NORTHWEST Kidney Centers

Peritoneal Dialysis Therapy Self-Learning Package

NORTHWEST Kidney Centers

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Introductory Information

PURPOSE

The RN will demonstrate knowledge of the theory and skill related to the nursing care of the patient receiving peritoneal dialysis.

LEARNING OBJECTIVES

Following the completion of the independent learning activities, the RN will be able to:

1. Understand the principles and goals of peritoneal dialysis.
2. Identify complications of peritoneal dialysis.
3. Perform appropriate exit site care.
4. Perform Peritoneal Dialysis (CAPD or CCPD/APD using the Home Choice Cycler™).
5. Identify appropriate components to be documented about peritoneal dialysis regimen.

REQUIREMENTS FOR COMPETENCY

The RN will:

1. Perform the following learning activities via independent study:
    a) Review the learning module for Peritoneal Dialysis (PD);
    b) Review Clinical Policy and Procedures for PD; and
    c) Review the supplementary readings and video related to this policy/procedure

2. Attend a one-day training session conducted by the Hospital Services Educator.
    a) The Charges Nurses will coordinate clinical sessions for hands-on patient care and PD competency checklist.
3. Successfully complete the PD Competency Skills checklists under the supervision of a certified RN.

Supplementary Resources (available through the Hospital Services Educator):

- Counts, C. (2008). Peritoneal dialysis. In American Nephrology Nurses Association, *Core Curriculum for Nephrology Nursing* (5th ed.) (pp. 215-231, 765-853). New Jersey: ANNA.

- CD/DVD Tutorial: *"Home Choice Training"* produced by the Baxter Corporation

Terminology

In order to understand peritoneal dialysis, several terms must be understood.

1. Exchange refers to the total process of instilling the dialysis solution, allowing the solution to dwell in the peritoneum for a specified period of time and then draining the solution. The generally accepted drain time for dialysate solution is twenty (20) minutes (unless drainage difficulty is encountered). A long drain time with an empty peritoneal cavity causes the omentum to wrap around the peritoneal catheter causing entrapment where fluid may not run in or out. A surgical procedure is required to fix this problem.

2. Exit site refers to the area where the peritoneal dialysis catheter exits the abdomen or chest (as applicable).

3. Flush refers to the instilling the peritoneal cavity with a specified volume of dialysate fluid and draining immediately after instillation (no dwell time). The most common reason to perform a flush procedure is to determine catheter patency. Small volumes (500 mL - 1000 mL) of dianeal are generally used during flush procedures.

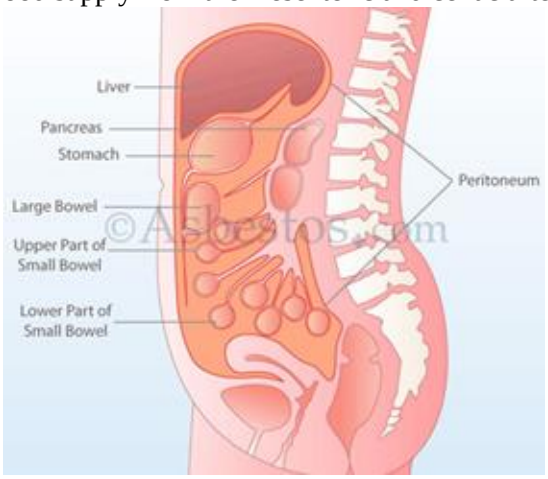
4. Effluent refers to the spent or old dianeal solution drained from the peritoneal cavity.

5. Dry/Target Weight refers to the weight at which the patient is at their best fluid balance. This weight is determined by the nephrologist, taking into consideration: vascular volume (B/P and JVP), amount of edema, pulmonary status (pulmonary edema, SOB). Peritoneal dialysis patients should be weighed every day using the same scale and at the same time every day (preferably first thing in the morning).
The strength of dialysis solutions to be used for the day will be based on the amount of fluid to be removed during dialysis to reach/approach the dry weight.

6. NO TOUCH TECHNIQUE means the gloved hand is never in direct contact with the catheter tip.

Anatomy/Physiology

The peritoneal membrane is a serous semipermeable membrane that covers the abdominal organs, is 1-2 square meters and approximates the body surface area. The peritoneal membrane is continuous and closed in males and interrupted by the ovaries and fallopian tubes in females. The peritoneal cavity normally contains about 100 mL of transudate. The peritoneal membrane receives a rich blood supply making it an effective membrane for dialysis. The parietal peritoneum receives its blood supply from the arteries of the abdominal wall, while the visceral peritoneum receives its blood supply from the mesenteric and celiac arteries.



Principles of Dialysis

Dialysis is the process of artificially cleaning the blood using a man-made solution and a semi permeable membrane. The major functions of dialysis are to remove waste products from the blood, to correct metabolic imbalance and to maintain fluid and electrolyte balance.

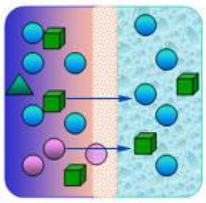
Dialysis incorporates the principles of diffusion, osmosis and ultrafiltration. Diffusion across the peritoneal membrane into the dialysate is the primary mechanism of waste removal in peritoneal dialysis.

Diffusion is the bi-directional movement of particles (solutes) across a semi permeable membrane from an area of higher solute concentration to an area of lower concentration.

Many factors influence the movement of solutes across the peritoneal membrane such as:

- the peritoneal membrane size,
- permeability,
- water versus lipid solubility,
- protein binding,
- concentration gradient,
- peritoneal blood flow,
- dialysate fluid volume,
- rate of equilibration
- Temperature of the solution

- Clearance of waste products by diffusion
  - Capillaries deliver solutes
  - Solutes move from high to lower areas of concentration
  - Solutes move at different rates
  - No net gain or loss after equilibrium



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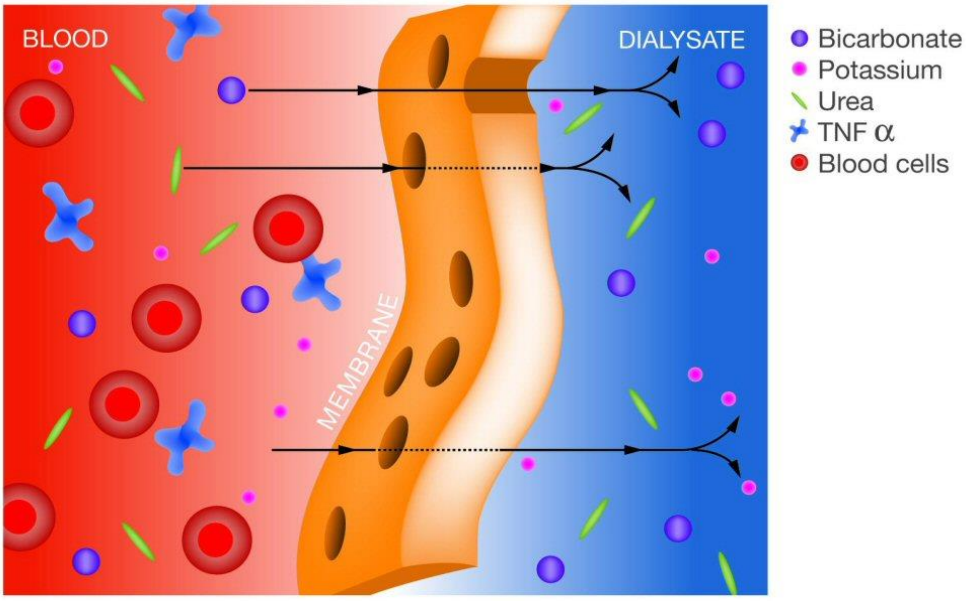
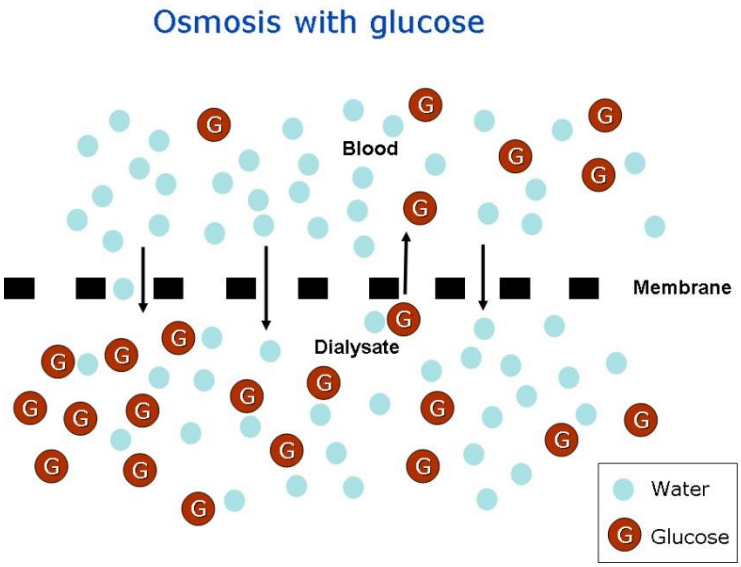


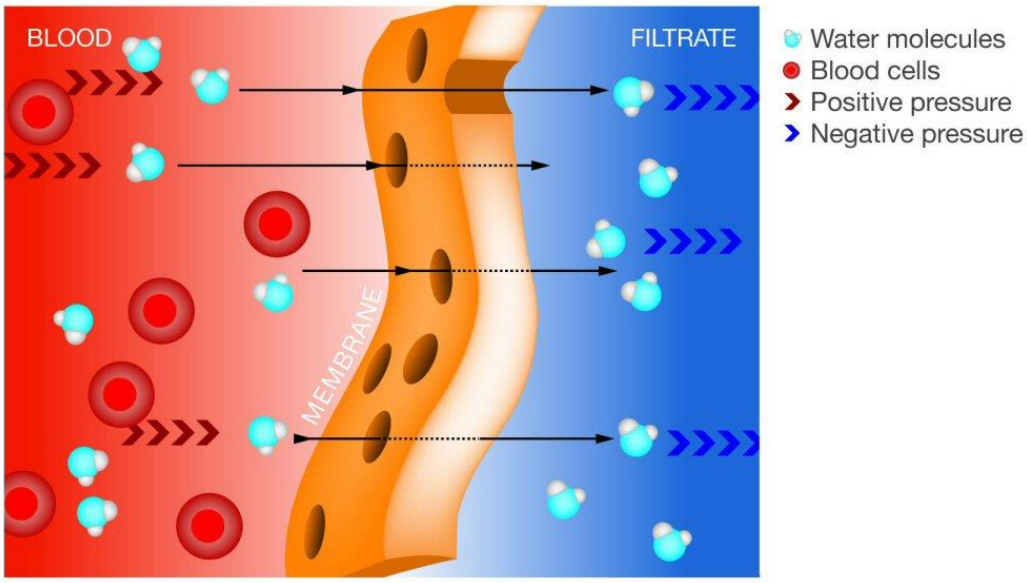
Osmosis is the movement of fluid across a semi permeable membrane from an area of lower to an area of higher solute concentration.

