PURPOSE

Peritoneal Dialysis is performed to remove fluids and toxins, regulate electrolyte levels and manage azotemia via diffusion and osmosis. Indications for peritoneal dialysis include:

- hyperkalemia
- oliguria or anuria
- metabolic acidosis
- fluid overload unresponsive to diuretics
- combination of the above
- renal failure

Expected outcomes of peritoneal dialysis include:

- therapeutic goals of Peritoneal Dialysis are achieved
- catheter and access site is maintained without complications
- peritoneal dialysis access site functions properly
- respiratory status is adequate throughout treatment
- patient has acceptable levels of comfort

POLICY STATEMENTS

Initiation of Peritoneal Dialysis in non-critical care areas requires written orders by the Nephrologist. These orders must include the choice of dialysis solution and concentration, fill volume, inflow/dwell and drain times and cycle numbers if using a Y-set or total prescription time and cycle number if using Cycler. The choice of a last fill (if patient will be capped off) in terms of dialysis solution/concentration and volume must also be specified.

The addition of ALL medications to any PD solution requires a Nephrologist’s written order. The order must include drug name, dosage in both concentration and preferably also in total amount added per volume, route, and frequency and orders for monitoring.

Strict aseptic technique is required during peritoneal dialysis catheter access to reduce the risk of peritoneal infection.

Both acute and chronic dialysis may be initiated utilizing either a Y-set System or the HomeChoice Pro Cycler. Differences in the prescription, dwell volumes used, cycle lengths and frequency are the main differences seen when comparing Acute to Chronic PD prescriptions and will be decided by the Nephrologist in consideration of the individual patient.

Peritoneal dialysis Y-set tubing is changed every 96 hours and cycler tubing every 24 hours or if the system otherwise becomes contaminated. Tubing that is disconnected from the patient at any time during treatment is changed every 24 hours. Dialysis solutions are changed every 24 hours or as directed from the Stability Chart when medications are added. Please refer to the Stability Chart of Medications.

ALL infants and children receiving peritoneal dialysis MUST be weighed daily. This should occur on the same scale, same time (every 24 hours), same clothes, and following first morning void (if able). The child should be fully drained of their dwell, and weights must be recorded based on this “empty” weight.

Clinically unstable patients, or those with other concerns may require more frequent weights and this is at the discretion of the Nephrologist.

Dialysis fluid is heated between 36 to 37 degrees Celsius prior to instillation. At no time will this fluid be heated via microwave; rather the Home Choice may be used to warm and maintain appropriate temperature for both cycler fluid and dialysate bags used for the Y-set.

A Peritoneal Dialysis Emergency Clamping Kit must always be prepared and available at the bedside. Kit includes: - UltraClamp Tubing Clamp - 2% Chlorhexidine/70% alcohol swabs
- Sterile towel

**SITE APPLICABILITY**

- Inpatient unit 3F
- Pediatric Intensive Care Unit

**PRACTICE LEVEL/COMPETENCIES**

Peritoneal Dialysis is an advanced skill and is practiced after the practitioner has obtained the required education and has had his/her learning validated at the bedside with an appropriate dialysis trained nurse.

**DEFINITIONS**

**Azotemia:** is a medical condition characterized by abnormally high levels of nitrogen-containing compounds, such as urea, creatinine, various body waste compounds, and other nitrogen-rich compounds in the blood. It is largely related to insufficient filtering of blood by the kidneys. It is characterized by a decrease in the glomerular filtration rate (GFR) and increases in blood urea nitrogen (BUN) and serum creatinine concentrations.

**Dialysis fluid/dialysate:** prescribed sterile solution of specific concentrations to facilitate diffusion and osmosis across the peritoneal membranes.

**Fill volume:** the amount of dialysate prescribed to fill the peritoneal cavity per each cycle or run. The prescribed fill volume is based on weight or BSA of the child and is adjusted for numerous factors (e.g. patient’s tolerance, more solute or fluid removal) in conjunction with the input of the nephrologist. Too small fill volumes may lead to rapid solute equilibration and inadequate ultrafiltration, too large fill volumes can lead to excessive increases in intra-peritoneal pressure that reduces dialysis efficiency due to enhanced lymphatic uptake. Excessive fill volumes may be associated with discomfort/pain, respiratory complications, hernia, gastroesophageal reflux, and hydrothorax.

**Effluent:** dialysis fluid (fill volume) plus ultrafiltrate and waste removal emptied from the peritoneal cavity.

**Ultrafiltrate:** fluid and substances that have passed through the semipermeable membrane during dialysis. Calculated by subtracting dialysis fluid (fill volume) from the effluent volume.

**Hand Hygiene:** Refer to Infection Control Manual Policy and Procedure for Hand Hygiene.

**Peritoneal Dialysis (PD):** A therapy where solutes and water are transported across the peritoneum (a semi-permeable membrane), utilizing a commercially prepared sterile solution which is introduced into and removed from the peritoneal cavity. The solution used is formulated to assist in the removal of toxins and regeneration of bicarbonate and removal of excess total body water and salt.

