Peritoneal Dialysis: Continuous Ambulatory Peritoneal Dialysis (CAPD) Exchange Using the Baxter Twin Bag System

Site Applicability

PHC Renal in-patient areas, out-patient areas (Peritoneal Dialysis Unit), critical care areas (CSICU and ICU)

Practice Level

Specialized: Registered Nurses and Licensed Practical Nurses who have successfully completed the Nephrology Nursing Orientation to Peritoneal Dialysis, and RNs in Critical Care areas.

Need to Know

Continuous Ambulatory Peritoneal Dialysis (CAPD) is a manual method of peritoneal dialysis, performed by gravity. A sterile solution called dialysate is instilled into the peritoneal membrane through a peritoneal dialysis catheter, forming a concentration gradient between the peritoneal membrane and the patient's blood.

Diffusion and osmosis occur while the dialysate is dwelling in the patient's peritoneal cavity, allowing wastes and fluid (ultrafiltrate) to move from the patient's blood and surrounding tissues, across the peritoneal membrane, and into the dialysis solution. After a dwell period (4 to 6 hours), this dialysate is drained from the body removing the waste products and ultrafiltration is achieved. New dialysate is then re-instilled allowing the process of dialysis to continue.

Typically, the peritoneal cavity is continuously filled with dialysate, empty only during the draining and filling phases of an exchange. Therefore, dialysis occurs 24 hours per day, 7 days per week. A new "mini cap" is applied to the peritoneal dialysis catheter after each CAPD exchange allowing the patient freedom of movement during the dwell phase.

Typical frequency of CAPD: 4 to 5 exchanges in 24 hours, 4 to 6 hours apart, during the day. Breakfast-time, lunch-time, dinner-time and bedtime are used as typical timing reference points. Each exchange typically takes 30 minutes to complete.

The nephrologists' CAPD order must include:

- number of exchanges per day,
- fill volume(s),
- dialysate type and/or concentrations.

Types of Peritoneal Dialysis Solutions:

Standard Baxter Dianeal Solutions:

0.5% Dianeal (0.5% Dextrose): if hypovolemic

1.5% Dianeal (1.5% Dextrose): to maintain weight

2.5% Dianeal (2.5% Dextrose): if weight 1 to 2 kg above goal weight

4.25% Dianeal (4.25% Dextrose): if weight 2+ kg above goal weight

Glucose is used to obtain the concentration gradient of Dianeal.

- Higher levels of glucose irritate the peritoneal membrane and can cause poor dialysis over time.
- Glucose may cause increased blood sugar levels and may require changes to diabetic medications.

Extraneal: (7.5% Icodextrin) **

- Extraneal is a dialysate composed of a starch derived glucose polymer that metabolizes to maltose.
- Icodextrin resists reabsorption across the peritoneal membrane, therefore it is best used once daily for the longest dwell (up to 15 hours for CAPD). For CAPD this is the nighttime dwell.
- Note: Some reports of rash when using Extraneal have occurred. Notify Nephrologist if this occurs.

WARNING** Falsely elevated blood glucose levels have occurred for patients using Extraneal, when measuring blood glucose using glucometers and test strips that use glucose dehydrogenase pyrroloquinolinequinone (GDH PQQ) or glucose-dye-oxidoreductase-based methods. ***These methods should NOT be used to measure glucose levels in patients receiving EXTRANEAL.***

*The **STAT STRIP** used at PHC does not use the above methods and is safe to use for measuring blood glucose on patients using Extraneal.*

Glucometer compatibility may be checked via following link: Country Specific Glucose List

Physioneal: (Bicarbonate/Lactate PD Solution)

- Respects the natural environment of peritoneal cells and fits with the natural bicarbonate and pH blood levels; has improved biocompatibility.
- Used to reduce pain on infusion as compared with standard Dianeal.
- The Fill bag is divided into two chambers. The two fluids must be mixed prior to instilling into patient. The solution must be used within 24 hours of mixing.