Many factors influence the movement of water across the peritoneal membrane such as:

- surface area,
- membrane permeability,
- colloid osmotic pressure,
- hydrostatic pressure,
- dextrose concentration
- dwell time.



Ultrafiltration is the removal of fluid from the blood using an osmotic pressure gradient.
Dextrose is added to the dialysate solution to create an osmotic gradient. The ultrafiltration is highest at the beginning of each dialysis exchange when the osmotic gradient is the highest. Reabsorption of water occurs if the dialysate fluid is allowed to dwell past the osmotic equilibrium. Hypertonic solutions and shortened dwell times are used to increase ultrafiltration.



Standard Dialysate Solutions

The dialysate solution is prescribed according to the needs of the patient in terms of solute clearance and fluid removal. Dialysate solutions have a fixed electrolyte concentration, use lactate as a buffer and glucose to increase osmolarity to enhance ultrafiltration (fluid removal). Low calcium solutions are indicated for patients who have elevated serum calcium levels which may be associated with the use of calcium phosphate binders. Potassium is omitted from dialysate solutions because patients with renal failure require potassium removal.

Frequent or rapid exchanges may lower serum potassium levels and, if necessary, an authorized prescriber's order for potassium supplementation either orally or intraperitoneal administration may be indicated.

The dialysate solutions come in a variety of sizes ranging from 2000 mL - 3000 mL for CAPD and 6000 mL bags for cycler dialysis. The volume is adjusted according to the patient's size and physical condition. Dialysate solutions are available in the following dextrose concentrations: 1.5%, 2.5%, 4.25% and Extraneal (Icodextrin)

The choice of dextrose concentration is based on the patient's dry and present weight, lying and standing blood pressure and the presence or absence of edema and congestion. Other factors include the presence of diarrhea, vomiting, anorexia, increased fluid intake and/or the patient's fluid balance.

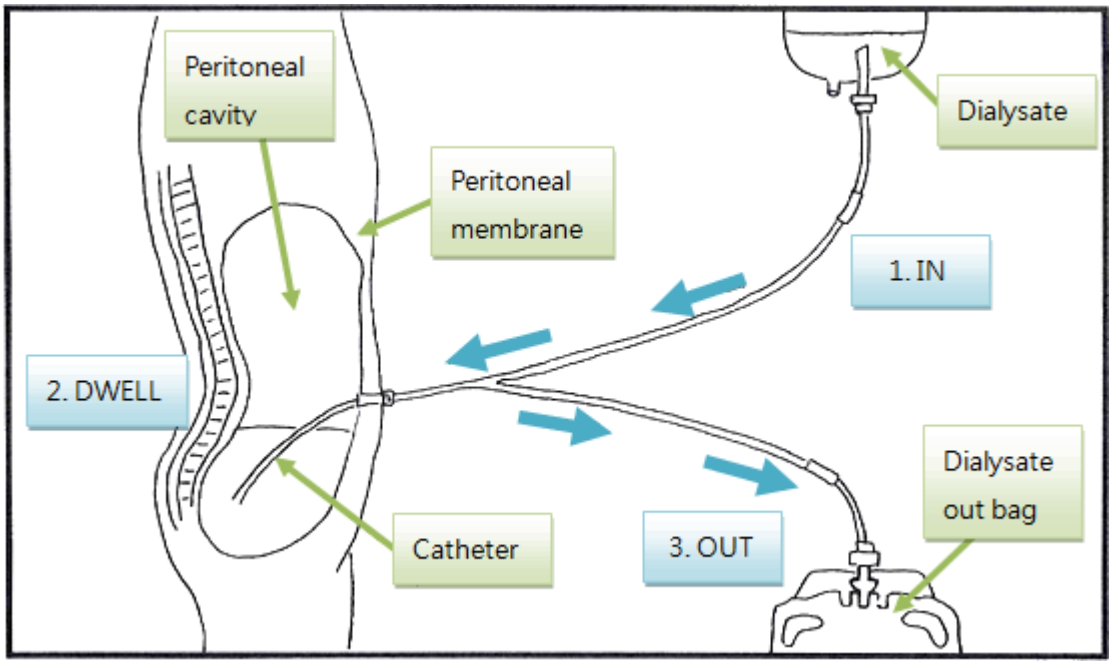
The following can be used as a general guideline to assist in decision-making regarding selection of dialysate fluid concentration:

1. **1.5% solution** - when B/P is low to normal and patient is at or near ideal/target weight (+/- 0.5 kg). This solution is isotonic.
2. **2.5% solution** - when BP is normal to slightly elevated and patient is 0.5 - 1.0 kg above ideal/target weight. (Solution removes some body fluid). This solution is hypertonic.
3. **4.25% solution** - when hypertensive and patient is more than 2.0 - 3.0 kg or more above ideal/target weight. (Solution removes increased amount of fluid). This solution is hypertonic.
4. **Extraneal (Icodextrin)** - a PD solution used for long daytime dwells in which sustained ultrafiltration is desirable. The solution consists of a water-soluble glucose polymer and is iso-osmolar to blood serum in comparison with the standard dialysate solutions. The average dwell time for Extraneal (Icodextrin) l when using CAPD therapy is 6-12 hours and for CCPD therapy 14-16 hours.

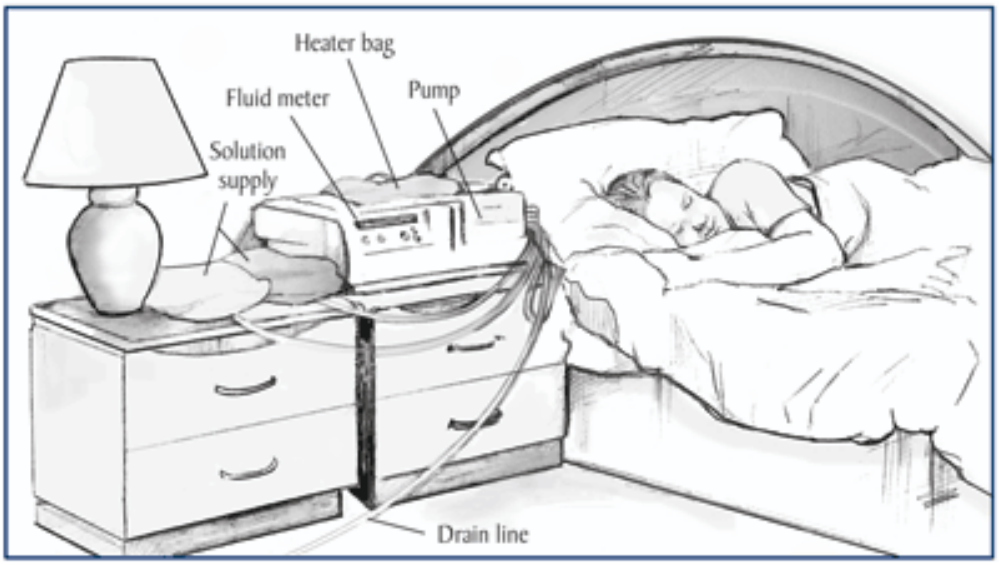
- To prevent over or under hydration, accurate assessment of fluid status including weight, intake and output is important.
- Glucose meters that use glucose dehydrogenizes reagent test strips are not to be used to check blood sugars. These reagent test strips can cross react with metabolites found Extraneal Icodextrin) can cause inaccurate blood glucose measurements.

The choice of modality selection is based on several factors including: peritoneal membrane characteristics and patient preference. The two most common ways to perform peritoneal dialysis are:

1. **<u>Continuous Ambulatory Peritoneal Dialysis (CAPD)</u>** - this technique of removing fluid and waste across the peritoneal membrane requires the continuous presence of dialysis solution in the peritoneal cavity. (24 hours a day, 7 days a week). The solution in the cavity is drained and replaced by fresh solution 4-5 times daily at specific intervals. Between solution exchange procedures the patient is able to assume normal activities.



2. **<u>Continuous Cycling Peritoneal Dialysis (CCPD)/Automated Peritoneal Dialysis (APD)</u>** - this technique of removing fluid and waste across the peritoneal membrane requires an automated cycler that performs a specific number of exchanges usually nightly while the patient sleeps. The procedure takes about 8-10 hours to complete and requires that the patient be connected to the machine for the entire length of the procedure; CCPD/APD procedures are done 7 days per week and the patient may require additional day exchanges.



Complications of Peritoneal Dialysis

1. Peritonitis

A major complication of peritoneal dialysis is peritonitis. Most peritonitis is due to normal skin flora, although other organisms may be involved. Bacterial or fungal infection can enter the peritoneal cavity by 3 routes: across the wall of the GI tract through discrete perforations; along the exit site of the peritoneal catheter from the skin; or entry into the peritoneal dialysis system from contamination, usually at the time of performing an exchange. Typical infective organisms include gram-positive skin bacteria such as Staph. epidermis, Staph. aureus, or Corynebacterium diphtheria, but other organisms such as gram negative (Pseudomonas, E. coli) or even fungi such as Candida albicans can sometimes cause peritonitis.

