weakness</td>
<td>• HPN has infused too fast.</td>
<td>• Always use an infusion pump to cycle your HPN in order to gradually increase the rate at the start and decrease the rate at the end.</td>
<td>• Check your urine fractional. Call HomeMed if your urine fractional is not negative.</td>
</tr>
<tr>
<td>• Feeling tired and thirsty</td>
<td>• Body is unable to process the amount of sugar in your HPN solution.</td>
<td>• <strong>Do not press the [Prime] key</strong> when your pump tubing is connected to your catheter.</td>
<td>• Check your blood sugar if directed and call HomeMed or your doctor if too high.</td>
</tr>
<tr>
<td>• Dry mouth</td>
<td>• Infection</td>
<td></td>
<td>• Take your temperature. Call HomeMed or your doctor if greater than 100.4°F as soon as possible.</td>
</tr>
</tbody>
</table>
**Hypoglycemia**: a lower than normal level of sugar in the blood.

<table>
<thead>
<tr>
<th>Symptoms of hypoglycemia</th>
<th>What could be the cause?</th>
<th>How do I prevent it?</th>
<th>What do I do?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Nervous</td>
<td>• HPN is suddenly stopped.</td>
<td>• Do not stop your HPN infusion in the middle of a cycle unless directed by HomeMed or your doctor.</td>
<td></td>
</tr>
<tr>
<td>• Irritable</td>
<td>• Not tolerating HPN cycle or taper time.</td>
<td>• Always taper your HPN solution.</td>
<td></td>
</tr>
<tr>
<td>• Headache</td>
<td></td>
<td></td>
<td>• Check your blood sugar if directed and call HomeMed or your doctor if too low.</td>
</tr>
<tr>
<td>• Dizziness and/or cold sweats</td>
<td></td>
<td></td>
<td>• Drink something with sugar in it (such as orange juice) or suck on a hard candy.</td>
</tr>
<tr>
<td>Infants may be:</td>
<td></td>
<td></td>
<td>• Call your doctor if these symptoms continue.</td>
</tr>
<tr>
<td>• Lethargic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Damp to touch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pale</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Fluid imbalance:** fluid balance will be affected by your nutritional and health status.

<table>
<thead>
<tr>
<th>Symptoms of fluid imbalance</th>
<th>What could be the cause?</th>
<th>How do I prevent it?</th>
<th>What do I do?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults: Weight loss or gain of 3 pounds or more for 2 days in a row.</td>
<td>The amount of HPN solution may be too little or too much.</td>
<td>Infuse your HPN as directed.</td>
<td>Notify HomeMed or your doctor if you have symptoms of fluid imbalance, your total intake is a lot more or less than your total output, or you missed HPN.</td>
</tr>
<tr>
<td>New or increased swelling.</td>
<td>Your total intake is greater or less than your total output.</td>
<td>Try to infuse HPN at the same time every day.</td>
<td></td>
</tr>
<tr>
<td>Decreased and/or concentrated urine output.</td>
<td>Not infusing HPN as directed.</td>
<td>Keep accurate records of your intake and output.</td>
<td></td>
</tr>
<tr>
<td>Infants: sunken or puffy eyes, bulging or sunken “soft spot”, or rapid and labored breathing.</td>
<td></td>
<td>Check your weights at the same time every day and record.</td>
<td></td>
</tr>
</tbody>
</table>
When should I contact my doctor, visiting nurse or HomeMed?

Call 911 if:
- You experience symptoms of air embolism: shortness of breath, coughing, and chest pain.
- For infants: if lethargic or if they are less responsive or have difficult, rapid or labored breathing.

Notify immediately if:
- You have a hole or break in your catheter.
- You have pain in the neck or shoulder when infusing the HPN solution.
- You experience symptoms of systemic (body-wide) infection such as fevers, chills, sweats and weakness.
- Your arm (on the same side of your catheter) becomes swollen, cool or painful.