- **Intermittent PD (IPD):** Dialysis solution is present in the peritoneal cavity from time to time usually ranging from 15-20 exchanges per day, 3-4 days per week.
- **Continuous Ambulatory PD (CAPD):** Dialysis solution is always present in the peritoneal cavity. New solution is exchanged typically 3-5 times per day and performed manually by using gravity to move fluid into and out of the peritoneal cavity.
- **Continuous Cycling PD (CCPD):** Dialysis solution is always present in the peritoneal cavity where 6-12 night exchanges per day are performed by an automated machine (cycler) with a last fill dwelling throughout the day. This enables the patient to be disconnected from the machine and free to do normal daytime activities.
Phases of an Exchange:

PD involves repeated fluid exchanges or cycles:
- **Instillation or Fill Phase**: dialysis solution is infused into the peritoneal cavity through an abdominal catheter.
- **Dwell Phase**: dialysate remains in the peritoneal cavity, which allows osmosis and diffusion to occur. Dwell time varies based on the child’s clinical need and is prescribed by the responsible physician. Shorter dwell times increase ultrafiltration and urea clearance. Longer dwell times favour higher creatinine and phosphate clearance but may reduce ultrafiltration.
- **Drain Phase**: the dialysate and the excess extracellular fluid, wastes, and electrolytes are drained from the peritoneal cavity via the peritoneal catheter.

**Peritoneal Catheter**: permits the infusion of dialysis fluid into the peritoneal space and the movement of water and associated solutes out of the peritoneal space.

**Titanium adapter**: is used to secure a Transfer Set or Dialysis Tubing to the PD catheter. They are lightweight and resistant to electrolyte-containing solutions and result in a tighter connection than plastic adapters. They do not chafe the catheter which can cause cracks or holes to develop.

**Transfer Set**: an extension tubing that attaches to the PD catheter at the skin level exit site. The transfer set remains in place between PD therapy and is replaced every 6 months or sooner if concerns regarding compromise of the transfer set integrity, post contamination episode or if recurrent/relapsing peritonitis.
Minicap®: Povidone Iodine impregnated cap that is attached to the end of the transfer set to maintain sterility of the exposed end.

Opticap®: Povidone Iodine impregnated 2 part cap made up of a Minicap® (female luer connection) and an Opticap® (male luer connection) that is used to maintain sterility of the exposed end of the tubing set when disconnecting the set.

**EQUIPMENT**

<table>
<thead>
<tr>
<th>Y-Set System:</th>
<th>Cycler system:</th>
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<tbody>
<tr>
<td>• Dialysis fluid as per physician’s orders</td>
<td>• Dialysis fluid concentration as per physician’s orders</td>
</tr>
<tr>
<td>• PD Administration Set (Y-Set)</td>
<td>• Cycler set with cassette (Standard or Low-recirculation)</td>
</tr>
<tr>
<td>• PD Collection drainage bag</td>
<td>• 12 ft. Drain Line or Drain bag (15L x2)</td>
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<tr>
<td>• IV pole</td>
<td>• Drain manifold (if using drain bag)</td>
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<tr>
<td>• Mask</td>
<td>• Mask</td>
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<td>• Micropore (paper) tape</td>
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<tr>
<td>• Clean towel</td>
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<td>• Cycler (to use as a warmer)</td>
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**PROCEDURE**

1. **IDENTIFY** patient and **ENSURE** patient and family understand procedure and questions are answered. **Evaluates and reinforces understanding of previously taught information.**
2. **OBTAIN** and **VERIFY** PD orders with patient identification using two patient identifiers. **Reduces error.**
3. **GATHER** needed equipment and supplies. **Facilitates completion of task in a timely manner.**
4. **MASK** and **PERFORM** hand hygiene. **Standard/routine precautions.**
5. **PERFORM** the 7 checks of a dialysis bag: **Reduces errors and risk of contamination.**
   - Right concentration
   - Right Volume
   - Expiration date
   - Clear Solution
   - No Leaks/Holes
   - Intact Frangible/Seal
   - Intact Port