***Goal Weight -** The target weight for a dialysis patient when euvolemic.

Equipment and Supplies

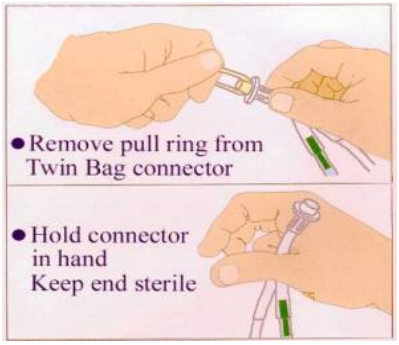
1. Twin Bag of prescribed concentration
2. 4 x 4 sterile gauze or clean hand towel
3. 2 plastic blue clamps (Do not use metal clamps as they can damage the tubing)
4. Mini Cap
5. IV pole
6. Clean gloves
7. Surgical Mask

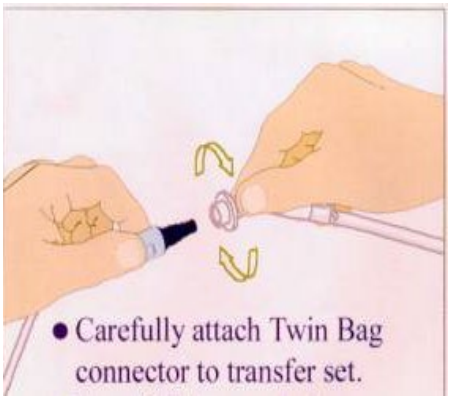
Procedure

A CAPD Exchange includes three phases: drain, fill and dwell.

Steps

Steps	Rationale
Preparation:	
1. Choose dialysis solution based on Physician's orders and a thorough volume assessment. Heat twin bag in outer wrapper, with tubing side facing down, in microwave, to 37 degrees Celsius or *to body temperature.* General warming time is 1 min per litre of fluid in the bag. Each microwave varies. Adjust time accordingly. **If medications are to be added, they must be added AFTER warming the bag.**	Volume status must be assessed daily: daily weights compared to goal weight, BP, respiratory, edema, dizziness etc. Warming dialysate to body temperature promotes patient comfort and effective dialysis. **Heating dialysate with medication added can affect medication stability.**
Steps	**Rationale**
2. Wipe any moisture from the bag using 4 x 4 gauze or clean towel. Gently squeeze the bag to check for leaks and clarity of solution. Check for expiry date, solution concentration, volume, and defects or discoloration.	Discard bag if leakage occurs while microwaving. The system must be intact and sterile. Do not use if faulty or expired; this can lead to infection. Inform 6B CNE or PD Clinic CNL if defective bag found to report product concern to Baxter

3. Expose patient's transfer set. Ensure transfer set clamp is closed. Hang fill bag on IV pole. Separate tubing. Place empty drain bag in drain position (on hook near the base of IV pole, or flat on ground).	Clamp must be closed to prevent leakage of dwelling dialysate and to maintain sterility until Twin Bag is connected.
Connect twin bag to patient transfer set:	
1. Put on mask 2. Wash hands. 3. Apply clean gloves.	
4. Remove pull ring from twin bag connector. Hold in hand to keep end sterile.	
5. Remove minicap from transfer set. Avoid twisting PD catheter. Keep transfer set in other hand to keep sterile.	

Steps	Rationale
Cont.	
6. Attach the twin bag connector to the transfer set by twisting the Twin Bag connector onto the transfer set while keeping the transfer set stationary. Ensure the connection is secure. This is to prevent disconnection and contamination during the PD exchange.	 Twisting or pulling of the PD catheter could cause irritation to PD exit site and increase the risk of exit site infection.
Drain:	
1. Open transfer set clamp, drain patient of dialysate completely. This may take 20 minutes or more.	If drain is slow or difficult, adjust patient position, raise level of bed, check for kinks in tubing, and /or provide laxatives as prescribed.
2. Observe for completed drain by ensuring: Return of fill volume amount (at minimum) No further streaming of dialysate into drain bag Drain tubing cool to touch. Patient may experience sucking pain sensation in lower abdomen or rectal area	Inadequate draining may lead to overfilling with subsequent fills and can result in harm to patient. When the PD cavity is empty of fluid, the PD tube tip may attach itself (suck) onto the interior of the PD membrane wall, causing discomfort to the patient. This is also referred to as “drain pain.”

Steps	Rationale
Cont.	
1. Close transfer set clamp. Place blue clamp on drain line.	
2. If this is the 1st exchange of the day and patient can mobilize safely, ***weigh*** patient now. If the patient cannot safely mobilize, wait until the "fill" steps are complete, and weigh the patient within 20 minutes of completing the exchange.	A "dry weight" (empty peritoneal cavity) in the morning is the most accurate weight. A "wet weight" indicates the patient's documented weight *includes* the volume of the dialysate in their peritoneal cavity. Subtract the volume of the fill in weight (1 litre = 1 kilogram) to document the patient's actual dry weight.