Peritonitis has two types of presentation: 25-30% are very ill, while the majority have minor symptoms. Diagnostic criteria include:

- Cloudy PD effluent.
- Abdominal pain, nausea, vomiting, diarrhea or temperature greater than 38 C.
- PD effluent WBC greater than 100 cells/ L {greater than 0.1 x 10 (9) cells/L} and PD effluent WBC differential greater than 50% neutrophils;
- Organisms visualized directly on PD effluent gram stain or positive PD effluent culture.

Peritonitis that goes untreated or is recurrent can cause permanent damage to the peritoneal membrane resulting in scarring and/or adhesions that decrease the amount of effective peritoneal membrane surface, which can result in failure of peritoneal dialysis as a long term treatment option for the affected patient.

During episodes of peritonitis, patients may experience reduced ultrafiltration and may require a higher dialysate glucose concentration. It is important to monitor patients with peritonitis for signs of fluid overload such as an increase from their dry/target weight, edema or pulmonary congestion.

Adhering to strict aseptic technique during dialysis procedures will decrease the risk of peritonitis.

2. Exit Site and Tunnel Infections

A healthy exit site is natural to light pinkish colored, has no drainage.
Exit site and tunnel infections are potential complications of chronic peritoneal dialysis catheters. It is important to assess and record exit site color, size of any discolored area around the exit site, discomfort, drainage, crust or scab. Treatment is based on the results of a culture of the catheter site. Unfortunately, tunnel infections maybe recurrent, and may necessitate removal of the catheter and switching to hemodialysis.

In addition, trauma to the exit site and/or tunnel may interfere with the exit site healing process and may lead to infection. To prevent trauma to the exit site or tunnel, the following strategies should be implemented and reinforced with the patient/family:

1. Avoid tension and pulling on the catheter during catheter related procedures,
2. Teach the patient/family to avoid pressure against the exit site from belts, tight clothing
3. Do not forcibly remove exit site crust/scab
4. Antibiotic cream should be used—**avoid ointments**. Ointment contains alcohol as an inactive ingredient, which can degrade the catheter and cause it to crack.

3. Failure to Drain

Failure to drain is a common problem associated with peritoneal dialysis. Causes include: ***constipation* (#1 reason)**, air lock in tubing causing loss of syphon effect, kink in catheter or catheter tubing, unopened clamps, displaced catheter, or obstruction with fibrin or blood clot or omental wrap. Tissue-type plasminogen activator (t-PA) is a recombinant protease specific for fibrin, and has been shown to be an effective thrombolytic for peritoneal dialysis catheters.

4. Constipation

Constipation is a major cause of poor draining. The patient's bowel routine must be assessed and measures taken to avoid or correct constipation. Constipation may also contribute to peritonitis causing discrete perforations that allow E. coli or other organisms to move across the wall of the GI tract and into the peritoneal cavity.

5. Dialysate Leaks

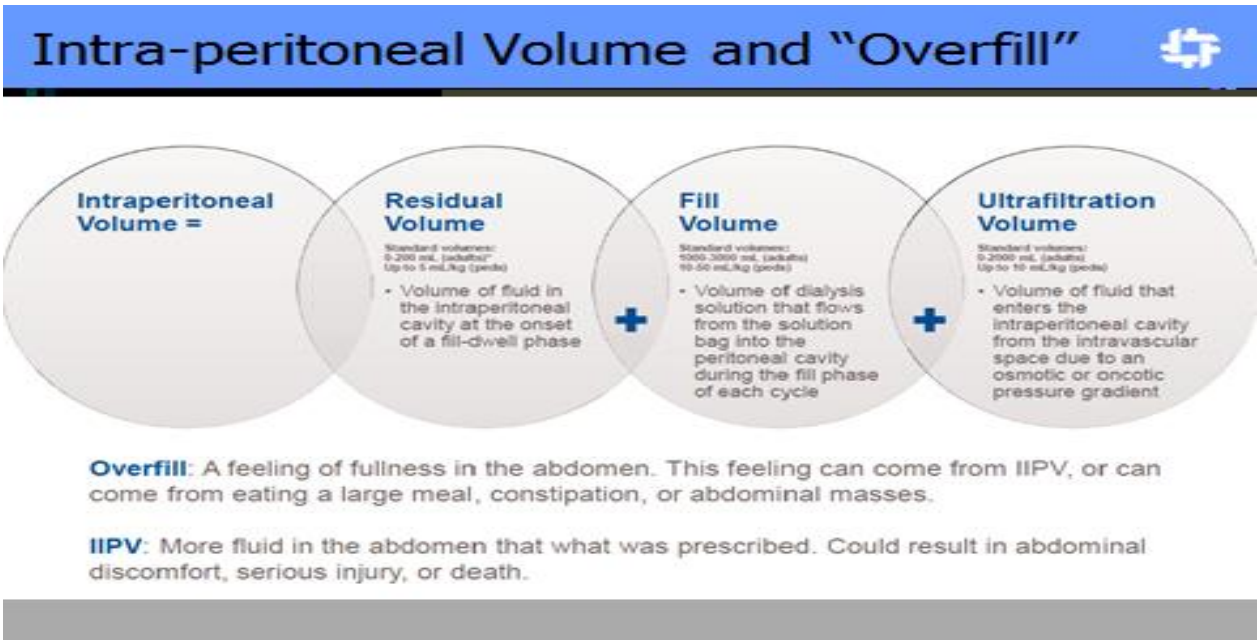
Dialysate leaks are associated with increased intra-abdominal pressure. Risk factors include hernia, heavy lifting, and large dialysate volumes early after catheter insertion, coughing, straining, etc. Leaking may occur from the catheter exit site, extravasation into the subcutaneous tissues (abdominal wall edema, perineal edema, penile edema) and through inguinal hernia resulting in scrotal edema.

Suspected leaks must be reported to the nephrologist promptly. The usual treatment for leaking is to empty the peritoneal cavity, have the patient on bed rest for a couple of days, initiate daily dressings, adherence to diet/restrictions, then attempt to resume peritoneal dialysis with small volumes of solution if there is no further evidence of leaking.

Steps that need to be taken include: (1) use a Dextrostick to ascertain the presence of glucose, (2) resuture the exit site, (3) discontinue peritoneal dialysis for a minimum of 2 weeks to allow healing, (3) if unable to stop therapy, decrease volume with automated peritoneal dialysis in supine position; and (4) stabilize or replace the catheter.

6. Fluid Overload

Fluid overload may be caused by inadequate fluid removal (e.g., poorly functioning catheter, inadequate sodium removal) or excess fluid and salt intake. Signs and symptoms include a positive fluid balance, increased blood pressure, weight gain, SOB, and edema. Interventions include: limit fluid intake; maintain accurate in/out records; monitor vital signs and weight frequently; shorten the dwell time and infuse a hypertonic dialysate solution and low sodium diet adherence.



7. Fluid Deficit

Fluid deficit may be caused by excessive fluid removal (e.g. excessive use of hypertonic solution and sodium removal), or inadequate intake. Signs and symptoms include a negative fluid balance, decreased blood pressure, weight loss, poor skin turgor, and dry mucous membranes). Interventions include maintain an accurate in/out record, replace salt and water, monitor vital signs and weight frequently and infuse a hypotonic dialysate solution.

8. Pain

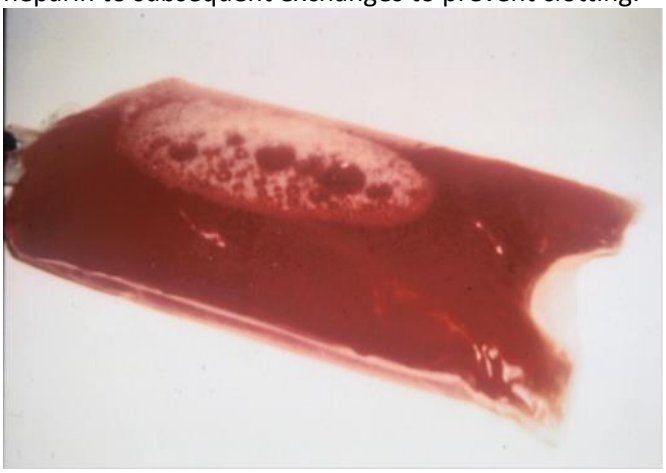
Pain occurs in many forms (e.g., incisional, abdominal, shoulder, back) and can be related to procedural factors such as rapid instillation of dialysate, introduction of air into peritoneal cavity, air with exchanges, incorrect fluid pH or temperature. The usual types of pain or discomfort are generally after the catheter has been inserted and should disappear in a couple of weeks, constipation or misplaced catheter.

9. Hernias

Hernias are caused by increased intra-abdominal pressure. Patients developing hernias usually require reduced volumes and an increase in the number of dialysis exchanges until the hernia is surgically repaired and abdominal wall is healed.

10. Bloody Effluent

Bloody effluent is usually insignificant and may be related to ovulation, or rupture of a small blood vessel. It is relatively common following abdominal surgery. The concern is that the blood will clot leading to catheter obstruction. Bloody dialysate should be reported to the nephrologist. A common practice is to flush the peritoneal cavity with dialysate to clear the blood (usually 3 exchanges of in and out with no dwell time) and add heparin to subsequent exchanges to prevent clotting.



