Assisting with the Bedside (Percutaneous) Insertion of Chronic Peritoneal Dialysis Catheters

BCRenal
an agency of the Provincial Health Services Authority

ORIGIN DATE: MAY 2009
REVISED DATE: NOVEMBER 2013

This procedure is posted on the BC Provincial Renal Agency website – For Healthcare Professionals Channel – Guidelines, Protocols & Clinical Tools – http://www.bcrenalagency.ca/healthcare-professionals/guidelines-protocols-clinical-tools

Related procedure: Assisting with the Bedside[1] (Percutaneous) Removal of Chronic Peritoneal Dialysis Catheters (also on the BCPRA website).

1.0 PRACTICE STANDARD

Skill Level (Nursing):
Nurses[2] who have received orientation to the procedure, potential complications and relevant peritoneal dialysis (PD) equipment and supplies may assist the physician with bedside PD catheter insertions.

A two-hour orientation to PD catheter insertions and removals is anticipated to be sufficient for nurses who have experience in peritoneal dialysis or assisting with procedures. A longer time may be required for those who do not have peritoneal dialysis experience or experience in assisting with procedures. Orientation to include observation of one procedure and assistance (gloved) with second.

[1] Throughout this document "bedside" procedure refers to a procedure performed in a setting outside the operating room.
[2] Nothing in current legislation or the standards of the Licensed Practical Nurses (LPN) College of BC precludes an LPN in assisting with PD catheter insertions/removals. Employer policies may limit LPN practice in a particular hospital or unit after consideration of factors such as the availability of support, education, experts for consultation, staffing levels, etc. If conscious sedation is utilized, a formalized Operating Room LPN program may be required (information based on telephone communication with the CLPNBC, May 2009, 2013).

Need to Know:

In BC, chronic PD catheters are inserted in two ways:

a. As a surgical procedure in the operating room performed by a vascular or general surgeon. May be done using an open incision and surgical dissection (laparotomy) or a laparoscopic technique. Both are done as same day or short stay (1 – 2 day post-operative stay) procedures and under a general anaesthetic.

b. As a "bedside" (non-surgical) procedure in a non-surgical setting performed by a physician who has had special training. May be done using a (i) trocar, rigid catheter and guide wire (Seldinger technique); or (ii) preassembled cannula with trocar and a spiral sheath (Quill) and peritoneoscope (Y-Tec technique). Both are done as outpatient procedures and may involve an overnight stay. Procedures are done using a local anaesthetic +/- an anti-anxiety medication, narcotics or conscious sedation.

Pre-PD bedside catheter insertion:

- Written consent must be obtained prior to initiating the procedure.
- Anticoagulants (including acetylsalicylic acid or Aspirin®) and antiplatelet drugs are discontinued 5 days prior to the procedure to prevent bleeding (inform the physician prior to performing the procedure if anticoagulants and antiplatelet drugs have not been discontinued).
- An international normalized ratio (INR) may be ordered 3 days prior or just prior to the procedure to measure coagulation status (if ordered, ensure results are available on the chart prior to the procedure).
- Calcium and iron supplements may be discontinued up to one week prior to the procedure to prevent constipation.
- Patients are asked to complete a bowel preparation prior to the procedure to reduce the risk of bowel perforation during catheter insertion.
- Patients are asked to have a light breakfast or no breakfast on the day of the procedure (to keep the bowel clear and enable a general anaesthetic if complications arise during or after the procedure).
- Patients are asked to take their regular medications on the day of the procedure with sips of water. Patients with diabetes are provided specific instructions regarding diabetes medications (insulin dose is usually reduced).
- Patients are asked to void prior to the procedure to reduce the risk of perforation during the procedure.
- Pre-operative marking of the abdomen prior to catheter insertion by the nephrology team should include:
  - Patient preference
  - Marking of the abdomen with the patient recumbent followed by rechecking the marked position with the patient upright.
  - The location of the skin incision for entry into the peritoneal cavity should be first identified and marked at a point that allows the tip of the catheter to be at the pubic symphysis.

  - The exit site should be marked so that it is visible to the patient for appropriate exit site care and positioned away from the belt line.
  - Avoid scars, belt line, fat and skin folds, moist areas due to perspiration, pressure points from clothing or areas that cannot be sufficiently visualized during exit site care.
- Procedure is done using local anaesthetic (anaesthetize the area of the primary incision) +/- an oral anti-anxiety agent, narcotic or conscious sedation.
- The type of PD catheter used for bedside catheter insertions will be dependent on program and physician preference. Variations include:
  - Number of cuffs (one vs. two).
    - Two cuffs are most common with one pre-peritoneal and one below the skin
  - Design of the subcutaneous pathway (permanently bent vs. straight).
    - Straight catheters are most common.
  - Design of the intra-abdominal portion (straight vs. curled/coiled).
    - Curled catheters are the most common—curled catheter is less likely to migrate.

