

PERITONEAL DIALYSIS: CARE OF THE PAEDIATRIC PD PATIENT - SCH

PRACTICE GUIDELINE[®]

DOCUMENT SUMMARY/KEY POINTS

- Peritoneal dialysis (PD) can be used to treat both acute renal impairment and end stage kidney disease.
- Peritoneal dialysis is generally the preferred form of dialysis.
- Medical officer will prescribe the required dialysis regimen including any required additives on the peritoneal dialysis chart.
- Prior to attending peritoneal dialysis the RN should have completed the PD competency based learning and assessment package.
- The RN caring for the patient receiving PD requires yearly review of skills and knowledge.
- Patient and or parents / carers of chronic PD patients will be trained to attend dialysis. This training is to be documented in the continuation notes. If a parent / carer has been trained to attend dialysis at home they are able to perform their child's dialysis in the ward in consultation with the ward nursing and medical staff.
- This protocol details the procedures required for caring for the patient on peritoneal dialysis

Work Health & Safety

- Peritoneal fluid is a body substance and as such adherence to the relevant policies is mandatory

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

Approved by:	SCHN Policy Procedure and Guideline Committee	
Date Effective:	1 st October 2015	Review Period: 3 Years
Team Leader:	CNC Renal	Area/Dept: Nephrology SCG

CHANGE SUMMARY

- Document due for mandatory review.
- Replaces SCH document C.13.03 of similar name
- Change made:
 - New concentration cleansing solution as Chlorhexidine 2% no longer available.
 - Sample collection from manual dialysis changed to accommodate change in administration set.
 - Guide for addition of potassium to peritoneal dialysis fluid adjusted.
 - Guide for selection of peritoneal dialysis catheter adjusted.

READ ACKNOWLEDGEMENT

- All staff caring for patients with peritoneal dialysis must read and acknowledge this document..
- **Competency assessment required.** Nurses caring for peritoneal dialysis must complete:
 - [Peritoneal Dialysis Work Book](#)
 - And
 - [Care of the Paediatric Peritoneal Dialysis Patient Learning & Assessment plan](#)

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Overview

PD is the oldest form of dialysis. The patient's own peritoneal membrane is utilised as a semi permeable membrane allowing wastes, solutes and water to be removed through diffusion, osmosis and convection. A catheter inserted into the peritoneal cavity allows hypertonic dialysate to be instilled and exchange of wastes, solutes and water to occur. Wastes and solutes are removed passively through diffusion, particles move freely across the membrane until equilibrium has been achieved. Water is passively removed by osmosis. Dissolved solutes will also be 'dragged' along with the water as long as the solutes are small and permeable through the membrane. This is known as 'solute drag' ^(1,2).

PD is generally the preferred dialysis for children at SCH, R with end stage renal disease as it offers several advantages when compared to haemodialysis ^(1,2,4). Of particular importance, PD allows improved growth, more stable blood chemistry and minimal dietary restrictions for the paediatric patient. Furthermore, given the direct relationship between peritoneal membrane surface area and body surface area, children can achieve superior transfer of solutes and water ⁽¹⁾. Predominately performed at home, PD can offer increased flexibility for the child and family helping them to lead a relatively normal life ^(1,4).

Aim of Peritoneal Dialysis

The purpose of PD is to augment the patient's own renal function in a safe and effective manner. This can be a short or long term requirement for that patient ^(1,2). The goal of PD is to obtain the best possible patient condition.

Indications for Peritoneal Dialysis

Indications for PD in the paediatric patient include ^(1,2,3,4)

1. Acute Renal Failure:

- Electrolyte disturbances, eg: hyperkalemia; hyponatremia; acidosis.
- Fluid overload.
- Poisoning.
- Haemolytic uraemic syndrome

2. Chronic Renal Failure ^(1,2):

- Congenital abnormalities of the renal tract, e.g.: vesicoureteric reflux with renal scarring; obstructive lesions such as posterior urethral valves.
- Glomerulonephritis.
- Hereditary disease, e.g.: nephronophthisis, cystinosis, and polycystic kidney disease.
- Malignancy, e.g.: bilateral Wilm's tumour

Types of Peritoneal Dialysis

Automated Peritoneal Dialysis (APD):

- Exchanges are performed automatically by a cycling machine ⁽¹⁾.