Basic steps to change settings	Display screen
1. Press ▽ to change or review settings (*before* you press ***GO*** to start your therapy). **– OR –** Press ***STOP*** then press ▽ during your therapy.	PRESS GO TO START
2. Press ***ENTER*** to access the CHANGE PROGRAM menu. THERAPY is the first setting that appears.	CHANGE PROGRAM THERAPY: CCPD/IPD
3. If you do not want to change this setting, press ▽ to see TOTAL VOL (Total Volume).	TOTAL VOL: 15000ML
4. Press ***ENTER*** to change the setting, if needed.	TOTAL VOL: 15000ML (The option or value blinks)
5. Press △ and ▽ to change the value.	TOTAL VOL: 14000ML
6. Press ***ENTER*** to save the new value.	TOTAL VOL: 14000ML (Blinking stops)
7. Press ▽ to display # OF DAY FILLS. This setting only appears for Hi-Dose therapies. 8. Make changes, if needed, by following Steps 4–6.	# OF DAY FILLS:
9. Press ▽ to display DAY FILL VOL (Day Fill Volume). This setting only appears for Hi-Dose therapies. 10. Make changes, if needed, by following Steps 4–6.	DAY FILL VOL: ML

Basic steps to change settings *(continued)*	Display screen
11. Press ▽ to display THERAPY TIME. NITE THER TIME (Night Therapy Time) appears for Hi-Dose therapies.	THERAPY TIME: 8:00 NITE THER TIME: 8:00
12. Make changes, if needed, by following Steps 4–6.	
13. Press ▽ to display FILL VOL (Fill Volume). NITE FILL VOL (Night Fill Volume) appears for Hi-Dose Tidal therapies.	FILL VOL: ML NITE FILL VOL: ML
14. Make changes, if needed, by following Steps 4–6.	
15. Press ▽ to display TIDAL VOL (Tidal Volume). This setting only appears for Tidal therapies. NITE TIDAL VOL (Night Tidal Volume) appears for Hi-Dose Tidal therapies.	TIDAL VOL: % NITE TIDAL VOL: %
16. Make changes, if needed, by following Steps 4–6.	
17. Press ▽ to display TOTAL UF. This setting only appears for Tidal therapies. NITE UF (Night UF) appears for Hi-Dose Tidal therapies.	TOTAL UF: ML NITE UF: ML
18. Make changes, if needed, by following Steps 4–6.	
19. Press ▽ to display LAST FILL VOL (Last Fill Volume).	LAST FILL VOL: ML
20. Make changes, if needed, by following Steps 4–6.	
21. Press ▽ to display DEXTROSE. This setting only appears if you use Last Fill.	DEXTROSE: SAME
22. Make changes, if needed, by following Steps 4–6.	

Basic steps to change settings *(continued)*	Display screen
23. Press ▽ to display FULL DRAINS EVERY. This setting only appears for Tidal therapies.	FULL DRAINS EVERY: 3
24. Make changes, if needed, by following Steps 4–6.	
25. Press ▽ to display WEIGHT UNITS.	WEIGHT UNITS: KG
26. Make changes, if needed, by following Steps 4–6.	
27. Press ▽ to display PATIENT WEIGHT.	PATIENT WEIGHT: KG
28. Make changes, if needed, by following Steps 4–6.	
29. Press ***STOP*** when the option or value is not blinking to exit Change Program.	

➤ **NOTE:** The following prompts appear if you do not change the value for Last Fill Volume:

- The system calculates the number of cycles. CYCLES appears briefly on the display screen. — CYCLES:
- NITE CYCLES (Night Cycles) appears for Hi-Dose therapies. — NITE CYCLES:
- Then the system calculates the Dwell Time. DWELL TIME appears briefly on the display screen. — DWELL TIME: HH:MM
- NITE DWELL (Night Dwell) appears for Hi-Dose therapies. — NITE DWELL:

In Tidal therapies, the system also calculates:

- TIDAL VOLUME — TIDAL VOLUME: ML
  NITE TIDAL appears for Hi-Dose Tidal therapies. — NITE TIDAL: ML
- UF (ultrafiltration) PER CYCLE — UF PER CYCLE:
  NITE CYCLE UF appears for Hi-Dose Tidal therapies. — NITE CYCLE UF:

Basic steps to change settings *(continued)*	Display screen
30. PRESS GO TO START appears on the display screen after the calculated settings. You are now ready to press ***GO*** to begin the setup for your therapy.	PRESS GO TO START
➤ **NOTE:** If you *do* change the value for Last Fill Volume: CHECK I-DRAIN VOLUME appears on the display screen.	CHECK I-DRAIN VOLUME
31. Press ***STOP***. The I-DRAIN (Initial Drain) ALARM submenu from the MAKE ADJUSTMENTS menu is shown. This allows you to update the I-Drain Alarm setting to be consistent with the new Last Fill Volume. See	I-DRAIN ALARM: 60ML (The value blinks)

Follow the basic steps below to make adjustments to your settings.

Basic steps to Make Adjustments	Display screen
1. Before you press ***GO*** to start your therapy, press ▽. CHANGE PROGRAM appears on the display screen.	PRESS GO TO START CHANGE PROGRAM
2. Press ▽ again. MAKE ADJUSTMENTS appears.	MAKE ADJUSTMENTS
3. Press ***ENTER*** to access the Make Adjustments menu. ADJUST BRIGHTNESS appears.	ADJUST BRIGHTNESS
4. If you do not want to change this setting, press ▽ to see the next option.	ADJUST LOUDNESS
5. Press ***ENTER*** to select the setting you want to change.	ADJUST LOUDNESS (The option or value blinks)
6. Press △ and ▽ to change the option or value.	
7. Press ***ENTER*** to save the option or value.	ADJUST LOUDNESS (Blinking stops)
8. Press ▽ to display the next option.	
9. Continue to review or change settings by repeating Steps 4 through 8.	
10. Press ***STOP*** to exit Make Adjustments. The system saves the settings until you change them again.	PRESS GO TO START

NORTHWEST Kidney Centers

Gather your supplies
1 – Solution Bags
2 – Drain Option
3 – Disposable Set
4 – Disconnect Cap(s)
5 – Face Mask(s)
Patient Line Extension, if needed (not pictured)

Check solution bags for SEAL:
Strength
Expiration Date
Amount
Leaks

Place a single solution bag on the heater pan

WARNING: The solution bag must cover the silver heater sensor button

Turn on the cycler
- Press the On/Off switch to the ON position
- Observe that all the characters on the display flash for several seconds
- Depending on your cycler's programming, you may be asked to enter your weight and blood pressure
- The current mode (STANDARD MODE or LOW FILL MODE) appears for a few seconds
- When the system is ready, the screen displays PRESS GO TO START

Prepare the disposable set
- Open the packaging by grasping the top and pulling down in opposite directions
- Close all clamps on the disposable set

WARNING: Inspect the cassette and tubing for damage

Press GO when you are ready to begin
- LOAD THE SET appears

Open the door
- Push the handle up to unlock and open the door

Load the cassette
- The cassette only fits one way, with the lines leading to the right of the cycler
- Close the door and press the handle down to lock the door

Place the organizer
- Place the long slot of the organizer over the hook at the top of the door

Attach your drain option
- For Drain Bag: Before attaching, ensure clamp is closed on the short tube with the blue pull ring to prevent leakage. - OR -
- For Drain Line Extension: Leave the line clamp open and remove tip protectors from both ends of drain

NOTE: If you use a drain line extension or an integrated set, you must leave a space between the end of the drain line and any fluid in the drain or container

Press GO
- SELF TESTING appears on the display screen
- When the self-test is complete, OPEN THE CLAMPS alternating with CONNECT BAGS appears on the display screen

Put on face mask and wash and dry your hands thoroughly

WARNING: Follow aseptic technique taught by your dialysis center when handling lines and solution bags to reduce the possibility of infection

Connect bags
- Connect the line with the RED clamp to the heater bag
- Connect the line with the BLUE clamp to the Last Fill bag
- Connect the lines with the WHITE clamps to additional solution bags, if needed
- Break the frangibles for all solution bags

NOTE: Do NOT stack the bags on top of one another. Place all bags on a flat surface. Ensure all lines are unkinked

Check connections and open clamps
- Open clamps only on lines connected to solution bags
- Make sure the patient line is in the left slot of the organizer
- Open the clamp on the patient line

Press GO to begin priming

WARNING: Failure to open the clamp on the patient line will prevent this line from being primed, which can cause air to be delivered to you during FILL 1

Priming complete. Check that the fluid level is at or near the connector on the patient line before connecting
- The display screen alternates between CONNECT YOURSELF and CHECK PATIENT LINE

WARNING: Verify that the fluid level is near the connector at the end of the patient line, or you may experience pain

Get your transfer set ready
- Make sure your transfer set is available but do not remove the cap until after you have washed your hands

Put on face mask and wash and dry your hands thoroughly

WARNING: Follow aseptic technique taught by your dialysis center when handling lines and solution bags to reduce the possibility of infection

Connect yourself
- Remove the MiniCap from the transfer set
- Immediately connect the transfer set to the patient line by removing the pull ring and attaching the transfer set
- Open the transfer set

After connecting yourself to the cycler, press GO
- Treatment begins with INITIAL DRAIN

This procedural quick reference guide is a reference tool only and is not to be used as a comprehensive guide.

*Rx Only. For complete instructions, including warnings and precautions, refer to the HomeChoice and HomeChoice Pro APD Systems Patient At-Home Guide.

UF Target allows you to set a minimum amount of UF that must be drained to prevent the LOW UF alarm from occurring.

Steps to set the I-Drain Alarm	Display screen
1. Press ***ENTER*** to access the MAKE ADJUSTMENTS menu.	MAKE ADJUSTMENTS
2. Press ▽ until I-DRAIN ALARM appears.	I-DRAIN ALARM:1400ML
3. Press ***ENTER***. The volume digits blink.	I-DRAIN ALARM:1400ML (The volume blinks)
4. Press △ or ▽ to change the setting.	I-DRAIN ALARM:1800ML
5. Press ***ENTER*** to save the new Initial Drain Alarm volume. The blinking stops.	I-DRAIN ALARM:1800ML (Blinking stops)
6. Press ▽ to display the next option. **– OR –**	COMFORT CONTROL: 36
7. If you do not want to make any other adjustments, press ***STOP*** to exit Make Adjustments.	PRESS GO TO START

The UF Target allows you to set a minimum amount of UF that must be drained to prevent the LOW UF alarm from occurring.