Call as soon as possible if:
- You are not able to infuse any or part of the HPN solution.
- You are having difficulties flushing your catheter.
- You see redness, swelling, tenderness, and/or drainage at the catheter exit site.
- You experience symptoms of low blood sugar (hypoglycemia) or high blood sugar (hyperglycemia).
- Your blood sugar results are too high or too low.
- Your urine test results for sugar are not negative.
- For adults: your urine output is less than 800 mL per day for two days in a row.
- For children: there is no urine output for more than 8 to 12 hours.
• For infants: they have puffy eyes, full or sunken “soft spot”, or decrease in wet diapers.
• There is new or increased swelling in your feet, ankles, or fingers.
• You have vomiting, diarrhea, or a sudden increase in fistula drainage.
• For adults: you have a weight loss or gain of 3 pounds or more for two days in a row.

How do I prepare for emergencies?

• Keep supplies that are necessary to flush your IV catheter with you at all times.
• Always keep your IV catheter taped securely to prevent dislodgement.
• If you notice that the filter is leaking or cracked, change the IV tubing.
• If your pump doesn’t charge or you are not able to charge your pump, call HomeMed.
• You may wish to purchase a medical alert bracelet at your local pharmacy stating your medical condition and the presence of your IV catheter.
• Keep your HPN manual, infusion pump manual and telephone numbers in a place where you can find them easily if problems arise.
• If you are infusing your HPN solution and need to leave your home immediately, do not stop the infusion. Put the HPN solution and prescription in the backpack and take it with you.
• If you need to temporarily relocate from your home, contact our office with your temporary address and phone number.
• If you lose power to your refrigerator, remove your HPN solution and additives and store them in a portable cooler with ice. This will keep your HPN and medications stored safely for at least 24 hours. Call HomeMed for further instructions.
Non-emergency health changes and reminders:

- Notify your doctor in advance of any dental work or minor surgery to be done. You may need to take antibiotics.
- Brush and floss your teeth and use mouthwash 2-3 times a day.
- If you have a cold or are sick, wear a mask when starting, stopping or mixing your HPN solution, or when changing your catheter dressing.
- Notify HomeMed if you are admitted to a hospital or if you started on any new medications.
Appendix A

Frequently asked questions:

1. **How will I get the supplies I need for my HPN?** HomeMed will deliver all the supplies you will initially need, to your home or hospital room, the same day or evening of discharge. A team technician from HomeMed will contact you before discharge so a delivery time can be arranged. The team technician will also discuss with you the weekly schedule for delivering further supplies to your home.

2. **What types of things will be provided?** HomeMed will provide HPN bags, a refrigerator (to be used only for HPN), pump tubing, extension tubing, infusion pump, backpack, empty syringes, needles, heparin and saline flush syringes, medication to be added to the HPN solution, alcohol wipes, IV dressing change kits, tape, sharps container, IV pole, and extra IV fluid bag for backup use.

3. **How will I learn how to give HPN with all the supplies above?** The HomeMed training team will instruct you in the hospital. Equipment and supplies will be brought to your room to practice with and you will also be given written material to read. Once you are home, a visiting nurse will reinforce what you have learned in the hospital.

4. **When will the visiting nurse come to my home?** A visiting nurse agency will be arranged before your discharge. The visiting nurse will call you to set up a visit time. Generally, it’s around 7 or 8 pm the evening of discharge. This is because most people are “cycled” on their HPN and due to be connected in the evening.

5. **What is “cycling”?** In the hospital, HPN is connected to your IV catheter 24 hours a day. At home, many patients are on HPN only 12 hours per day, and
generally infuse at night while sleeping. Before discharge, HomeMed works with your doctor towards cycling your HPN down to 12 hours. Each patient is different, due to their age and medical status, in terms of how quickly the HPN cycle can be lowered. If you are not on a 12 hour cycle at discharge, you may be able to continue to be “cycled down” once at home with the help of HomeMed.

6. **Who are my HomeMed clinicians?** The team of clinicians who will care for you include a pharmacist and a nurse. They will be in contact with you frequently once you are home. They will monitor your labs and HPN progress along with your doctor.

7. **Who do I contact if I’m missing supplies?** During your first visit with your visiting nurse, it's a good idea to go through your supplies with your nurse to verify that you have all the items necessary to start your HPN therapy. The team technician at HomeMed is the individual to contact if something is missing. Wait until morning to contact them if it’s not urgent. If it’s necessary to have the item that night, call HomeMed at (800) 862-2731 to reach a clinician.