Continuous Peritoneal Dialysis:

- Frequent cycles attended continuously, either manual or automated. Usually attended for the care of a newly placed Tenckhoff catheter, for increased fluid removal or the treatment of peritonitis. Also may be utilised as a treatment for acute renal failure.

Continuous Ambulatory Peritoneal Dialysis (CAPD):

- Usually 3 - 5 exchanges are attended manually each day. Constant contact of the dialysis solution and the peritoneum gives improved exchange of wastes, resulting in steady biochemistry levels, thereby decreasing some of the dietary restrictions ⁽¹⁾.

Intermittent Peritoneal Dialysis (IPD):

- Series of frequent exchanges of dialysis solution, either manual or automated. Usual requirement for adequate dialysis is hourly cycles for 20 - 24 hours, two times a week. The peritoneum is left dry between treatments.

Continuous Cyclic Peritoneal Dialysis (CCPD):

- The most commonly used form of PD for long term paediatric renal patients. At night, while the patient sleeps, an automated cycling machine performs 4 or more exchanges. The patient is left with a day time dwell; leaving the peritoneum in continual contact with the dialysis solution, resulting in steady biochemistry levels, thereby decreasing some of the dietary restrictions ⁽¹⁾.

Nightly Peritoneal Dialysis:

- At night, while the patient sleeps, an automated cycling machine performs 4 or more exchanges. The peritoneum is left dry in between dialysis treatments ⁽¹⁾.

Tidal Peritoneal Dialysis:

- A form of APD, where only some of the dialysis solution is exchanged with fresh solution each exchange. This fresh gradient ensures that the dialysis solution never becomes equilibrated with the blood, thus promoting increased clearances of creatinine and urea. Full drains are usually attended for the initial drain and the final exchange, however can be attended more frequently if required. Modified Tidal PD may also be utilized for patients with significant drain pain ⁽¹⁾.

High dose CCPD:

- One or more exchanges are attended during the day or afternoon, before the usual CCPD treatment ⁽⁵⁾.

High dose Tidal Peritoneal Dialysis:

- One or more exchanges are attended during the day or afternoon before the usual night time tidal therapy. Any daytime exchanges are standard exchanges not tidal exchanges – i.e.: full drains are attended at the end of each exchange ⁽⁵⁾.

Types of Peritoneal Dialysis Catheters

Peritoneal dialysis catheters are made of silicone rubber with the presence of one or two Dacron cuffs for tissue ingrowth. There are many forms of this catheter for example the *straight Tenckhoff*, *curled Tenckhoff* and the *swan neck* or *bent Tenckhoff*. These catheters are surgically implanted ^(1,2,3,6).

The size of the catheter used is dependent on the size of the child ^(3,7) and preference of the surgeon. As a guide the following may be used:

- Neonatal straight 2 cuff-less than 10kg
- Paediatric straight 2 cuff-10 to 30 kg
- Paediatric coil 2 cuff-10 to 30 kg
- Paediatric swan neck curl 2 cuff-10 to 30 kg
- Adult (42cm) straight 2 cuff-more than 30kg
- Adult swan neck curl 2 cuff-more than 30kg

Standard

1. Medical officer will prescribe the required dialysis regimen including any required additives on the peritoneal dialysis chart.
2. Prior to attending peritoneal dialysis the RN should have completed the PD competency based learning and assessment package.
3. The RN caring for the patient receiving PD requires yearly review of skills and knowledge.
4. Patient and or parents / carers of chronic PD patients will be trained to attend dialysis. This training is to be documented in the continuation notes. If a parent / carer has been trained to attend dialysis at home they are able to perform their child's dialysis in the ward in consultation with the ward nursing and medical staff.