Calculation for setting total UF target would be the number of cycles x Minimum UF to be removed dependent upon dextrose per cycle. Multiply by 70% (70% is the expected UF is the recommended starting point)

- 1.5% = 100 mL-300mL per cycle
- 2.5% = 300mL-500mL per cycle
- 4.25% = 500mL-1000Ml per cycle

For Example single Dextrose Strength:

Order for CCPD, 12 hours, and 6 cycles using 2.5 % Dextrose

Calculation for total UF target would be:

- 6(# of cycles) x 300mL (Minimum UF to be removed for 2.5%) = 1800
  - 1800 x 70% = 1260 ml

UF TARGET volume is 1260 mL.

However, programming the UF Target on the cycler will be either 1250 or 1300. Cycler only goes in increments of 50mls.

For Example mixed Dextrose Strength:

Order for CCPD, 12 hours, and 6 cycles using mix of 1.5% and 2.5 % Dextrose

Calculation for total UF target would be:

6(# of cycles) x 300mL (Minimum UF to be removed for 1.5% & 2.5%

1.5%=100 (Minimum UF to be removed for 1.5%) x 3 cycles 300

2.5%=300 (Minimum UF to be removed for 2.5%) x 3 cycles=900

=1200 → 1200 x 70% = 840 ml

UF TARGET volume is 840 mL.

However, programming the UF Target on the cycler will be either 800 or 850. Cycler only goes in increments of 50mls.

The ALARM must be programmed YES or NO.

- If ALARM: YES is set, and the UF TARGET is not met, the *HomeChoice/HomeChoice* PRO APD System beeps continuously. A LOW UF alarm appears on the display screen.
- If ALARM: NO is set, and the UF TARGET is not met, only the LOW UF alarm appears on the display screen. The system will not beep. It will wait for you to wake up and finish draining. At that time, you can change your position and initiate a Manual Drain.

Steps to set UF Target	Display screen
If LAST MANUAL DRAIN is set to YES:	LAST MANUAL DRAIN: Y
1. Press ▽ to display the UF TARGET screen.	UF TARGET: 0ML
2. Press ***ENTER***. The volume digits blink.	UF TARGET: 0ML (The volume blinks)
3. Press △ or ▽ to change the setting.	UF TARGET: 1200ML
4. Press ***ENTER*** to save the new setting. The blinking stops.	UF TARGET: 1200ML (Blinking stops)
5. Press ▽ to display the ALARM option.	ALARM: NO
6. Press ***ENTER***. The NO or YES blinks.	ALARM: NO (NO or YES blinks)
7. Press △ or ▽ to select YES or NO.	ALARM: YES
8. Press ***ENTER*** to save the new setting. The blinking stops.	ALARM: YES (Blinking stops)
9. If you do not want to make any other adjustments, press ***STOP*** to exit Make Adjustments.	PRESS GO TO START

Follow the steps below to end your therapy and disconnect from the cycler.

Steps to end your therapy	Display screen
1. END OF THERAPY appears.	END OF THERAPY
2. Press ▽ to view the end of therapy summary information. 3. Record your I-Drain Volume and the other values in the summary. The amount shown is the total Initial Drain Volume from the current therapy.	I-DRAIN VOL: ML
4. Press ▽. LAST M-DRAIN only appears if you drained some fluid using the Manual Drain option after a Last Fill. Shows the amount of solution drained.	LAST M-DRAIN: ML
5. Press ▽. The amount shown is the TOTAL UF for the therapy.	TOTAL UF: ML
➤ **NOTE:** A low, or negative, Total UF at the end of a therapy may indicate your last Drain was incomplete and too much fluid may still remain in your peritoneal cavity. Make sure the Last Manual Drain option is set to ON, and a UF Target set with a value that equals around 70% of your expected UF. For help in converting 70% of your expected total therapy UF into a value that can be programmed as your Total UF for your Tidal therapy, see 16.17, *Determining Tidal Total UF and Last Manual Drain UF Target Volume Settings*, on page 16-22. See also 9.2.9, *Last Manual Drain*, on page 9-12.	
6. Press ***ENTER*** to access cycle-by-cycle UF information starting with the last cycle. Cycle UF values only appear for CCPD and Hi-Dose CCPD therapies.	CYCLE 5 UF: ML

Steps to end your therapy *(continued)*	Display screen

⚠ WARNING

A consistently high UF in the last cycle may indicate that UF is accumulating in your peritoneal cavity during the course of your therapy.

- **For a CCPD therapy, your Minimum Drain Volume percent may be programmed too low.**
- **For a Tidal therapy, your expected Total UF may be programmed too low.**

Either of these conditions can result in an increased intraperitoneal volume (IIPV) situation. Using a higher than normal dextrose concentration in combination with either of these conditions can further increase the risk of an IIPV situation. IIPV can result in a feeling of abdominal discomfort, serious injury, or death.

If any patient, or patient caregiver, suspects the patient has IIPV during a treatment, press *STOP* immediately, then press ▽ and initiate a Manual Drain. The Manual Drain procedure is located in 15.5, *Manual Drain Procedure*, on page 15-59. See 15.8, *Increased Intraperitoneal Volume (IIPV)*, on page 15-65 if IIPV is suspected.

Additional care should be taken to monitor for IIPV symptoms those patients not able to communicate essential information to their caregiver during treatment, such as small children or infants.

7. Press ▽ to continue accessing Cycle UF values.

   You can view up to 29 cycles.

   Press ***STOP*** to return to the previous menu after Cycle UF values have been reviewed.

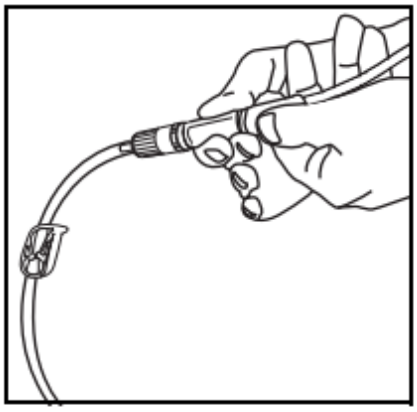
   Cycle UF values only appear for CCPD and Hi-Dose CCPD therapies.

CYCLE 4 UF: ML

Steps to end your therapy *(continued)*	Display screen
8. Press ▽. The average actual DWELL TIME for the therapy is shown. Press ***ENTER*** to review cycle-by-cycle information. Press ***STOP*** to return to END OF THERAPY.	AVG DWELL TIME:HH:MM
9. Press ▽. The amount of Dwell Time LOST or ADDED is based on the estimated Dwell Time calculated at the beginning of therapy. If the Lost Dwell is 30 minutes or longer, and you have not viewed this information, the system will beep and display the Lost Dwell Time.	LOST DWELL: HH:MM ADDED DWELL: HH:MM
10. Press ▽. Press ***ENTER*** to select MANUAL DRAIN.	MANUAL DRAIN
11. Press ▽. Press ***ENTER*** to review the 20 most recent alarms. Press ***STOP*** to return to END OF THERAPY.	ALARM LOG END OF THERAPY
12. Press ***GO***. CLOSE ALL CLAMPS appears.	CLOSE ALL CLAMPS

13. Close the transfer set.
14. Close patient clamp on disposable set.
15. ***Close all clamps*** and disconnect yourself as instructed in the steps in 12.2, *Disconnect Yourself*.

    Do ***not*** press ***GO*** again until ***after*** you have disconnected.



Steps to shut down the cycler

➤ **NOTE:** ***Close all clamps*** and disconnect yourself by following the steps in 12.2, *Disconnect Yourself*, on page 12-6 before continuing.

1. Press ***GO.***

   The display alternates between CLOSE ALL CLAMPS and DISCONNECT YOURSELF.

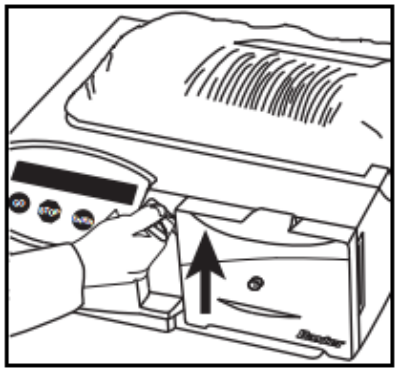
   The occluder (behind door) retracts for 2 minutes (30 seconds for Fill volumes less than or equal to 500 mL) to allow removal of the cassette.

CLOSE ALL CLAMPS

DISCONNECT YOURSELF

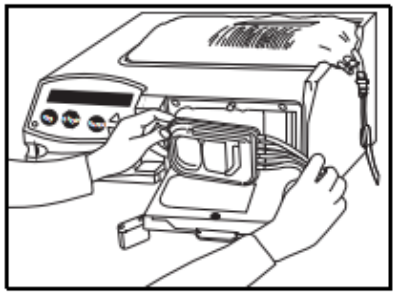
2. Lift the handle up to unlock and open the door.
3. If the occluder closes before you open the door, press ***STOP*** and then ***GO***.

   The occluder retracts again for a short time.



4. Remove and discard the disposable set and solution bags.

   Follow your local guidelines for disposal of dialysis waste materials, and check with your local authorities if questions arise about the waste disposal regulations in your area.

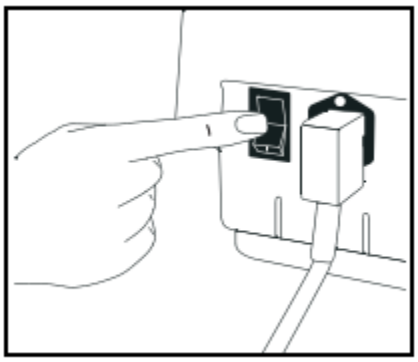


5. Press ***GO.***

   TURN ME OFF appears.