During PD bedside catheter insertion:

- Wash hands and use maximal sterile barrier precautions.
  - Staff: surgical mask covering mouth and nose, sterile or clean gown and sterile gloves, surgical cap or hood may be worn.
  - Patient: gown or pajamas and sterile drapes from head to toe with the abdomen exposed. A mask covering the patient's mouth and nose is recommended, especially if patient is methicillin-resistant staphylococcus aureus (MRSA) positive or has an airborne infectious disease.
- Aseptic technique to be used throughout the procedure.
- Body substance precautions to be used throughout the procedure.
- Sharps/biomedical waste to be disposed of appropriately.

Post-PD catheter insertion:

- The dialysis fluid should fill and drain rapidly and the patient should not have an unusual urgency to void or defecate. Dialysate returns should show no evidence of fecal material or persistent bleeding.
- Initial dressings remain in place for one week post-procedure (unless dressing is not intact or wound requires assessment secondary to pain, wet dressing or suspected infection). Catheter should be immobilized and secured to the abdomen to enable healing of the exit site.
- Patients return to the PD clinic or another designated area once per week to have their dressing changed and PD catheter flushed until they start on dialysis. Alternative arrangements may be made for dressing changes and flushing of catheters if more convenient for patients.
- If possible, the PD catheter should not be used for at least two weeks post-insertion to allow proper healing.

Potential complications of PD catheter insertions include:

1. Organ perforation:

   a) Bowel perforation: sudden abdominal pain, hissing sound and/or foul smell from gas release, watery stool, inadequate drainage of dialysate, dialysate effluent may be cloudy, odorous or clearly fecal, dipstick of feces shows high glucose (indicating presence of dialysate). Surgical intervention may be required.

   b) Bladder perforation: sudden pain, extreme urgency to urinate, massive voiding of dialysate, unable to instill and/or drain dialysate, dipstick of urine shows high glucose (indicating presence of dialysate). Surgical intervention may be required.

2. Catheter placed preperitoneally: pain on inflow, minimal or no drainage, initially clear drainage becomes blood-tinged. Surgical intervention may be required.

3. Bleeding: dialysate dark red and does not clear with flushes, bleeding may be evident at catheter exit site. Surgical intervention may be required.

2.0 EQUIPMENT

- PD catheter insertion tray (see Appendix 1 for contents)
- Sterile gloves x 2
- Sterile or clean gowns x 2
- Surgical cap or hood x 2
- Sterile towel x 1 (to dry hands)
- Masks x 3 (MD, RN, patient)
- Soaker (blue) pads x 2
- Antiseptic solution and scrub brush
- Syringe 10 mL x 2
- Disposable needles (#18g, #21g, #25g)
- Lidocaine with epinephrine
- Lidocaine without epinephrine
- 1 set of curved Kelly forceps (for blunt dissection)
- 1 set of retractors/spreader
- Blade stab (for exit)
- Temporary PD catheter with connecting tube and catheter holder
- Permanent PD catheter
- IV pole with Y-tube PD administration set
- 2 litre PD drainage bag
- 2 litre of dialysate with heparin 1:1000 IU (500unit/L)
- 500 cc 0.9% sodium chloride irrigation solution
- Sutures
- Dressing over exit site (e.g. Mepore)
- Abdominal pads (2)
- Pre-operative medication(s) as per order
  - Sedation
  - Antibiotic
  - Antiemetic
- Transfer set
- PD adapter/connector

If Seldinger technique, also include:
- Trocar
- Guidewire
- Dilator/introducer
- Split-sheath

If peritoneoscopic/Y-Tec technique, also include:
- Quill catheter guide
- Peritoneoscope

3.0 ASSESSMENT AND INTERVENTIONS

Preparation for PD bedside catheter insertion:

1. Ensure timely arrival of patient (1 hour prior to procedure).
2. Ensure consent for procedure has been signed.
3. Record patient's current condition including vital signs (BP, pulse and temperature), blood glucose using portable meter (if patient has diabetes), height, weight and allergies.
4. Ensure patient has voided.
5. If ordered and not already performed, arrange to have blood drawn for stat INR (need results prior to starting the procedure).
6. Check patient for constipation (if laxative(s) taken prior to the procedure day was not effective, check with physician regarding the use of an enema).
7. Assess patient for catheter placement. Review with physician. Pre-operative marking of the abdomen prior to catheter insertion by the nephrology team should include:
    i. Patient preference
    ii. Marking of the abdomen with the patient recumbent followed by rechecking the marked position with the patient upright.
    iii. The location of the skin incision for entry into the peritoneal cavity should be first identified and marked at a point that allows the tip of the catheter to be at the pubic symphysis.
    iv. The exit site should be marked so that it is visible to the patient for appropriate exit site care and positioned away from the belt line.
    v. Avoid scars, belt line, fat and skin folds, moist areas due to perspiration, pressure points from clothing or areas that cannot be sufficiently visualized during exit site care.
8. If IV antibiotic ordered, start saline lock (give antibiotic pre-procedure).
9. Place soaker pads under the patient's trunk area.
10. Position patient supine and close to the edge of the bed in the flat position. Drape the patient and fold patient's arms on chest (i.e. out of the way). Expose the abdomen.
11. Administer pre-medication(s) as ordered.
12. Clip the abdominal insertion area and scrub with antibacterial soap if ordered.
13. Assemble equipment, including the IV pole with the dialysis equipment and solution. Prime all lines.
14. Position the prepared peritoneal dialysis system, garbage can, sharps container.

During PD bedside catheter insertion:

1. Wash hands with conventional antiseptic containing soap and water.
2. Don surgical mask, cap or hood, sterile or clean gown and sterile gloves.
3. Place mask on patient, especially if patient is methicillin-resistant staphylococcus aureus (MRSA) positive or has an airborne infectious disease.
4. Set up for physician: sterile gown, sterile gloves, mask, sterile towel.
5. Open the outer wrapper of the PD insertion tray. Open inner wrapper with lifting forceps.
6. Add to the tray: needles (#18g, #21g, #25g), syringes (2x10mL), and abdominal pads (2).
7. Add antiseptic to one bowl. To the other bowl, add 250 mL of normal saline and 2,000 units of heparin.
8. Close inner wrapper of tray.
9. Position the prepared PD system, garbage can, sharps container.
10. Open the inner wrapper of tray with the lifting forceps when doctor arrives.
11. Provide assistance to physician as required:
    - Assistance to gown
    - Local anaesthetic
    - Temporary PD catheter with connecting tube and catheter holder
    - Permanent PD catheter with connecting tube and catheter holder
12. When instructed, securely connect the Y-Type PD administration set to the:
    - L-connector of the connection tube of the temporary catheter.
    - Connector of the permanent catheter.
13. Open roller clamp on the patient end of the peritoneal dialysis system immediately and tape the patient end of the system to the bed.
14. Check ease of inflow and outflow and clarity of drainage, when instructed by physician.
15. Monitor patient for pain or discomfort.
16. Apply dressing to midline suture area and catheter exit site as per protocol. Anchor catheter tubing to abdomen.
17. Monitor vital signs.
18. Initiate PD as ordered.

Post-PD bedside catheter insertion:

1. Monitor vital signs until stable (if conscious sedation was used, monitor blood pressure, pulse and oxygen saturation every 15 minutes until stable).
2. During infusion of the dialysis fluid, observe for indications of bowel or bladder perforation:
    - Bowel: sudden abdominal pain, hissing sound and/or foul smell from gas release, watery stool, inadequate drainage of dialysate, dialysate effluent may be cloudy, odorous or clearly fecal, dipstick of feces shows high glucose (indicating presence of dialysate).
    - Bladder: sudden pain, extreme urgency to urinate, massive voiding of dialysate, unable to instill and/or drain dialysate, dipstick of urine shows high glucose (indicating presence of dialysate).

- **If either bowel or bladder perforation is suspected, drain the fluid and immediately notify the physician.** Obtain dialysis fluid specimen for investigation. Monitor vital signs q 5 minutes. Start IV and prepare patient for the operating room.

3. Observe the dialysis drainage and the dressing over the suture line for frank bleeding.
   - Some blood-tinged dialysis drainage is normal but usually it clears after several flushes.
   - A small amount of oozing at the catheter exit site is also normal.
   - **If dark red dialysate persists after several flushes and/or there is red bleeding at the catheter exit site, immediately notify the physician.** Monitor vital signs q 5 minutes. Start IV and prepare patient for the operating room. (Patients may go into shock, have decreased blood pressure, increased pulse, and clammy cool skin).
4. Reposition patient for comfort but maintain supine position until PD flushing is complete.
5. Patient may ambulate after the premedication has worn off and the dialysate fluid is drained from the abdomen.
6. Allow patient to have a light snack or liquid meal replacement.
7. Obtain order to restart anticoagulants or antiplatelets as necessary.
8. Discharge according to unit program specific criteria as per physician orders (usually within 2-4 hours of procedure):
   - Vital signs within normal range for patients
   - No evidence of bleeding at surgical site
   - Able to ambulate
   - Tolerated light snack
   - Voided at least once
   - Discharge with driver
   - Patient teaching completed (see next section)
9. Document patient tolerance to the procedure and any complications, length of the procedure, dialysate inflow, outflow, blood loss, time and mode of discharge in the patient record.

