PERITONEAL DIALYSIS CATHETER (PDC) – PERCUTANEOUS INSERTION PROCEDURE UNDER LOCAL ANAESTHESIA (SELDINGER TECHNIQUE)

Cross References (including NSW Health/ SESLHD policy directives)	NSW Health PD2017_032 – Clinical Procedure Safety NSW Health PD2005_406 - Consent to Medical Treatment - Patient Information NSW Health GL2015_016 Adult Urethral Catheterisation for Acute Care Settings NSW Health PD2013_043 - Medication Handling in NSW Public Health Facilities NSW Health PD2007_036 - Infection Control Policy NSW Health PD2012_007 - User applied Labelling of Injectable Medicines, Fluids and Lines NSW Health PD2014_024 Patient Identification Bands Commission on Safety and Quality in Healthcare: Guidelines for use of the National Inpatient Medication Chart (NIMC) July 2009 NHMRC Australian Guidelines for the prevention and control of Infection in Healthcare. 2010. Available: http://www.nhmrc.gov.au/node/30290 • Hand and wrist jewellery and fingernail enhancements • Hand hygiene and hand care • Personal protective equipment SESLHD SESLHNPD/126 Antiseptics and Disinfectants Procedure SESLHD SESLHDPD/140 Waste management SESLHDPR/577 Peripheral Intravenous Cannulation (PIVC) Insertion, Care and Removal (Adults) SGSHHS CLIN191 Labelling injectable medicines, fluids and lines SGH-TSH CLIN027 - Aseptic Technique - Competency and Education Requirements SGH CLIN Peritoneal Dialysis Catheter – Nasal Swab and Mupirocin SGH CLIN Peritoneal Dialysis – Intraperitoneal Lignocaine Or Sodium Bicarbonate Administration (For Drain Or Inflow Pain Management) SGSHHS CLIN079 Preoperative/Procedure Management Of An Adult SGSHHS CLIN033 Oxygen Therapy: Post Operative Administration SGH CLIN345 Peritoneal Dialysis – Inpatient Management SGH CLIN379 Intraperitoneal Actilyse (Alteplase) Administration SGH CLIN380 Intraperitoneal Heparin Administration SGH CLIN364 Peritoneal Dialysis Catheter – Heparin Lock SGH CLIN Peritoneal Dialysis Catheter – Post Insertion Catheter Care, Dressing And Management Renal SGH WPI 053 Peritoneal Dialysis – 1 Litre Flush On A Peritoneal Dialysis Catheter Renal SGH WPI Peritoneal Dialysis – CAPD Freeline Solo Exchange Renal SGH WPI PDC – Break-In Management For Patients Requiring Urgent PD with Newly Inserted PDC Renal SGH WPI PD – Commencement And Management Of PD Patients

	at Home Renal SGH WPI PDC – Simple/Small Flush On A Peritoneal Dialysis PDC: Management of Poor Flow/No Flow flowchart Renal SGH WPI PD – Management Of Patients Requiring Intermittent Peritoneal Dialysis SGH Renal Website
1. What it is	A clinical business rule to ensure the procedure of percutaneous insertion of a PDC under local anaesthesia is performed according to best practice guidelines reducing the risk of procedural complications and ensuring patient safety
2. Risk Rating	Moderate
3. Employees it Applies to	Registered Nurses (RN) trained in peritoneal dialysis Medical Officers (MO) trained in peritoneal dialysis

4. Process

PDC is a silicone tube inserted into the patient's peritoneal cavity for peritoneal dialysis. PDC can be inserted percutaneously under local anaesthesia in a procedure room. The benefits of percutaneous PDC insertion are:

- Small incision site, hence, lower risk of bleed or leak from wound allowing early use of PDC for urgent dialysis
- Reduced fasting time and early mobilisation
- Can be performed by a trained physician in any procedure room, usually under local anaesthesia. Anaesthetists, operating room, recovery room or surgeons are usually not required
- Reduced hospital stay

The only disadvantage is percutaneous PDC insertion into the peritoneal cavity is often performed without image guidance (blind insertion technique)

4.1 Contraindications to percutaneous PDC insertion

1. Patients with suspected intra-abdominal adhesions
2. Obese or morbidly obese patients
3. Patients with prior abdominal surgeries and/or surgical scarring