TURN ME OFF

6. Press the On/Off switch to the OFF position.



Steps to perform a Manual Drain	Display screen
The current FILL phase appears on the display screen.	FILL 3 OF 5
1. Press ***STOP.***	STOPPED: FILL
2. Press ▽.	FILL VOLUME: ML
3. Press ▽.	TOTAL UF: ML
4. Press ▽.	BYPASS
5. Press ▽.	CHANGE PROGRAM
6. Press ▽.	MAKE ADJUSTMENTS

7. Press ▽. — MANUAL DRAIN

8. Press ***ENTER.*** — DRAINING: ML

   The display screen shows the Drain volume. The system continues to drain until flow is no longer detected.

9. Press ***GO*** to return to therapy.

10. Reinitiate a Manual Drain if it is stopped during Fill.

Trouble Shooting

WARNING

Bypassing a LOW UF alarm can leave fluid in the peritoneal cavity and result in an increased intraperitoneal volume (IIPV) situation.

IIPV can result in a feeling of abdominal discomfort, serious injury, or death.

If any patient, or patient caregiver, suspects the patient has IIPV during a treatment, press *STOP* immediately, then press ▽ and initiate a Manual Drain. The Manual Drain procedure is located in 18.5, *Manual Drain Procedure*, on page 18-53. See 18.8, *Increased Intraperitoneal Volume (IIPV)*, on page 18-58 if IIPV is suspected.

Additional care should be taken to monitor for IIPV symptoms for those patients not able to communicate essential information to their caregiver during treatment.

LOW UF

Display Message: LOW UF

Cause: The UF Target was not met.

This setting is programmed as a part of the Last Manual Drain feature.

- When ALARM: YES is set, this is an audible Manual Restart Alarm.
- When ALARM: NO is set, this is a silent Manual Restart Alarm with a display message only.

LOW UF *(Continued)*

To Correct:

1. Press ***STOP*** to mute the alarm.
2. Press ***GO*** to continue draining automatically.

   – OR –

3. Press ▽ to:
   - View Manual Drain information.
   - Check with your dialysis center to learn when it is safe to bypass. To bypass the alarm, see *Steps to bypass LOW UF alarm*, below.
   - Initiate a Manual Drain.

Steps to bypass LOW UF alarm	Display screen
	LOW UF
1. Press ***STOP***.	DRAIN N OF N alternates with LOW UF
2. Press ▽. 3. Check DRAIN VOLUME.	DRAIN VOLUME: ML
4. Press ▽. An incomplete Initial Drain is not reflected in your UF.	I-DRAIN VOL: ML
5. Press ▽. The volume shown is the TOTAL UF from the current Drain.	TOTAL UF: ML
6. Press ▽.	BYPASS

Steps to bypass LOW UF alarm *(Continued)*	Display screen
7. Press ***ENTER*** to bypass. END OF THERAPY or LAST FILL appears.	END OF THERAPY – or – LAST FILL

LOW DRAIN VOLUME

Display Message: LOW DRAIN VOLUME

Cause:

- A Slow Flow, No Flow, or air and fluid condition occurred before the programmed Minimum Drain Volume % (or Initial Drain Volume) completed.
- A No Flow condition occurred before the Low Fill Mode Minimum Drain Time completed.

This is an Auto Restart Alarm.

To Correct:

1. Change your position to try to drain more fluid.
2. Check for kinks in your patient line.
3. Correct the problem you found.

   You do not need to press any buttons.

   – OR –

If the alarm becomes a Manual Restart Alarm:

1. Press ***STOP*** to mute the alarm.
2. Change your position or lower the cycler by six (6) inches.
3. Press ***GO*** to return to your therapy.

If the alarm continues during your therapy, or if the alarm occurs regularly over multiple therapies:

1. Follow the steps below to check your Drain Volume.

Steps to check the Drain Volume	Display screen
LOW DRAIN VOLUME appears on the screen.	LOW DRAIN VOLUME
1. Press ▽. 2. Check DRAIN VOLUME.	DRAIN VOLUME: ML
3. Press ▽. An incomplete Initial Drain causes fluid to remain in your peritoneal cavity. This can cause the actual UF to be lower than the Total UF displayed.	I-DRAIN VOL: ML
4. Press ▽. The volume shown is the TOTAL UF from the previous Drain.	TOTAL UF: ML
5. Press ▽.	BYPASS

Steps to check the Drain Volume *(Continued)*	Display screen

➤ **NOTE:** Resume the Drain or select MANUAL DRAIN unless you have absorbed a lot of fluid. Resuming the Drain can result in an audible alarm. Using Manual Drain repeatedly does not generate an audible alarm.

6. Select one of the following options:

   DRAIN 2 OF 5

   a. Press ***GO*** to return to Drain if you do not want to bypass.

      This is the *recommended* option.

   DRAINING: ML

   – OR –

   a. Press ▽ until MANUAL DRAIN appears.

   MANUAL DRAIN

   b. Press ***ENTER***.

   – OR –

   a. Press ***ENTER*** to bypass only if your clinician instructs you to do so.

      Contact your dialysis center to learn when it is safe to bypass.

      You have bypassed the LOW DRAIN VOLUME alarm. The next FILL begins.

   FILL 3 OF 5

Low Drain Volume Alarm (LDVA)

Root Causes	• Patient reabsorbed more solution than expected or incomplete Last Fill • Patient empty at start of Initial Drain (I-Drain) • I-Drain Alarm setting too high	• Catheter obstruction • Poor catheter position • Cycler position too high relative to patient position • Fibrin blockage
Troubleshooting	• Check Drain Volume – press down arrow • Change position to try to drain more fluid • Check for kinks, air or fibrin in patient line • Have you changed your prescription?	• Have you completed a day drain? • Verify cycler position relative to patient supine position • Call dialysis center to help diagnose problem causing LDVA
Prevention	• Review or adjust the Initial Drain (I-Drain) Alarm setting if the Last Fill volume, Last Fill dwell time, or if the Last Fill solution type changed • Determine root cause for patient absorbing more solution than expected - Increased sodium intake? - Recently ill – dehydrated?	• Review Therapy Log to monitor I-Drain Volume - Check for incomplete Last Fill • Routinely assess catheter flow • Routinely ask patient if he/she is experiencing LDVA during treatment

NOTE: Patients should not bypass Initial Drain without talking to a clinician.

Check Lines Alarm

Root Causes	• Empty solution bags • Blocked solution bag port • Closed clamps	• Kinks • Disconnected solution bags • Fibrin blockage
Troubleshooting	• Reposition bags to push fluid to port and clear blocked port	
Prevention	• Use the appropriate solution volume to prevent empty solution bags • The total solution volume connected must be greater than the sum of: 1. Total solution volume prescribed 2. Patient line - 45 mL	3. Priming and flushing volume a. Heater bag prime and integrity test - 250 mL b. Supply bag - 120 mL for each additional supply bag 4. Extension set - 45 mL (if used)

SYSTEM ERROR 2240 Alarm

Root Causes	• Patient presses GO to start therapy, but has not connected themselves • Disconnected disposable tubing • Use of dummy tummy during training • Incomplete prime	• Disrupted tip protector on unclamped and unused supply lines • Loose connections • Leaks
Troubleshooting	• Ask patient if he/she disconnected during therapy • If patient disconnected – was this during drain, fill or dwell?	• Did patient follow the Emergency Disconnect procedure? - Press STOP before disconnecting - Press GO when reconnected - Dwell – preferred phase to disconnect • Therapy needs to be terminated and a new therapy (on cycler or via manual exchange) initiated
Prevention	• Review the Emergency Disconnect Procedure (Patient At-Home Guide, page 18-65) • If a SYSTEM ERROR 2240 occurs, you must end the therapy and start a new therapy (on cycler or via manual exchange)	

VERIFY IDRAIN

Message Display: VERIFY IDRAIN: OFF

Cause 1: The I-DRAIN ALARM setting is OFF.

To Correct Cause 1:

1. Press the power switch OFF and ON again.
2. Set the I-DRAIN ALARM to a value other than OFF. See 10.2.7, *I-Drain Alarm*, on page 10-9.

➤ **NOTE:** You have permanently changed the Initial Drain Alarm setting for this therapy and all future therapy sessions.

Cause 2: The I-Drain Alarm setting is lower than expected.

To Correct Cause 2:

1. Press ***STOP*** and the setting blinks.
2. Press △ or ▽ to temporarily change the minimum I-Drain Alarm setting.
3. Press ***ENTER*** to accept the value.
4. Press ***GO*** to resume Initial Drain.

➤ **NOTE:** You have temporarily changed the Initial Drain Alarm setting for this treatment session. To permanently change the I-Drain Alarm, see 10.2.7, *I-Drain Alarm*, on page 10-9.

SYSTEM ERROR 2240 or 2267

Message Display: SYSTEM ERROR 2240 SYSTEM ERROR 2267

Cause:

The system detected air in the disposable tubing set and solution bag, and diverted flow to drain.

SYSTEM ERROR 2240 and SYSTEM ERROR 2267 can be caused by one or more of the following:

- Leaks
- Disconnected disposable tubing
- Loose connections
- Fluid level not at or near the patient connector after completing the prime cycle (incomplete prime)
- Unclamped, unused supply lines (if the tip protector has been disrupted)
- Use of "Dummy Tummy" during training

To Correct:

1. Press ***STOP*** to mute the alarm.
2. Write down the System Error number and treatment phase (Fill, Drain, or Dwell) that appears on the display screen.
3. Turn the power switch OFF and ON to end therapy.

   SYSTEM ERROR 2367 appears.
4. Press the power switch OFF and ON again.