*For Y-Set System:*

6. **CLOSE** all clamps on tubing then **CONNECT** tubing to bags by luer lock.
7. **ATTACH** drain bag to drain line.
8. **SECURE** lines to pole using tape.
9. **FILL** one buretrol with 70 millilitres (mL). **INVERT** the drip chamber filling it halfway. **CLOSE** clamp and return drip chamber to upright position.
10. **OPEN** regulating clamp below chamber to prime
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<tr>
<th>Step</th>
<th>Action</th>
<th>Notes</th>
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<tbody>
<tr>
<td>11.</td>
<td><strong>FILL</strong> second buretrol allowing solution to run through drip chamber and into drain bag. <strong>Close</strong> roller clamp.</td>
<td></td>
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<tr>
<td>12.</td>
<td><strong>OPEN</strong> clamp on end of drainage bag to empty priming solution.</td>
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<tr>
<td>13.</td>
<td><strong>PLACE</strong> clean towel underneath transfer set.</td>
<td></td>
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<tr>
<td>15.</td>
<td><strong>REMOVE</strong> Minicap® from patient’s transfer set and <strong>CONNECT</strong> tubing to transfer set by luer lock.</td>
<td>Minicap® maintains sterility of the exposed end of the transfer set.</td>
</tr>
<tr>
<td>16.</td>
<td><strong>OPEN</strong> drain line allowing fluid to drain from the patient.</td>
<td>Drains abdomen.</td>
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**NOTE:** side to side turning may assist with the drainage of PD should there be retention of dialysis fluid.

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<tr>
<td>17.</td>
<td><strong>CLOSE</strong> drain line when drainage ceases.</td>
<td></td>
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<tr>
<td>18.</td>
<td><strong>MEASURE</strong> amount of effluent and observe the appearance.</td>
<td></td>
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<tr>
<td>19.</td>
<td><strong>FILL</strong> buretrol with prescribed volume + 10 mL</td>
<td>Ensure 10 mL remains in bottom of buretrols to avoid trapping air in the line.</td>
</tr>
<tr>
<td>20.</td>
<td><strong>FILL</strong> patient with prescribed amount.</td>
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**NOTE:** For an acute patient needing PD immediately, patient should be supine during the dwell time and started with small volume exchanges to prevent abdominal leak and risk of peritonitis.

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**NOTE:** During the dwell time, the dialysis solution bags are put on the cycler for warming.

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<td>22.</td>
<td><strong>REPEAT</strong> steps (drain, fill, dwell) for a complete exchange/cycle as ordered.</td>
<td>Drain, fill, dwell is considered 1 complete exchange/cycle.</td>
</tr>
</tbody>
</table>

**NOTE:** Patient may need 3 quick flushes (no dwell time) for:
- clearing blood in the peritoneal cavity (post catheter insertion)
- ensuring the patency of the PD catheter
- severe abdominal pain for suspected peritonitis (this is done prior to antibiotic administration)
- contamination

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<td>23.</td>
<td><strong>CALCULATE</strong> ultrafiltrate and cumulative ultrafiltrate balance.</td>
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**Ultrafiltrate = effluent volume – fill volume**

**For Cycler:**

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<tbody>
<tr>
<td>7.</td>
<td><strong>SCROLL</strong> down to “Change Program”</td>
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<tr>
<td>8.</td>
<td><strong>ENTER</strong> dialysis prescription as per physician’s orders.</td>
<td></td>
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<tr>
<td>9.</td>
<td><strong>PRESS</strong> STOP to complete entry.</td>
<td></td>
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<tr>
<td>10.</td>
<td><strong>PRESS</strong> GO to set up the cycler. Refer to “Home”</td>
<td></td>
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Choice PRO Automated PD Systems: Patient At-Home Guide

11. **CHECK** patient line for air.

12. **PLACE** clean towel underneath transfer set.

13. **MASK** and **PERFORM** hand hygiene. **Routine Infection Control practices; reduces transmission of microorganisms and contamination.**

14. **REMOVE** Minicap from patient's transfer set and **CONNECT** tubing to transfer set by luer lock.

15. **OPEN** transfer set and **PRESS** GO to commence treatment. **Initiates dialysis.**

**NOTE:** Patient may need 3 quick flushes (bypassing the dwell phase) for:
- severe abdominal pain for suspected peritonitis (this is done prior to antibiotic administration)
- contamination

**DOCUMENTATION**

**DOCUMENT** on appropriate records including Peritoneal Dialysis Flowsheet, Nurses’ Notes, MAR, Patient Care Flowsheet:
- Date and time of treatment initiation/discontinuation
- Condition of peritoneal catheter and exit site assessment
- Date and time of exchange
- Dialysis solution used (including additives), volume of dialysis fluid instilled, dwell time, amount and appearance of effluent
- Medications added to dialysate (date, time, drug name, dosage, route)
- Intake and output and ultrafiltrate fluid balance (hourly and cumulative output totals)
- Daily weight
- Vital signs
- Child’s tolerance of procedure(s)
- Patient/Family Education
- Unexpected outcomes and complications
- any other pertinent actions or observations

**REFERENCES**


Centers for Disease Control and Prevention. Guideline for Hand Hygiene in Health-Care Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the
PERITONEAL DIALYSIS – SET-UP AND INITIATION FOR ACUTE OR CHRONIC PD UNDER DIRECTION OF NEPHROLOGY SERVICE


Warady, B.A., Bakkaloglu, S., Newland, J., Cantwell, M., Verrina, E., Neu, A., Chadha, V., Yap, H-K. and