4.2 Common complications of percutaneous PDC insertion (for immediate medical and PD team attention and/or review)

1. Bowel or solid organ perforation during insertion
2. Excessive bleeding or bruising from insertion or exit site
3. Heavily blood stained PD effluent
4. Constant and unresolving abdominal, insertion or exit site pain
5. Infection at wound sites within 2 weeks
6. PD catheter migration
7. Poor flowing or blocked PD catheter

4.3 Pre-procedure clinical management

1. Diabetic patients on insulin:
   a. Early light breakfast
   b. Half dose of morning insulin
   c. Monitor BSL and inform the renal team of result
      Note: Intravenous (IV) Dextrose may be required whilst fasting or during the procedure

2. Patients on anti-platelet medications:
   a. High risk patients (coronary and other stents) are to continue their standard therapy
   b. Low risk patients (primary prevention of CVA or IHD) are to stop aspirin or clopidogrel 5 days before procedure. If doubt exists, consult the patient's cardiologist or neurologist

3. Hyperkalaemic patients:
   a. Treat as per renal department guide
   b. Haemodialysis may be considered

4. Patients with fluid overload:
   a. Patient may need loop diuretics
   b. Haemodialysis may be considered

5. Uraemic patients or patients with high risk of bleeding:
   Prophylactic measures should be considered in uraemic patients and in patients at high risk of bleeding
   a. Desmopressin [1- deamino-8-D-Arginine Vasopressin (DDAVP)] can shorten or normalize bleeding time. Usual dose is 0.3 ug/Kg IV 30 minutes prior to surgery
   b. Conjugated estrogens can improve bleeding time in both male of female. Usual dose is 0.6 mg/Kg IV over 30 minutes daily for 5 days. Low dose transdermal estrogen (50-100ug daily), and oral estrogens (50mg daily) are also effective
   c. Recombinant Erythropoietin (40U/Kg x 3 over 1 week) can improve the number of reticulated platelets and improve platelet function
   d. Cryoprecipitate – rarely used and will require haematology approval

4.4 Pre – procedure and day before procedure preparation

1. Renal team must organise a day before the procedure hospital admission to the renal ward (4 South)
2. Renal team or PD nurses will book a procedure room in Cardiac Catheter Laboratory or 4South (if CCL is not available)
3. Notify relevant staff of booking i.e. interventional nephrologists, admitting renal team, patient's nephrologist, PD CNC and nurses, ward nurses/team leader/educator
4. Inform renal team, PD CNC and nurses of patient's arrival on the ward
5. PD nurses to counsel and educate patient on PD, PDC insertion process and care prior to insertion procedure
6. Interventional nephrologist or renal team to consent patient as per NSW Health PD2005_406 - Consent to Medical Treatment - Patient Information
7. Renal team to request for the following pathology testing:

- Serology must have been attended within the last 3 months
- Full blood count
- UECs
- Clotting studies (if necessary)
- MRSA swabs (axilla, groin, nasal and umbilical) –
  Patients with positive nasal swab are to commence intra-nasal mupirocin treatment as per SGH CLIN Peritoneal Dialysis Catheter – Nasal Swab and Mupirocin

8. Routine checks and recording of vital signs upon and during hospital admission i.e. pulse rate, blood pressure, temperature, respiratory rate, oxygen saturation and blood sugar level (for diabetic patients)
9. Insertion of in-dwelling urinary catheter insertion to ensure bladder is empty as per NSW Health GL2015_016 Adult Urethral Catheterisation for Acute Care Settings
10. Bowel preparation with PicoPrep – to decrease risk of bowel perforation during PDC insertion
11. Haemodialysis may be required for symptomatic (hyperkalaemic, uraemic or fluid overload) patients
12. Antiseptic shower the night before the procedure
13. PD Catheter marking by PD nurse or interventional nephrologist
    Note: Mark with permanent ink while patient is sitting. Avoid beltline and abdominal overhang in obese patients.