PATIENT EDUCATION AND RESOURCES

Pre-PD bedside catheter insertion topics:

- Type of procedure, insertion site and type of catheter
- Medication changes for day of procedure
- Transportation to and from hospital
- Bowel care prior to procedure
- Showering the night before and/or morning of procedure
- Eating the night before and day of procedure
- What to bring to the hospital the day of the procedure (snack and medications)
- What to wear (loose clothes such as jogging suit) the day of the procedure
- What to expect during the recovery period

Post-PD bedside catheter insertion topics:

- Dressing care
- No showers, baths or swimming until your nurse or doctor tells you
- Management of discomfort/pain
- Avoid constipation
- No heavy exercise or lifting until your nurse or doctor tells you
- No tight clothing that could put pressure on the catheter
- Follow-up appointments
- When to call for medical help (kidney doctor, nurse or emergency department)

Resources (available on BCPRA website):

- "Bedside" Insertion of a Peritoneal Dialysis Catheter: Patient Preparation Sheet (patient instruction sheet under separate cover)
- After Bedside Insertion of a PD Catheter: What do I need to know? (patient teaching pamphlet under separate cover)

4.0 DOCUMENTATION

1. Document patient tolerance to the procedure and any complications, length of the procedure, time and mode of discharge, dialysate inflow, outflow, and blood loss in the patient record.

2. Document insertions, re-insertions, and removals in the Dialysis Access module in PROMIS.

5.0 REFERENCES

1. American Nephrology Nurses' Association. (2008). *Core Curriculum for Nephrology Nursing, 5th ed.*, 777-795.

2. Ash, S. (2003). Chronic peritoneal dialysis catheters: overview of design, placement, and removal procedures. *Seminars in Dialysis, 16*(4), 323-324.

3. Asif, A. (2004). Peritoneal dialysis access-related procedures by nephrologists. *Seminars in Dialysis, 17*(5), 398-406.

4. Crabtree, J. H. (2006). Selected best demonstrated practices in PD access. *Kidney International Suppl, Nov*(103), S27-37.

5. Crabtree, J. H. et al. (2012). Catheter insertion and care. *Access Care and Complications Management Update*. Retrieved from http://www.qxmd.com/references/access-care-guide

6. Figueiredo, A. et al. (2010). Clinical practice guidelines for peritoneal access. *Peritoneal Dialysis International, 30*, 424-429.

7. Flanigan, M. and Gokal, R. (2005). Peritoneal catheters and exit-site practices toward optimum peritoneal access: a review of current developments. *Peritoneal Dialysis International, 25*, 132-139.

6.0 DEVELOPED BY

1. BC PD Clinicians Group
2. Adapted from:
   - Bedside Insertion of Peritoneal Dialysis Catheter Procedure, Royal Columbian Hospital
   - PD: Assisting the Nephrologist with the Percutaneous Insertion of a Chronic Indwelling PD Catheter, Vancouver Coastal Health
   - Bedside Peritoneal Dialysis Catheter Insertion, Vancouver Island Health Authority

7.0 REVIEWED BY

1. BC PD Clinicians Group
2. BC Provincial Renal Agency – Medical Advisory Committee

Appendix 1: Sample PD Catheter Insertion Tray

EQUIPMENT

1 - 11½" x 17" SS tray
2 - 5" SS solution bowls
6 - 2" x 2" gauze sponges 8-ply
10 - 4" x 4" gauze sponges 4-ply
3 - green towels
1 - ortho towel (for lining tray)
4 - ortho towels (folded)
1 - 45" x 45" wrapper

INSTRUMENTS

3 - artery forceps (use 1 for placing in first fold of wrapper)
1 - 6½" needle holder
1 - 6" dressing forcep
1 - 6" tissue forcep
1 - suture scissor
1 - #3 B.P. handle

ASSEMBLE

Place tray with 17" side facing you.
Line tray with ortho towel allowing excess towel to overflow evenly on all sides.
Place (2) solution bowls side by side along left 11½" side of tray.
Place instruments in order given along bottom of tray next to bowls.
Place 6 - 2" x 2" gauze and 4" x 4" gauze across top of tray.
Place (3) green towels and (4) ortho towels evenly over items on tray.
Fold surplus towel from bottom over tray forming a 2" cuff. Place artery forcep in this first fold (the forcep will be sterile and can be used to add items to tray by user).
Fold surplus towel from top over tray forming a 2" cuff.
Fold in sides of towel.
Wrap diagonally with 36" wrapper.
Use instrument packing slip and label "**PERITONEAL DIALYSIS TRAY**" *with initials and date.*

STERILIZE

Steam sterilize at 134° C (273° F) for 4 minutes.