Observations

Blood pressure, pulse and weight should be monitored when the patient's peritoneum is empty of dialysis fluid. If blood pressure readings are taken when the patient is "full", the reading may be falsely elevated. If it is not possible to attend observations when the patient is "empty", the observations should be clearly charted as being measured when the peritoneum is "full".

Weight should be attended when the peritoneum is empty. If it is not possible to attend the weight when the patient is "empty" the weight should be clearly charted as being attended when the peritoneum is "full" along with the volume of fluid indwelling. Do not subtract the indwelling fluid volume from the patient's weight. Weight should be attended at approximately the same time each day, usually before breakfast, the patient should always have on a similar type of clothing, no jumpers, dressing gowns or shoes. Depending on the individual patient situation, weight may be requested more frequently, and at specific times. CCPD patients should have their weight attended at commencement and completion of the dialysis session.

CICU Note: Where possible all dialysis patients in CICU should be weighed daily, or as requested, as condition allows.

Concept of Dry Weight

The concept of dry weight is important for all dialysis therapy. Normally any change in a patient's day to day weight is due to a change in their fluid status. The patient is said to be at their dry weight when they are at their heaviest weight possible without showing signs of fluid overload^(1,2), e.g.: increased blood pressure, elevated jugular venous pressure (JVP), oedema, etc.

Parameters used for assessing dry weight.

- Lying and standing blood pressure and pulse rate.
Note: If the patient is on antihypertensives, these readings could be deceptive
- JVP - an elevated JVP, when the patient is resting at 45° angle, indicates fluid overload
Note: The JVP may be difficult to assess in children
- Oedema - sacral, peripheral and/or periorbital oedema indicate fluid overload, however may also be as a result of hypoalbuminemia
- Chest auscultation
- Chest X-ray to determine presence or absence of pulmonary oedema or cardiomegaly
- Mucous membranes and skin turgor
- Patient well being

Documentation of Dialysis

The dialysis prescription is ordered by the medical staff on the appropriate dialysis form, either manual or automated. Ultrafiltrate volume is recorded for each cycle when attending manual dialysis, or at the completion of therapy when attending automated dialysis; these values are recorded on the appropriate dialysis chart. In rare circumstances the medical staff may request that ultrafiltrate volumes from automated dialysis are recorded more frequently; these should be recorded on the fluid balance chart, as well as on the dialysis chart at the completion of the dialysis session.

Insertion of Peritoneal Dialysis Catheter

Pre-operative preparation

Equipment

- P.D. catheter: dependent on the size of the patient. Discuss catheter choice with surgeon.
- Complete titanium connector - (chronic dialysis patients only)
- Extension line
- FreeLine Solo 1.5% Dianeal x 2000 mL
- Fluid warmer bag
- Hanging fish scales
- Minicap x 1
- Clamps x 2

Note: All items are available on C1South.

Peri-operative care

- In theatre the peritoneal dialysis catheter is checked for patency using a volume of 10 mL / kg, or as directed by the individual surgeon.^(1,2,8) Some fluid may be left indwelling at the discretion of the surgeon/anaesthetist.

Post-operative care

- The surgical wound dressing is to be left intact for 48 hours, unless there is excessive ooze that necessitates a dressing change. Dressing changes should be attended using a modified sterile procedure to minimise the chances of external contamination.
- Exit site dressing must be left intact for seven days unless there is obvious signs of bleeding, leakage or infection^(1,2,3,4). If this occurs, change dressing as per new catheter exit site care. The catheter should be securely taped to the patient's abdomen⁽⁸⁾, approximately 2 to 5 cm from the exit site, to promote healing of the exit site and tunnel. Once the exit site is well healed, gauze is not necessary unless preferred by the patient, however the catheter must be secured to the skin at all times^(1,6).
- Please see exit site care regarding the specific care of the new and established peritoneal dialysis catheter exit site.