4.5 Preparation on the day of the procedure and before PDC insertion

1. Fast after early breakfast or 4 hours before procedure
2. Antiseptic shower and encourage to shave lower abdominal area if needed
3. Don hospital gown
4. Peripheral insertion of venous cannula as per SESLHDPR/577 Peripheral Intravenous Cannulation (PIVC) Insertion, Care and Removal (Adults)
   Note: Avoid forearm veins or arms reserved for vascular access
5. Prophylactic antibiotics 2 hours before procedure:
   - IV Cephazolin 1 gm or IV Vancomycin 1g (for MRSA positive patients)
   - IV Gentamicin 160 mg
6. Routine vital signs i.e. pulse, blood pressure, temperature, respiratory rate, oxygen saturation and blood sugar level (for diabetic patients)
7. Ensure patient identification bands are insitu as per NSW Health PD2014_024 Patient Identification Bands
8. Complete pre-procedure documentation including the Time Out form (paper–based or electronically in eMR PowerChart under Ad Hoc Charting) as per Level 2 Procedure of NSW Health PD2017_032 – Clinical Procedure Safety
9. Ward nurse escort to CCL or procedure room

4.6 Staffing requirement for procedure

1. Proceduralist
2. Scrub Assistant
3. Scout Assistant
4. Circulating Nurse
5. Registered/Enrolled Nurse to monitor vital signs

6. Medical Officer for IV sedation (if required)
7. Radiology Technician (for CCL procedure)

4.7 Pre-medication including awake sedation

All listed medications must be prescribed on a medication chart as per Commission on Safety and Quality in Healthcare: Guidelines for use of the NIMC; administered and labelled as per NSW Health PD2013_043 - Medication Handling in NSW Public Health Facilities, NSW Health PD2012_007 - User applied Labelling of Injectable Medicines, Fluids and Lines and SGSHHS CLIN191 Labelling injectable medicines, fluids and lines

1. Prophylactic antibiotics 2 hours before procedure:
    - IV Cephazolin 1 gm or IV Vancomycin 1g (for MRSA patients)
    - IV Gentamicin 160 mg
2. Anti-emetic 1 hour or just before procedure:
    - IV Metoclopramide 10mg and/or
    - IV Ondansetron 4mg/2mL or 8mg/4mL
3. Awake sedation:
    - Medical officer to supervise bedside administration 30 minutes before procedure:
        - IV Fentanyl 50-100 µg. Dose adjustment is required based on creatinine clearance i.e. CrCl (eGFR) 10-50mls/min decrease 25%; CrCl <10mls/min decrease dose 50%
    - Medical officer to supervise administration just before procedure:
        - IV Fentanyl 50-100µg. Ensure patient is relaxed but able to participate and respond to communication or instructions
          and
        - IV Midazolam 1mg every 2-3min. Administer over 2min and allow 2min to fully evaluate effect of sedative. Maximum dose is 2.5mg.
          Note: Do not administer rapidly especially when given in combination with IV Fentanyl
          Note: Cumulative dose >5mg is rarely needed; dose response varies with concomitant medications and clinical status. Dose adjustment is required based on creatinine clearance i.e. CrCl<10 mls/min, decrease dose by 50%.

4.8 Devices

4.8.1 Equipment

From Cardiac Catheter Laboratory or renal ward

- 3 x Sterile gown (TP8 or TP10)
- 2 x Large sterile drapes (TP2)
- Sterile gloves
- 2 x sterile gallipot
- 2 x sterile plastic drapes
- 2 x sterile prep sponges
- 1 x trolley for supplies
- 1 x trolley for sterile field
- Sterile scissors
- Antiseptic solution i.e. Betadine and Chlorhexidine Gluconate
- Disinfecting solution i.e. Viraclean and Methylated spirit
- Waste bins for clinical waste, general waste and sharps

- Linen skip

From PD unit
- Manual IV giving set
- Infusable Pressure Infusor
- PD fluid warmer

4.8.2 Key parts

From Cardiac Catheter Laboratory
- 5 x 2% lignocaine (100 mg in 5 ml)
- 2 x 10 ml syringes
- 2 x 20 ml syringe
- 3 x drawing up needles
- 10 x 10 ml normal saline polyampuole
- 3 x 21 g" needle
- 30 sterile gauze swabs
- Sedations i.e. Fentanyl and Midazolam\