Steps	Rationale
Prime:	
1. With a blue clamp on the drain line, and the transfer set clamp closed, break the green seal on the fill tubing by bending it back and forth until the seal snaps. Unclamp the blue clamp on the drain line for a count of 5 seconds, allowing fluid to prime the line and expel air into drain bag. Visually check that no air remains in the fill line.	 If air is allowed to enter the peritoneal cavity, the patient may experience pain (to shoulder and abdominal region). The air will slowly be reabsorbed over the next 1 to 2 days. Analgesics may be required. Priming the tubing with fresh fluid decreases chance for infection.
Fill:	
1. Open the transfer set clamp, allowing the fill to occur. This will take approximately 10 minutes. Once the patient is filled, close transfer set clamp, and place the remaining blue clamp on the fill line.	Prevents fluid from draining out of fill line when Twin Bag is disconnected 

Steps	Rationale
Disconnecting Twin Bag:	
1. Apply mask 2. Wash Hands. 3. Put on gloves. 4. Check the Mini Cap for expiry date. 5. Carefully peel open mini cap package and place on a flat surface, within reach, maintaining sterility of minicap by keeping it resting in open package. 6. Disconnect twin bag from transfer set.	
7. Attach new mini cap to transfer set and ensure mini cap is secure. 	Do not touch the inside of the cap. Maintain sterility.
Assess Drainage:	
1. Check drained dialysate for clarity, colour, presence of fibrin and weight. Drained dialysate may be weighed for accurate ultrafiltration volumes: • 1 kg = 1 Litre • 100 gr. = 100 mL	Any unusual findings re: nature of dialysate or difficulty with the exchange should be reported to the physician. (i.e. inadequate drain volume trend, pain when filling or draining)
2. Subtract the drain volume from the fill volume to obtain the ultrafiltration volume.	The patient may have absorbed fluid if hypovolemic, dwell time was over 6 hours, or is constipated.

Steps	Rationale
Cont.	
3. 	**If dialysate is cloudy, notify nephrologist immediately.** This indicates possible peritonitis.
4. Using appropriate PPE, dispose of dialysate: hang drain bag on hooks provided over sink (or lay on countertop next to sink) in *dirty utility room*. Place twin bag connection end into sink drain. Remove all blue clamps and allow dialysate to drain into sink. Empty twin bags are disposed in regular garbage.	There is a potential for splash injury when emptying dialysate into the sink.

Documentation

1. Cerner ➔ Interactive View and I & O ➔ Dialysis Management ➔ Continuous Ambulatory PD
   - Solution Type
   - Volume In and Volume Out
   - Medication added
   - Appearance of dialysate
   - Dry weight (weight when "empty")
   - Wet weight (if dry weight unable to obtain)
   - Goal weight
   - Comments (e.g. assessment for edema)
2. Cerner ➔ Interactive View and I & O ➔ Dialysis Management ➔ Peritoneal Dialysis Catheter
   - Dressing site assessment – Q shift and when dressing changed (daily and PRN while inpatient)
   - Document unusual findings in "Unexpected Events" (blocked tubing, drain issues…etc.)

3. Interactive View and I & O ➔ Adult System Assessment
    - Respiratory assessment, noting any dizziness, shortness of breath, abnormal breath sounds

Patient and Family Education

Encourage the patient to inform the nurse if he/she:

1. Experiences abdominal pain or fever because these symptoms could suggest possible peritonitis which needs to be treated promptly.
2. Notices their PD transfer set is leaking as the contamination protocol will need to be initiated.
3. Sees that their PD dressing is soaked which warrants further assessment of the PD exit site. There could be a leak at the exit site or patient could have an exit site infection.

Related Documents

1. Glucometer and Extraneal Compatibility - Country Specific Glucose List

References

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4. Baxter Corporation. Physioneal 40 Clear-Flex, Solution for Peritoneal Dialysis: Information for the patient.
5. Baxter Corporation. Country Specific Glucose List. http://www.glucosesafety.com/us/pdf/countryspecific_glucose_list.pdf
6. BC PD Clinicians Group. November 2013. Peritoneal Dialysis Guideline: Warming peritoneal dialysis solutions. BC Renal Agency.
7. BC Renal Agency (2007). Peritoneal Dialysis Training Video: a step-by-step guide to maintaining your independence
8. Crabtree, J., Firanek, C., et al. (2012). Access care and complications management update. Care of the adult patient on peritoneal dialysis. Medical Affairs Renal Division, Baxter Healthcare Corporation.
9. SPH PD Clinic. (2014) Step by Step Guide to the Peritoneal Dialysis Procedures (CAPD Flipchart). Adapted from version at Royal Columbian Hospital PD Unit.

Persons/Groups consulted:

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