8. **How often is the IV pump tubing changed?** Every day due to the sugar and lipid content in the HPN.

9. **There is some other clear IV fluid in my box. What is this used for?** Some patients may need additional hydration while on HPN. This may be due to increased vomiting, diarrhea, ostomy output, etc. HomeMed will inform you if additional hydration becomes necessary and you need to infuse this IV fluid. You may also need to use this IV hydration if your pump fails. Generally, IV hydration fluids do not need to be refrigerated unless the label directs you to do so.
10. I see a different type of tubing in my box with a dial on it. What is this used for? This is used if it is necessary to infuse extra hydration fluids. If required, HomeMed will discuss this with you. This type of tubing can be used for 3 days, since the sugar content is lower in hydration fluids.

11. Who do I call when my sharps container is full? Contact your team technician at HomeMed to send you an empty one to use. To dispose of a sharps container, seal and secure the lid, double bag it in opaque bags, and place into your regular household trash.

12. I have the urine test strips in my box to check for sugar. Why is this so important to do 3 to 4 hours into my cycle? Your HPN solution contains a large amount of dextrose (sugar). The time you will be receiving the greatest amount of dextrose is after the taper up period. If your urine results show a large amount of sugar, changes will need to be made in your HPN solution because you can easily become dehydrated (see “Complications” section for symptoms).

13. They check blood glucose levels in the hospital. Do I need to check these at home too? Some people, such as people with diabetes, are asked to monitor blood glucose levels. If blood glucose checks are needed, a member of your medical team will inform you of this.

14. If I feel hypoglycemic, hyperglycemic, dehydrated etc. Who do I contact? You can contact HomeMed or your doctor.

15. I'm feeling great on HPN. I'm gaining weight and have lots of energy. Can I just skip a day of HPN? No! When you are ready to “come off” HPN, this is done slowly and only under the supervision of your doctor and HomeMed.
16. I'm feeling so good; I'd like to travel a little bit. Is this possible while on HPN? Yes, you can travel, if approved by your doctor. Contact HomeMed to assist you with organizing this. Notify HomeMed as far ahead of time as possible so that your supplies can be shipped directly to your destination if possible.
### Appendix B

**Signs and symptoms of fluid, electrolyte and nutrient imbalances**

<table>
<thead>
<tr>
<th>Fluid imbalances:</th>
<th>Fluid overload (water excess)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• confusion, poor coordination</td>
</tr>
<tr>
<td></td>
<td>• nausea</td>
</tr>
<tr>
<td></td>
<td>• muscle cramps, weakness</td>
</tr>
<tr>
<td></td>
<td>• headache</td>
</tr>
<tr>
<td></td>
<td>• weight gain</td>
</tr>
<tr>
<td></td>
<td>• moist skin</td>
</tr>
<tr>
<td></td>
<td>• swelling in legs</td>
</tr>
<tr>
<td></td>
<td>• fluid intake greater than output</td>
</tr>
<tr>
<td></td>
<td>• shortness of breath</td>
</tr>
<tr>
<td></td>
<td>• light-colored, large amounts of urine output</td>
</tr>
<tr>
<td>Dehydration (water loss)</td>
<td>• dizziness, weakness</td>
</tr>
<tr>
<td></td>
<td>• thirst</td>
</tr>
<tr>
<td></td>
<td>• dry skin and mucous membranes</td>
</tr>
<tr>
<td></td>
<td>• swollen and dry tongue with deep grooves</td>
</tr>
<tr>
<td></td>
<td>• weight loss</td>
</tr>
<tr>
<td></td>
<td>• decreased urine output</td>
</tr>
<tr>
<td></td>
<td>• dark-colored, concentrated urine</td>
</tr>
<tr>
<td></td>
<td>• foul smelling urine</td>
</tr>
</tbody>
</table>
### Glucose

<table>
<thead>
<tr>
<th>Blood glucose:</th>
<th>Hyperglycemia (high blood sugar)</th>
</tr>
</thead>
</table>
| Sugar found in the blood. | • weakness  
| | • tired  
| | • thirst  
| | • headache  
| | • dry mouth  
| | • increased urine output  
| | • irritability, confusion  