From PD unit
- 2 x Titanium connector
- 1 x Baxter PDC Extension set
- 2 x Baxter Minicap
- 1 x Excilon dressing
- 8 x Tegaderm
- 1 x Calcium Alginate (5 x 5)
- 2 x cutifilm (10 x 8)
- Cut down set
- Suture material (polysorb)
- Heparin 5000 unit in 5 mls
- 2 x Warmed 1 Litre Normal saline
- 2 x Warmed 2 Litre CAPD PD fluid

4.8.3 Key Site

From PD unit
- 1 x Quinton Curl Cath PD catheter Kit (57 or 62 cm-check size preference with interventional nephrologist)

4.9 Procedure

1. Prepare patient as per SGSHHS CLIN079 Preoperative/Procedure Management Of An Adult:
   a. Check and record baseline vital signs just before procedure i.e. pulse rate, blood pressure, temperature, respiratory rate and oxygen saturation. Monitor and record vital signs every 15 minutes or as required throughout procedure
   b. Supplemental oxygen therapy as per SGSHHS CLIN033 Oxygen Therapy: Post Operative Administration i.e through nasal prongs 2L/min or Hudson mask 6L/min

c. Clean the lower abdominal area with antiseptic solution (i.e. Betadine) and shave if necessary

2. Clean 2 x trolleys with disinfectant as per SESLHD SESLHNPD/126 Antiseptics and Disinfectants Procedure
3. Gather all equipment
4. Perform hand hygiene
5. Prepare and set-up equipment and sterile field
6. Don face shield and face mask
7. Perform surgical hand hygiene
8. Don sterile gloves and surgical gown
9. Cover patient with sterile drapes leaving lower abdominal area exposed
10. Clean lower abdominal area again with Chlorhexidine Gluconate Solution (with or without alcohol)
11. Infiltrate the ±20mls lignocaine 2-3cm below umbilicus and then along the subcutaneous tunnel 4-5cm in length to the exit site, checking it is on side opposite to their dominant hand
12. Ensure the peritoneal sheath is 'peppered' with lignocaine to ensure adequate anaesthetic
13. Make horizontal skin puncture 2-3cm below umbilicus when numb then dissect 'bluntly' to peritoneal sheath (linea alba). This is the insertion site.
14. Insert needle attached to 10ml syringe with heparinised saline through the sheath. A syringe with ±10mls of heparinised saline should be injected during insertion of needle into the peritoneum, preventing perforation, and aiming it towards iliac fossa or behind bladder. An 18 gauge introducing needle with plastic outer sheath can also be used (not available in PDC pack), and the needle removed after insertion, this also to prevent bowel perforation
15. Fill peritoneal cavity with about 500 – 1000 ml of warmed Normal Saline. Patient may feel fluid entering peritoneum and may feel discomfort or pain.
    Note 1: For infusion pain, add 1% lignocaine 50mg/5mls amp (max 100mg) or 50mls 8.5% sodium bicarbonate injection (8.5g/100ml) into warmed normal saline for intraperitoneal infusion as per SGH CLIN Peritoneal Dialysis – Intraperitoneal Lignocaine Or Sodium Bicarbonate Administration (For Drain Or Inflow Pain Management)
    Note 2: Saline should flow easily. Ensure there is no subcutaneous collection, and that patient must not feel any bladder or bowel stimulation (suggesting bladder or bowel penetration)
16. Advance guide wire through needle or introducing sheath, directing it towards the iliac fossa/pouch of Douglas. Removing the needle once guide wire is moving smoothly, without any obstruction or resistance, up and down
    Note: If there is any resistance then the technique should be abandoned. A loop of bowel filled with faeces or adhesions could account for the resistance or obstruction.
17. Thread the trocar and introducer over guide wire, withdrawing trocar slightly and allowing introducer to cover sharper end of trocar once into peritoneum, to prevent bowel perforation
18. Request patient to tense abdominal wall by lifting head off pillow or by coughing whilst introducer is being advanced and when passing trocar through peritoneal sheath
19. Carefully introduce the end of PDC (with small holes) through outer cylinder of introducer/trocar. PDC should move through easily without resistance and dialysate/saline may escape through the catheter indicating correct positioning.