Commencing PD with New Catheter

Optimally the catheter should be flushed (frequent cycles until clear), then heparin locked and capped and left without use for a few days to permit good tissue healing^(3,8). If it is not possible to delay dialysis and the PD catheter must be used, cycling should be frequent with small volumes, undertaken in the supine position^(1,3,4,7,8). As a general rule commence at exchange volumes of 5 to 10 mL / kg and gradually increase over 7 to 10 days to a volume of 30 to 40 mL / kg. Always commence with manual cycles prior to starting automated dialysis. CAPD and CCPD with a large day-time dwell volume are generally not commenced within the first two weeks and should not commence if there are any fill or drain problems^(3,7,8,9).

Choosing Appropriate Dialysis Fluid

The dialysis prescription including cycle volume, cycling instructions, dialysis fluid type and strength is to be ordered by the medical staff on the appropriate dialysis form (manual or automated).

A guide for choosing Dianeal solution:

1. Hypovolemia: Use 1.5% Dianeal. Additional fluid input may be required
2. Normovolemia: Use either 1.5% or 2.5% Dianeal
3. Hypervolemia: Use 2.5% or 4.25% Dianeal

Some patients on CCPD may require a combination of strengths of Dianeal to achieve their required fluid removal. CCPD final dwell solution may be a different type of dialysis fluid. This is most commonly 7.5% icodextrin. If icodextrin is used, blood sugar measurements, if indicated, must be done with a glucose specific method to avoid interference by maltose, a metabolite of icodextrin.

Approximate fluid removal (based on one-Litre exchanges):

- Dianeal 1.5%: 100 to 200 mL
- Dianeal 2.5%: 200 to 300 mL
- Dianeal 4.25%: 300 to 400 mL

These figures represent a guide only. The ultrafiltration characteristics of the peritoneum vary greatly between individuals. When using either smaller or larger volumes, the fluid removal will be proportional.

Patients who are on IPD or those having hourly, or second hourly exchanges may have obligatory fluid loss, which may lead to hypovolemia.

Infants tend to absorb more glucose through the peritoneal membrane, resulting in the need for higher concentration of Dianeal ⁽¹⁾.

Notes:

- i. 4.25% Dianeal should always be used with caution as it is thought to be associated with many short and long term complications ⁽¹⁾. Fluid removal should be gradual, either the number of exchanges, or the hours on dialysis should be increased, rather than continual use of hypertonic solutions. Rapid fluid removal may cause depletion of the intravascular volume, hypotension, rebound hypertension, and tachycardia.
- ii. Overuse of hypertonic solutions in the short term may result in hyperglycaemia and thirst. Continual use of hypertonic solutions is thought to contribute to sclerosis of the peritoneal membrane, resulting in loss of ultrafiltrate ability⁽¹⁾.

Peritoneal Dialysis and Potassium

Patients on IPD or those having hourly or second hourly exchanges will lose significant amounts of potassium into the PD fluid.

PD fluid for these patients may need added potassium. If this is the case, potassium is ordered by the medical staff and added to dialysis bags by the nursing staff (see addition of medications). As a general rule the following may be followed.

If plasma potassium is:

- less than 3 mmol/Litre usually use 5 mmol/Litre potassium chloride (Potassium chloride) into PD fluid
- 3 to 3.5 mmol/Litre usually use 4 mmol/Litre Potassium chloride into PD fluid
- stable at 3.5 to 4.5 mmol/Litre usually use 3 mmol/Litre Potassium chloride into PD fluid
- > 4.5 do not add Potassium chloride and recheck in 12 hours

Notes:

- i. Potassium chloride must be ordered by the medical staff on the dialysis chart
- ii. Serum potassium level must be checked daily, or as indicated by the individual patient circumstances when Potassium chloride is being added to dialysis fluid

Addition of Medications to Peritoneal Dialysis Fluid

Indications:

- Addition of electrolytes to treat electrolyte abnormalities
- Addition of heparin to treat / prevent fibrin blockage
- Addition of antibiotics to treat peritonitis / line contamination

Procedure Elements:

Basic steps to be followed for all peritoneal dialysis management and associated procedures

1. Gather equipment and prepare area
2. Basic hand hygiene
3. Open equipment onto the clean field
4. Aseptic procedural hand hygiene
5. Undertake relevant procedure
6. Dispose of equipment
7. Basic hand hygiene
8. Document procedure.