<table>
<thead>
<tr>
<th>Hypoglycemia (low blood sugar)</th>
</tr>
</thead>
</table>
| • nervousness  
| • headache  
| • cold sweats  
| • dizziness  
| • irritability, confusion  

### Major electrolytes

<table>
<thead>
<tr>
<th>Sodium: Important for fluid balance and many vital functions.</th>
<th>Hypernatremia (high sodium)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• thirsty</td>
</tr>
<tr>
<td></td>
<td>• rough, dry tongue</td>
</tr>
<tr>
<td></td>
<td>• decreased urine output</td>
</tr>
<tr>
<td></td>
<td>• decreased weight</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hyponatremia (low sodium)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• weakness</td>
</tr>
<tr>
<td>• apathy</td>
</tr>
<tr>
<td>• weight gain, swelling in the hands and feet</td>
</tr>
<tr>
<td>• headaches, shortness of breath</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potassium: Involved in many important actions including heart function.</th>
<th>Hyperkalemia (high potassium)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• weakness</td>
</tr>
<tr>
<td></td>
<td>• generally tired</td>
</tr>
<tr>
<td></td>
<td>• muscle cramping or twitching</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypokalemia (low potassium)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• decreased reflexes</td>
</tr>
<tr>
<td>• muscle cramping or twitching</td>
</tr>
<tr>
<td>• muscle weakness</td>
</tr>
<tr>
<td>• rapid, weak pulse</td>
</tr>
<tr>
<td>Major electrolytes</td>
</tr>
<tr>
<td>--------------------</td>
</tr>
<tr>
<td><strong>Calcium:</strong></td>
</tr>
</tbody>
</table>
| Necessary for bone growth and blood clotting. Muscle, nerve, and heart function. | - drowsiness, tiredness  
- loss of appetite  
- nausea, vomiting  
- muscle weakness  
- deep bone pain |
| **Hypocalcemia (low calcium)** | |
| - twitching  
- seizures  
- tingling around the mouth  
- spasms of the feet or hands  
- numbness, tingling of hands or feet  
- abdominal cramping  
- nausea, vomiting, diarrhea |
| **Magnesium:**     | **Hypermagnesemia (high magnesium)** |
| Mineral found in soft tissue, muscle and bones. | - drowsiness  
- tiredness  
- flushing  
- muscle weakness |
| **Hypomagnesemia (low magnesium)** | |
| - not able to sleep  
- leg, foot cramps  
- muscle weakness, twitching, tremors |
### Major electrolytes

<table>
<thead>
<tr>
<th>Phosphorus:</th>
<th>Hyperphosphatemia (high phosphorus)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphorus:</td>
<td>• numbness, tingling of extremities</td>
</tr>
<tr>
<td>An element needed for normal metabolism of carbohydrates, protein and fat. Needed for normal muscle contraction and heart function.</td>
<td>• muscle cramps</td>
</tr>
<tr>
<td></td>
<td>• nausea, vomiting, diarrhea</td>
</tr>
<tr>
<td></td>
<td>• dry skin</td>
</tr>
<tr>
<td></td>
<td>• brittle nails</td>
</tr>
<tr>
<td></td>
<td>• tingling around the mouth</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypophosphatemia (low phosphorus)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• tiredness</td>
</tr>
<tr>
<td>• muscle weakness</td>
</tr>
<tr>
<td>• loss of appetite</td>
</tr>
<tr>
<td>• mild bone pain</td>
</tr>
</tbody>
</table>
## Appendix C

### Daily Monitoring Form

<table>
<thead>
<tr>
<th>Date</th>
<th>Temp</th>
<th>Weight</th>
<th>Intake</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>IV solution</td>
<td>Oral intake</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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</tbody>
</table>
### Daily monitoring form

<table>
<thead>
<tr>
<th>Date</th>
<th>Temp</th>
<th>Weight</th>
<th>Intake</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IV solution</td>
<td>Oral intake</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Urine/Urine fx</td>
<td>(other)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Daily monitoring form

<table>
<thead>
<tr>
<th>Date</th>
<th>Temp</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Intake

<table>
<thead>
<tr>
<th>IV solution</th>
<th>Oral intake</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Output

<table>
<thead>
<tr>
<th>Urine/Urine</th>
<th>fx</th>
<th>(other)</th>
<th>(other)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

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