20. Once end of PDC is in, hold firmly in place whilst peeling back outer cylinder of the introducer/trocar. If available, fluoroscopy can be carried out at this stage to ensure correct catheter placement.
21. Tunnel the outer end of the PDC through the subcutaneous tunnel using the tunneling device. Make a small incision for exit site at the end of the subcutaneous tunnel, ensuring a tight and secure exit site wound (as small as possible to prevent leaking and reduce bleeding)
    Note: Suture is not required on exit site. Sutures increase likelihood of exit site infection.
22. Check PDC is draining well by flushing with another 10-20mls of heparinised saline
23. If PDC flow is satisfactory, close skin puncture/insertion site with dissolvable suture, clean area with antiseptic solution and cover with kaltostat and cutifilm dressings
24. Attach titanium connector and extension set on outer end of PDC
25. Connect PDC to CAPD bag as per Renal SGH WPI Peritoneal Dialysis – CAPD Freeline Solo Exchange to drain out the initial 500 – 1000 ml of saline from the peritoneal cavity, If PD effluent is blood-stained, run in another 500 – 1000 ml of fresh PD fluid. Continue PDC flushes as per Renal SGH WPI 053 Peritoneal Dialysis – 1 Litre Flush On A Peritoneal Dialysis Catheter until PD effluent is clear
    Note: If PD effluent remains blood stained, heparinised the PD fluid as per SGH CLIN380 Intraperitoneal Heparin Administration to prevent clot formations that could potentially block the PDC
26. Clean PDC exit site and cover with excilon and tegaderm dressing as per SGH CLIN Peritoneal Dialysis Catheter – Post Insertion Catheter Care, Dressing And Management
27. Once flush is completed and if no further PD flushes are required, heparin lock PDC as per SGH CLIN364 Peritoneal Dialysis Catheter – Heparin Lock
28. Immobilise new PDC with tape
29. Sat patient up to 45^0, as soon as possible, to ensure catheter moves downwards into iliac fossa or behind the bladder
30. Discard all equipment as per SESLHD SESLHDPD/140 Waste management
31. Document procedure and post procedure instructions
32. Handover to PD nurse or ward nurse

4.9 Post procedure management

1. Monitor and record vital signs for 15 – 30 minutes or until stable in the procedure area
2. Organise ward transfer by notifying orderly and handover to ward nurse
3. Ward nurse to escort patient back to the ward
4. Monitor and record vital signs every 15 minutes for first hour, then hourly for minimum of 4 hours or until stable
5. Patient can eat and drink after first hour if vital signs are stable
6. Encourage patient to sit up and mobilise to lessen likelihood of catheter migration
7. Monitor PDC exit site and midline wound for bleeding or leaking
8. For excessive bleed/leaks, notify renal team and PD nurses and change dressing as necessary as per SGH CLIN Peritoneal Dialysis Catheter – Post Insertion Catheter Care, Dressing And Management
9. For patients requiring further PD flushes, monitor and record PD effluent quality as per Renal SGH WPI 053 Peritoneal Dialysis – 1 Litre Flush On A Peritoneal Dialysis Catheter
    Note: For heavy blood stained PD effluent, immediately notify renal team and PD nurses. Urgent blood tests and abdominal xray may be needed
10. Administer analgesia as needed and as ordered for abdominal or wound pain

Note: For increasing or unresolved abdominal or wound pain, notify renal team and PD nurses. Urgent review and abdominal xray may be needed

11. Monitor and record bowel movement
    Note: Notify renal team if patient is constipated (no bowel motion for >1 day). Administer laxative as needed and as ordered
12. Manage or resolve poor flowing or blocked PDC as per PDC: Management of Poor Flow/No Flow flowchart, SGH CLIN380 Intraperitoneal Heparin Administration and/or SGH CLIN379 Intraperitoneal Actilyse (Alteplase) Administration
13. Educate patient not to shower for 3 weeks with weekly PDC exit site dressing change as per SGH CLIN Peritoneal Dialysis Catheter – Post Insertion Catheter Care, Dressing And Management
14. Always immobilise tip of new PDC with tape
15. For patients requiring urgent dialysis immediately after insertion, commence PD and manage patient as per Renal SGH WPI PDC – Break-In Management For Patients Requiring Urgent PD with Newly Inserted PDC and as per Renal SGH WPI PD – Management Of Patients Requiring Intermittent Peritoneal Dialysis
16. For patients not requiring urgent dialysis: manage patient as per SGH CLIN 345 Peritoneal Dialysis – Inpatient Management and rest new PDC for 3 weeks with weekly PDC flushes as per Renal SGH WPI 053 Peritoneal Dialysis – 1 Litre Flush On A Peritoneal Dialysis Catheter or Renal SGH WPI PDC – Simple/Small Flush On A Peritoneal Dialysis
17. For discharge planning:
    a. Heparin lock new PDC as per SGH CLIN364 Peritoneal Dialysis Catheter – Heparin Lock
    b. Renal team and PD nurse review prior to discharge home
18. PD team to provide outpatient follow-up and schedule PD training as per Renal SGH WPI PD – Commencement And Management Of PD Patients at Home