Equipment required:

- Syringes
- Blunt fill needles 18G
- Needle free valve port
- Medications as required
- 2% chlorhexidine gluconate in 70% alcohol swabs
- Dialysis fluid of prescribed strength and volume

Procedure:

1. Basic procedure as outlined above
2. Connect 18G blunt fill needle to needle free valve port
3. Swab bung of dialysis bag with 2% chlorhexidine gluconate in 70% alcohol swab and leave to dry
4. Inject 18G blunt fill needle with needle free valve port attached into dialysis bag
5. Inject medications, repeat as appropriate
6. Remove blunt needle
7. Check bags for leaks

Manual Peritoneal Dialysis

Indications:

Manual PD is most commonly used for treating acute renal failure, it is also used for chronic dialysis where early dialysis is required or when the patients are too small to use the automated cyclers.

Principles:

The manual set is in the design of a "Y". The inflow path has a blood warmer coil and measuring burette. The outflow path has a measuring burette and waste bag. The flow of the fluid is controlled by the clamps on the set.

The dialysate requires heating during the inflow phase which is achieved using an electronic temperature controlled heater, and requires an additional warmer extension set to the inflow fluid pathway. Cycles usually commence at hourly intervals, with 5-10 mL/Kg of dialysate per cycle.

CICU Note: Some patients in CICU may not need the dialysate warmed; this should be documented.

When performing manual peritoneal dialysis the dialysis fluid is infused under gravity (clamp fully opened), drainage also occurs via gravity (clamp fully opened). The drain phase should be continued until the line cools and no further effluent is drained.

Equipment required:

- Paediatric administration set, drain bag and blood warmer extension set
- Multi prong adapter if required
- Electric temperature controlled blood warmer
- Dialysis prescription
- Dialysis fluid, of prescribed strength & volume
- Non-sterile gloves
- Required additives

Note: When using the "Paediatric administration set" dialysis fluid bags do not require pre-heating, as a blood warmer is added into the circuit.

Procedure:

1. Basic procedure as outlined above
2. Open dialysis fluid bags one at a time and check for⁽⁵⁾:
 - i. expiry date
 - ii. strength of fluid
 - iii. clarity of fluid
 - iv. the coloured ring tab is in place
 - v. squeeze the bag to check for leaks
3. Discard any bags which may be suspect
4. Do not handle dialysis fluid bag near port

5. Draw up and add any prescribed additives to bags
6. Open administration set and connect blood warmer extension set to the inflow chamber and multi prong extension to blood warmer set if required, connect drain bag to drain burette.
7. Close all clamps on administration set
8. Remove ring pull and connect bag/s
9. Using a non-touch technique; prime complete administration set; ensuring all air is out of the lines
10. Place blood warmer extension set around electric blood warmer
11. Connect patient as per connection procedure
12. Always drain patient's peritoneum before filling
13. Commence inflow
14. Document each cycle on manual PD chart

Note: Ultrafiltration must be calculated at midnight and included on the patient's fluid balance chart.

Estimated times required for hourly manual peritoneal dialysis cycles

- Infusion time 5-10 minutes
- Dwell time 30-45 minutes
- Drain time 10-20 minutes
- Total cycle time 60 minutes

If CICU medical staff request a set volume to be drained each cycle this should be documented in the dialysis order.

Required observations:

- Weigh patient when empty at approximately 0800 and 1600 each day to allow adjustment of the dialysis regime if required.
- Weight is attended when the peritoneum is empty. If it is not possible to record weight when the patient is "empty" the weight should be clearly charted as being attended when the peritoneum is "full" along with the volume of fluid indwelling. Do not subtract the volume of indwelling fluid from the patient's weight. The patient should always have on a similar type of clothing, no jumpers, dressing gowns, or shoes. Depending on the individual patient situation, weight may be requested more frequently, or at specific times.
- Where possible acutely ill patients in CICU should be weighed daily (or as required) as their condition allows.
- Patients on the ward should have blood pressure, pulse, respiration rate and temperature recorded every 4 hours (unless otherwise clinically indicated) when the patient's peritoneal cavity is empty. CICU patients should have observations attended as per CICU &/or treating nephrologist.