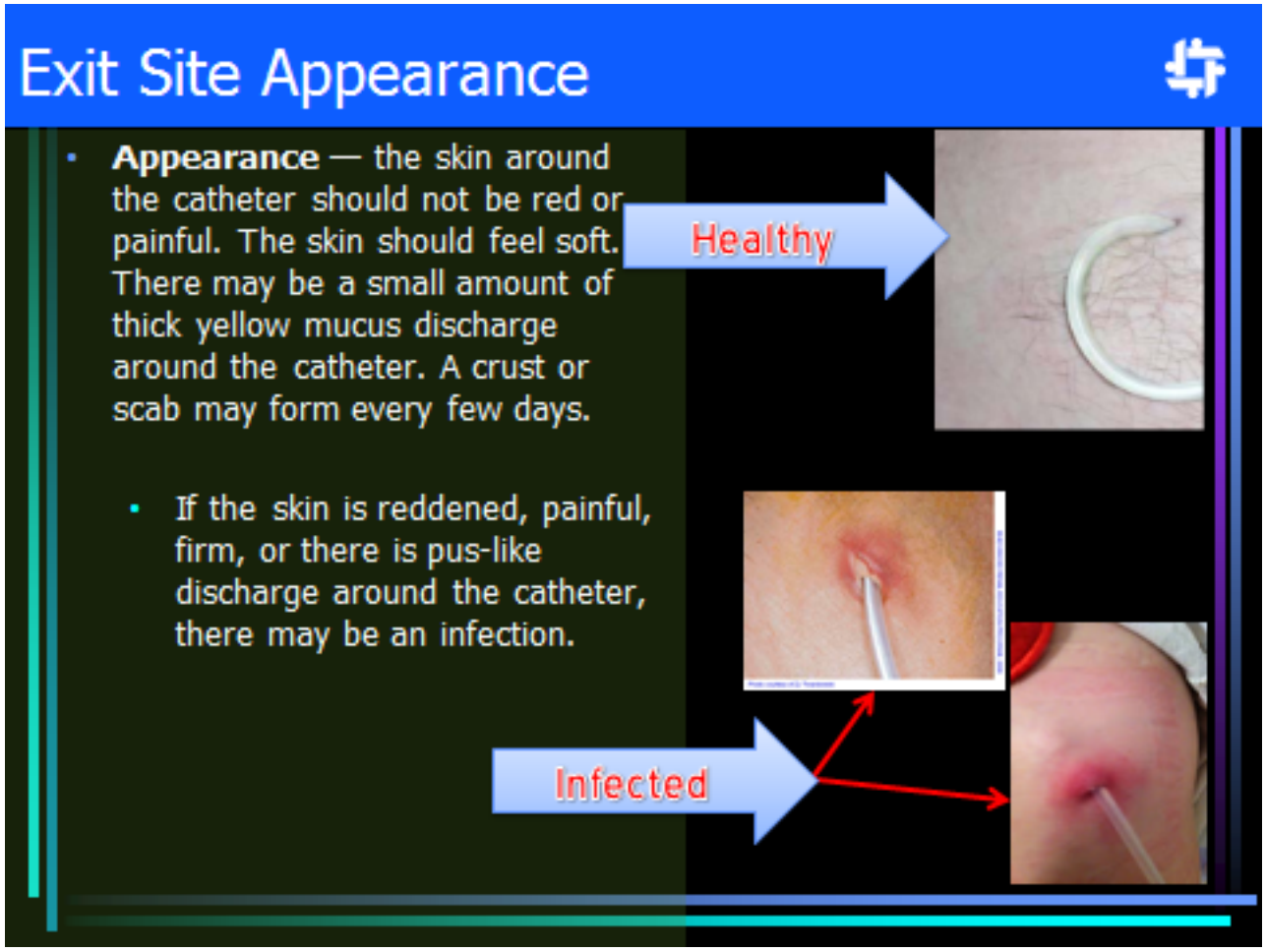
   PRESS GO TO START appears.
5. Close all clamps.
6. Discard the disposable set and solution bags.
7. Notify your dialysis nurse.

➤ **NOTE:** If you need help to correct the alarm, contact Baxter Technical Assistance at the number listed in 2.2, *Numbers to Call for Assistance*, on page 2-1.

PD Access Care

1. The skin around the access site should be washed daily or every other day with antibacterial soap. The soap should be stored in the original bottle (not poured into another container).
2. Hydrogen peroxide or alcohol should NOT be used.
3. Before cleaning the area, wash your hands with soap and water and put on mask and clean gloves.
4. Hold the catheter still during cleaning, which helps prevent injury to the skin.
5. Do not pick at or remove crusts or scabs at the site.
6. Pat the skin around the site dry after cleaning. Clean gauze is suggested.
7. Apply a prescription antibiotic cream to the skin around the catheter every time the dressing is changed.
8. Avoid using tapes or dressings that prevent air from reaching the skin. The site should be covered with a sterile gauze dressing, which should be changed every time the site is cleaned. The catheter should be anchored to the skin with tape or a specially designed adhesive.

PD Access Care—cont.

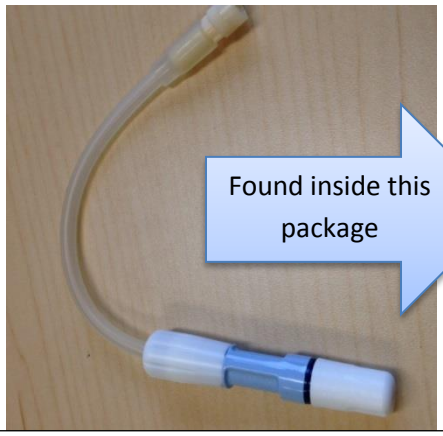


Adapting "Blue" Fresenius PD catheter to Baxter tubing

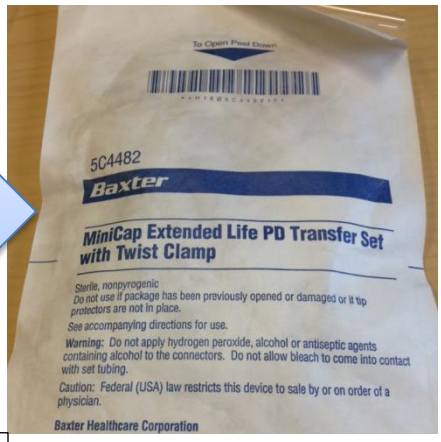
What you need at start of treatment.

Will need to be sure to Grab the Stay-Safe Luer Lock Adapter 4"