5. Keywords	Peritoneal Dialysis, Catheter, Percutaneous insertion, Seldinger technique
6. Functional Group	Renal, Peritoneal Dialysis
7. External References	Boujelbane, L., Fu, N., Chapla, K., Melnick, D., Redfield, R. R., Waheed, S., . . . Chan, M. R. (2015). Percutaneous versus surgical insertion of PD catheters in dialysis patients: a meta-analysis. *J Vasc Access, 16*(6), 498-505. doi: 10.5301/jva.5000439 Figueiredo, A., Goh, B.-L., Jenkins, S., Johnson, D. W., Mactier, R., Ramalakshmi, S., . . . Wilkie, M. (2010). Clinical Practice Guidelines for Peritoneal Access. *Peritoneal Dialysis International*, 30(4), 424-429. doi: 10.3747/pdi.2010.00087 Hagen, S. M., Lafranca, J. A., JN, I. J., & Dor, F. J. (2014). A systematic review and meta-analysis of the influence of peritoneal dialysis catheter type on complication rate and catheter survival. *Kidney Int, 85*(4), 920-932. doi: 10.1038/ki.2013.365 Hagen, S. M., Lafranca, J. A., Steyerberg, E. W., JN, I. J., & Dor, F. J. (2013). Laparoscopic versus open peritoneal dialysis catheter insertion:

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8. Consumer Advisory Group (CAG) approval of patient information brochure (or related material)	N/A
9. Implementation and Evaluation Plan Including education, training, clinical notes audit, knowledge evaluation audit etc	Inservices Publication on SGSHHS CIBR intranet page
10. Knowledge Evaluation	Q1: What are the benefits of percutaneous PDC insertion under local anaesthesia? A: Small incisions, lower risk of bleeding, procedure can be carried out in a procedure room by a trained doctor, reduced fasting time, early mobilisation and reduced hospital stay Q2: What are the clinical preparation required prior to procedure? A: Blood tests, body and nasal swab for MCS, routine obs, bowel prep, IDC insertion, antiseptic shower, haemodialysis if required, peripheral IV cannulation for prophylactic antibiotics Q3: What are the prophylactic antibiotics before procedure? A: Administer 2 hours before procedure, IV Cephazolin 1 gm or IV Vancomycin 1g (for MRSA positive patients) and IV Gentamicin 160 mg
11. Who is Responsible	Director of St George and Sutherland Renal Service. Nursing Unit Manager, Dialysis Unit

Approval for PDC – Percutaneous Insertion Procedure under Local Anaesthesia (Seldinger Technique)	
***Specialty/Department Committee**	Committee title: Peritoneal Dialysis Committee Chairperson name/position: Franziska Pettit, Staff Specialist Signature Date
***Specialty/Department Committee**	Committee title Chairperson name/position Signature Date
***Nurse Manager**	Name/position Christine Day, Nurse Manager Medicine Signature Date
***Medical Head of Department**	Name /position: George Mangos, Department Head Renal Services Signature Date
***Drug and Therapeutics Committee (SGH)**	Chairperson's Name: A/Prof Winston Liauw Signature Date
Executive Sponsor	Name/Position Signature Date
Contributors to CIBR development e.g. CNC, Medical Officers (names and position title/specialty)	Ivor Katz, Staff Specialist Johneen Tierney, Director of Pharmacy

Revision and Approval History

Date	Revision number	Author (Position)	Revision due
January 2018	1	(Anna) Claire Cuesta (PD CNC)	January 2021

General Manager's Ratification		
Name	Signature	Date
Name	Signature	Date