- If it is not possible to record observations when the patient is "empty", the observations should be clearly charted as being measured when the peritoneum is "full."
- The renal team must order the duration of the dialysis treatment. In CICU orders as per the CICU team or treating nephrologist.
- Used dialysate is classified as a body fluid and as such must be disposed of using universal precautions as documented in the [Infection Control policy](#).

Changing Dialysis Fluid Bags for Manual Dialysis

Equipment required:

- Dialysis fluid, of appropriate strength & volume – do not warm
- Outlet port clamps
- 2% chlorhexidine gluconate in 70% alcohol swab

Procedure:

1. Basic procedure as outlined above
2. Ensure that all lines are clamped
3. Open dialysis fluid bags one at a time and check for:
 - i. expiry date
 - ii. strength of fluid
 - iii. clarity of fluid
 - iv. the coloured ring tab is in place
 - v. squeeze the bag to check for leaks
4. Discard any bags which may be suspect
5. Do not handle dialysis fluid bag near port
6. Draw up and add any prescribed additives to bags using aseptic technique
7. Clamp old bags using blue clamps
8. Using aseptic technique, disconnect old dialysis fluid bag using 2% chlorhexidine gluconate in 70% alcohol swab, and connect new dialysis fluid bag
9. Continue dialysis
10. Document bag change on Manual PD chart and in patient records

Continuous Ambulatory Peritoneal Dialysis - CAPD.

Twin bag (e.g.: Free line solo) Procedure

Equipment required:

- Twin bag set of appropriate strength
- Minicap
- Hanging fish scales
- Clamps
- Fluid bag warmer

Procedure:

1. Basic procedure as outlined above
2. Place in bag warmer to warm⁽¹⁾
3. Open twin bag set and check for⁽⁵⁾:
 - i. expiry date
 - ii. strength of fluid
 - iii. clarity of fluid
 - iv. the coloured ring tab is in place
 - v. squeeze the bag to check for leaks
4. Discard any bags which may be suspect
5. Uncoil lines and peel drain bag away from full bag
6. Draw up and add any prescribed additives to bags
7. Connect to patient as per connection procedure
8. Place drain bag on the floor, clear window facing up
9. Open twist clamp on patient extension line and blue clamp on drain line and drain out. When drainage is complete; close patient extension line twist clamp
10. Check drained-out fluid for cloudiness, and fibrin
11. Weigh drainage bag
12. Break green frangible on full bag line
13. Run fluid from the dialysis bag into the drain bag – follow the air bubble in to the drain bag. Count to 10 slowly to ensure no air in the line. Close blue clamp on drain line
14. If less than the bag volume to be infused, drain excess fluid into the drain bag at this stage using hanging fish scales
15. Infuse prescribed amount of dialysis fluid by opening patient extension line twist clamp
16. When infusion is complete, close extension line twist clamp
17. Disconnect patient as per disconnection procedure

Connection of Any Giving Set

(To peritoneal dialysis catheter with patient extension line.)

Indications:

To connect administration set to PD catheter patient extension line for commencement of dialysis or when attending line change and continuing dialysis.

Collect equipment:

- Appropriate administration set
- Non-sterile gloves
- Equipment for exit site dressing - if required
- Minicap - if attending to line change

Note: If attending a line change the connection needs to be soaked in Povidone Iodine. To achieve this disconnect line and apply Minicap and allow 10 minutes before the connection to the new set of lines.