Found inside this package



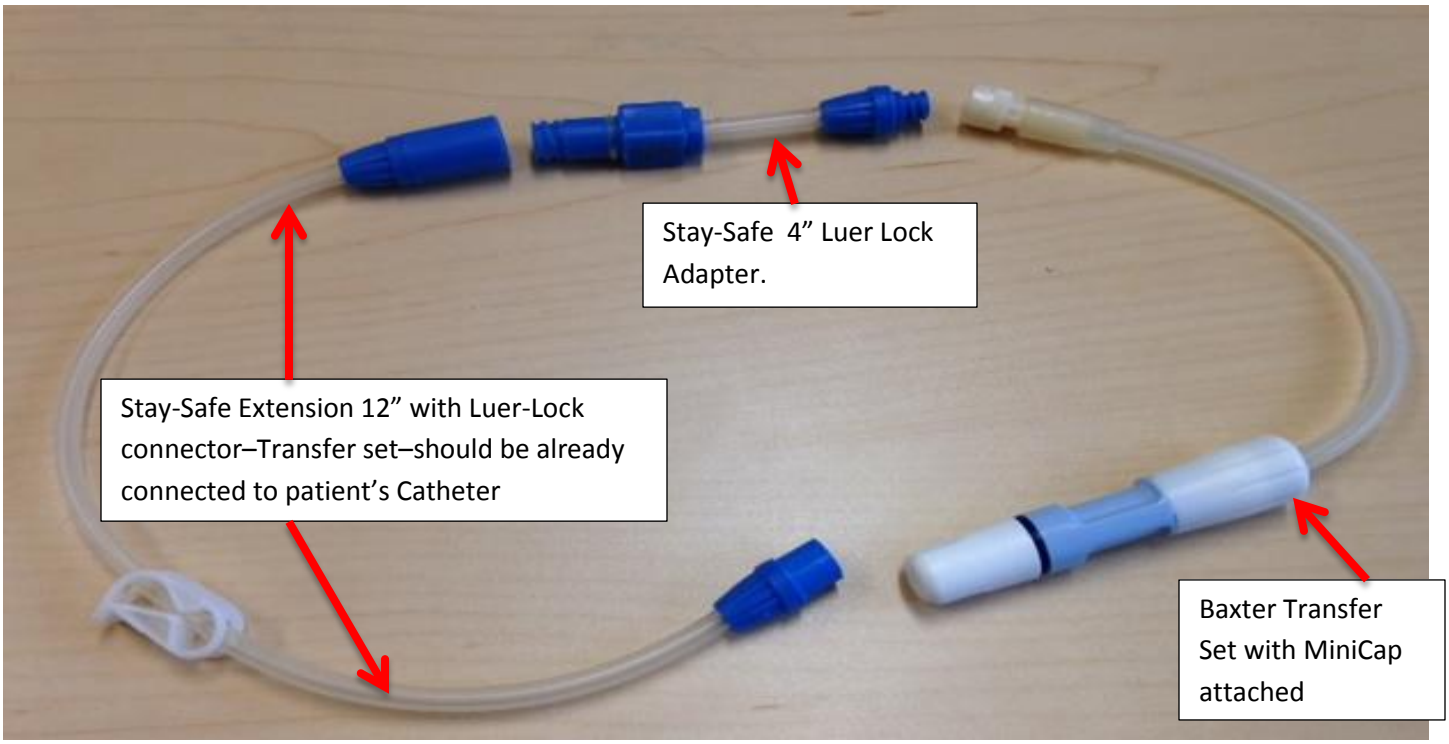
Found inside this package



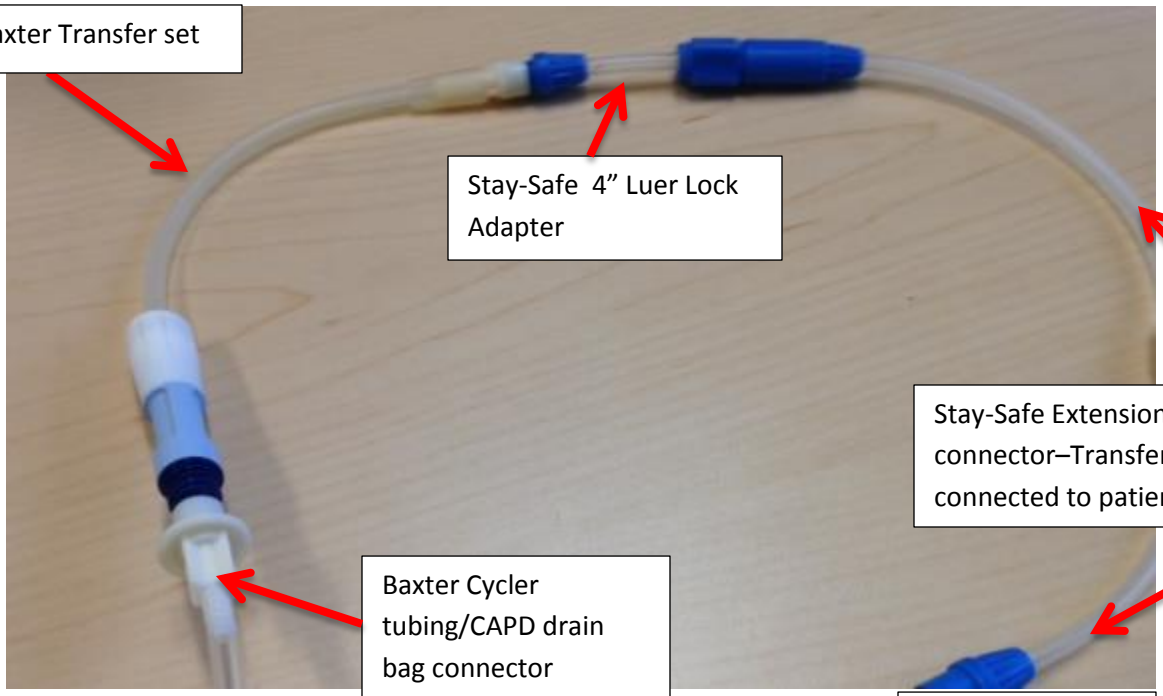
Will need to be Baxter Transfer Set

Found inside this package

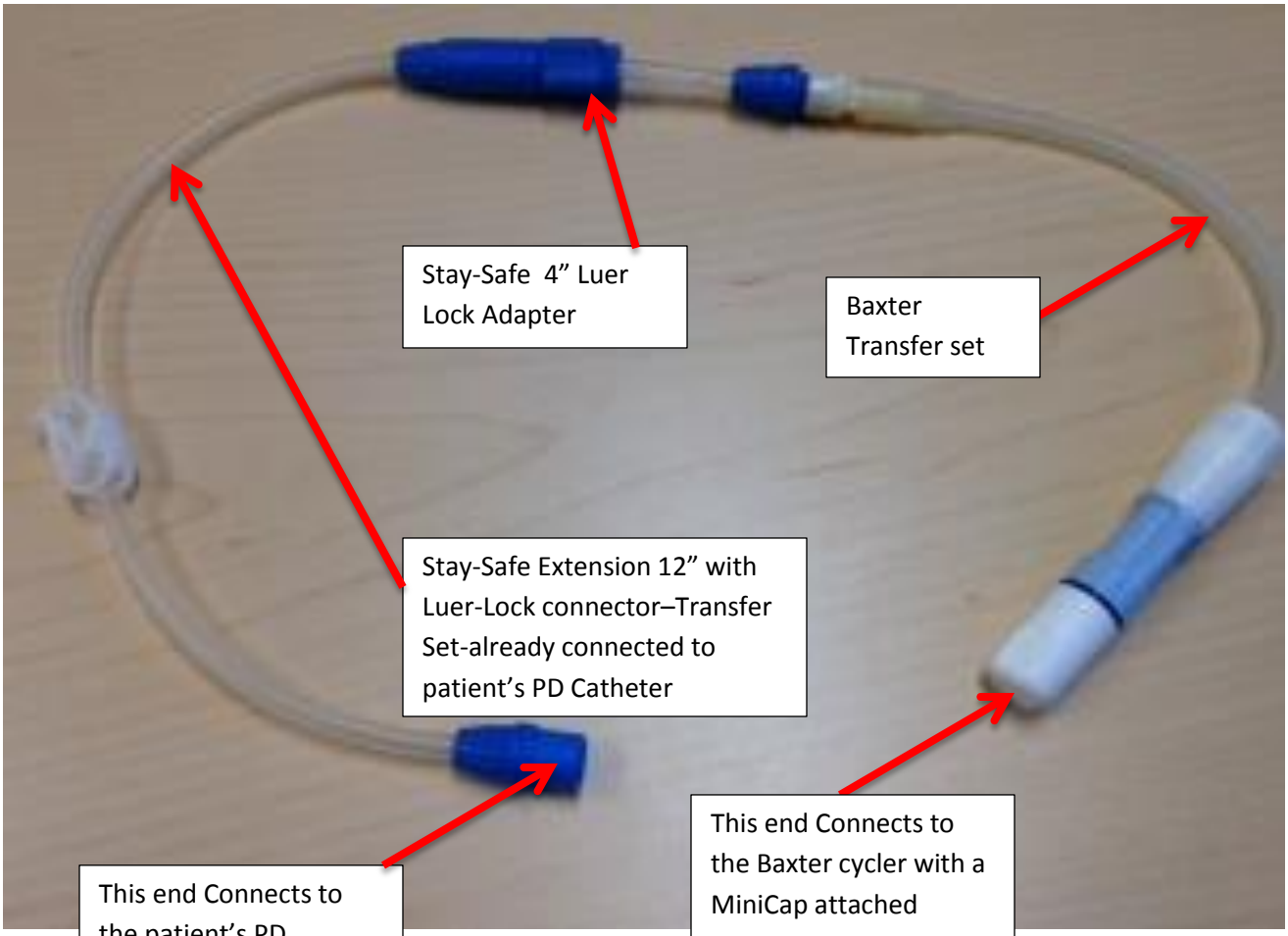
Will need to a MiniCap



How all the pieces fit together at the start of treatment?



How all the pieces fit together at the end of treatment?



You will send the patient home with this all connected—tell patient to remove the 4" adapter with Baxter Transfer set attached and put their usual end cap back on when they get home.

We (NKC) do not supply the necessary end cap to convert back to Fresenius. –so the patient needs to do it themselves when they get home (Fresenius patients are taught this by Fresenius, it's not a new process for them.

SELF TEST

1) A common source of peritonitis is associated with:
   a) Bacteria crossing from the bladder into the peritoneal cavity.
   b) Faulty dialysis supplies.
   c) Failure to wear sterile gloves during an exchange.
   d) Contamination of the transfer set tip during an exchange.
2) Signs and symptoms of peritonitis include:
   a) cloudy effluent, decreased WBC, positive Gram stain
   b) abdominal pain, increased WBC, positive Gram stain
   c) bloody effluent, abdominal pain, decreased Hgb
   d) fever, abdominal pain, normal WBC
3) To assess the clarity of the effluent after a CAPD exchange you should:
   a) hold the bag up to the light
   b) shake the bag then check it with a flashlight
   c) draw off a specimen with a sterile syringe
   d) reading print through the window on the bag
4) Mr. Crane a CAPD patient tells you that he has an enlarged scrotum. You suspect he has a:
   a) hernia
   b) bowel perforation
   c) dialysate leak
   d) enlarged prostate
5) Which of the following would most likely indicate fluid overload in a peritoneal dialysis patient:
   a) increased B/P, pedal edema, feels dizzy when standing
   b) decreased B/P, pedal edema, chest pain
   c) increased B/P, swollen fingers, shortness of breath
   d) decreased B/P, swollen fingers, fatigue

6) Common causes for poor draining in peritoneal dialysis include:

   a) constipation, catheter kink,

   b) fibrin, catheter kink

   c) constipation, catheter kink, fibrin

7) What medication would you use when you suspect that a PD catheter is occluded with fibrin?

   a) Heparin

   b) Alteplase

   c) Urokinease

   d) Streptokinase

8) Acceptable methods for heating dialysate fluid include:

   a) Keep outer wrapping on and immerse the dialysate fluid in a warm sterile water bath for 20 minutes.

   b) Keep outer wrapping on and place the dialysate fluid in an incubator set for 37 degrees.

   c) Remove outer wrapping and place the dialysate fluid in a microwave for 1 minute.

   d) Remove the outer wrapping and place the dialysate fluid on a heating pad set

9) The movement of fluid across a semi permeable membrane from an area of lesser to greater concentrations of particles is termed:

   a) Dialysis.

   b) Diffusion.

   c) Osmosis.

   d) Filtration.

10. Dialysis occurs at the level of a semi permeable membrane through the process of:

   a) Diffusion and osmosis.

   b) Osmosis and ultrafiltration.

   c) Diffusion and oncotic pressure.

   d) Osmosis and hydrostatic pressure.

11. Case Study 1

Jodie White is a 39 year old lady receiving CAPD. She is admitted to hospital for a parathyroidectomy. Her dialysis prescription is as follows:

a) Target weight 57.0 kg
b) Number of exchanges 5
c) Fill volume 2 liters
d) % dialysate 1.5%

While performing your assessment this morning you note that Jodie's weight is 59.2 kg with her peritoneal cavity drained, B/P 168/96 and she has moderate edema in her ankles.

a) Based on the above information what nursing action would you take?

12. Case Study 2

While changing Mr. Clark's peritoneal dialysis dressing, you note that the exit site looks red and there is some purulent drainage.

a) Based on the above information what nursing actions would you take?

b) What might you anticipate would be the treatment for this type of exit site?