Procedure:

1. Basic procedure as outlined above
2. Ensure that clamps on patient line of the administration set and patient's extension line are closed
3. If attending to line change
 - i. Aseptic hand hygiene
 - ii. Open minicap package
 - iii. Aseptic hand hygiene (Alcohol rub)
 - iv. Don non-sterile gloves
 - v. Attach Minicap, leave for 10 minutes prior to attending line change.
4. Aseptic hand hygiene
5. Don non-sterile gloves
6. Remove ring pull or cap from giving set
7. Remove minicap from patient extension line and keep hold of extension line do not touch end
8. Connect patient extension line to new administration set using a non-touch technique
9. Ensure firm and secure connection
10. Attend exit site dressing - if required
11. Ensure catheter is immobilised onto abdomen, tape should be placed 2 - 5 cm away from the exit site.
12. Commence dialysis as per prescription, always starting with a drain..
13. Attend and record observations – temperature, blood pressure, pulse, respirations and weight (attend observations when empty peritoneum).
14. Complete appropriate documentation

Note: All manual dialysis lines must be changed every 72 hours.

Disconnection of Any Giving Set

(From peritoneal dialysis catheter with patient extension line.)

Indications:

To disconnect administration set from PD catheter patient extension line at the completion of dialysis.

- Check with the renal / CICU team if the patient is to have their peritoneum empty or full.
- The patient must have their weight and observations taken, while "empty", prior to disconnection. If the patient is over their "dry" weight, further dialysis may be necessary, please check with appropriate team prior to disconnection. Document in continuation notes.

Equipment required:

- Minicap / Opticap if reusing lines
- Tape
- Non-sterile gloves
- Equipment for Heparin lock - if required
- Equipment for exit site dressing - if required

Procedure:

1. Record observations including weight
2. Complete dialysis chart
3. Basic procedure as outlined above
4. Ensure that all clamps on giving set and patient line are closed
5. Aseptic hand hygiene
6. Prepare Heparin / Saline lock if required, see procedure
7. Open mini cap / opticap package
8. Aseptic hand hygiene (Alcohol rub)
9. Don non sterile gloves
10. Disconnect administration set from extension line
11. Keep hold of extension line do not touch end
12. Instil Heparin / Saline lock if required, see procedure
13. Take minicap in other hand and connect to extension line using non touch technique
14. Ensure firm and secure connection
15. If disconnecting patient from manual set with lines that may be used for 72 hours or HomeChoice Hi Dose prescription, connect opticap to giving set so that line may be reused
16. Attend exit site dressing - if required
17. Ensure catheter is immobilised onto abdomen; Tape should be placed 2 to 5 cm away from the exit site

Continuous Cyclic Peritoneal Dialysis - CCPD.

Within Sydney Children's Hospital, Randwick the Baxter HomeChoice is the machine used for automated CCPD. This is also the machine used for home dialysis.

Please refer to the operator's manual regarding setting up and programming of HomeChoice machine. Available in Education Office C1South.

Do not apply alcohol, hydrogen peroxide or antiseptic containing alcohol to the disposable set⁽⁵⁾

Note: Dialysis fluid does not require pre- heating, as the HomeChoice machine has a heating element⁽⁵⁾.

Equipment required:

- HomeChoice administration set
- Drain line / drain bag
- Dialysis fluid, of appropriate strength & volume – do not warm
- Opticap if setting up early

Procedure:

1. Basic procedure as outlined above
2. Open dialysis fluid bags one at a time and check for⁽⁵⁾:
 - i. expiry date
 - ii. strength of fluid
 - iii. clarity of fluid
 - iv. the coloured ring tab is in place
 - v. squeeze the bag to check for leaks
3. Discard any bags which may be suspect
4. Do not handle dialysis fluid bag near port
5. Draw up and add any prescribed additives to bags
6. Program HomeChoice machine as per prescription
7. Set up HomeChoice machine as per user guide
8. Connect to patient as per connection procedure

If you are not connecting to the patient immediately you need to use the large cap of the opticap to cover the patient connector:

1. Ensure that the patient line has been primed. Re-prime if not fully primed
2. Clamp HomeChoice patient line
3. Aseptic hand hygiene
4. Open opticap packet
5. Aseptic hand hygiene (Alcohol rub)
6. Disconnect large cap (opticap) from blue connector and small cap
7. Connect opticap to HomeChoice patient line

Note: Ensure initial drain and ultrafiltration are documented on the peritoneal dialysis prescription at the completion on dialysis.

Alarm Trouble Shooting For Homechoice Machine

During therapy the HomeChoice continually checks to see if the programmed therapy is proceeding without any problems. It also checks to see if the internal system is working properly⁽⁵⁾.

Whenever the HomeChoice finds a problem, it will⁽⁵⁾:

1. Sound an alarm
2. Display the type of alarm
3. Record the alarm

Note: Please refer to the operator's manual regarding alarm trouble shooting.

Changing Dialysis Fluid Bags Automated PD Machine

Do not apply alcohol, hydrogen peroxide or antiseptic containing alcohol to the disposable set⁽⁵⁾.

When the dialysis prescription requires more than four bags of dialysis fluid a multi prong adapter can be used, or alternatively only change the supply bags, but do not change the heater bag. However, if dialysis prescription changes to a different fluid concentration, all bags will need to be changed.

Collect equipment:

- Dialysis fluid of appropriate strength and volume – do not pre warm

Procedure:

1. Basic procedure as outlined above
2. Open dialysis fluid bag and check for⁽⁵⁾:
 - i. expiry date
 - ii. strength of fluid
 - iii. clarity of fluid
 - iv. the coloured ring tab is in place
 - v. squeeze the bag to check for leaks
3. Discard any bags which may be suspect
4. Do not handle bag near ports
5. Draw up and add any prescribed additives to bags
6. Lay new bags out on top of machine
7. Dialysis machine to standby mode, by pressing 'STOP' button
8. Ensure all line clamps are closed
9. Aseptic hand hygiene
10. Change supply bags (one at a time) using a non touch technique
11. Once all bags have been changed, ensure there is no air in the lines

12. Open all clamps, on lines being used

13. Restart machine by pressing 'GO' button

Note: Do not change an empty heater bag, the HomeChoice machine will automatically refill the empty heater bag from the new supply bags. Only change the heater bag if you are changing the strength of Dianeal.

Problem Solving

Ensure that appropriate hand hygiene is performed prior to any connection or disconnection of the peritoneal dialysis system.

Appropriate Personal Protective Equipment (PPE) must be used in situations where there is potential exposure to blood / body fluids.

Problem	Action
<p>POOR OUTFLOW</p> <p>Dialysis fluid is running out slowly, or not running out at all.</p> <p>Note: <i>Heparin must be ordered by the medical staff.</i></p>	<ul style="list-style-type: none"> • Check that all clamps are open⁽⁵⁾. • Check tubing and catheter for kinks^(1,5). • Reposition patient⁽¹⁾. • "Twist" tubing⁽²⁾. • Check for fibrin⁽¹⁾. • If not resolved contact the renal team. • Try to flush the catheter using Heparin 1000 units in 10mL normal saline^(1,2). • If fibrin present send a specimen for M/C/S. • Add heparin to subsequent bags if blockage due to fibrin^(1,2). • Check for constipation^(1,2).
<p>POOR INFLOW</p> <p>Dialysis fluid will not run in.</p> <p>Note: <i>Heparin must be ordered by the medical staff.</i></p>	<p>Check that the plastic frangibles are broken and that all clamps are open⁽⁵⁾.</p> <p>Check tubing and catheter for kinks^(1,5).</p> <p>Reposition the patient⁽¹⁾.</p> <p>"Twist" tubing⁽²⁾.</p> <p>Squeeze the bag.</p> <p>If not resolved contact the renal team.</p> <p>Try to flush the catheter using Heparin 1000 units in 10mL normal saline⁽²⁾.</p> <p>If fibrin present send a specimen for MC&S.</p> <p>Add heparin to subsequent bags if blockage due to fibrin^(1,2).</p> <p>Check for constipation^(1,2).</p>
<p>CONTAMINATION of the PATIENT EXTENSION LINE</p> <p>(where the cap is placed) During</p>	<p>If the clamp on the patient extension line is closed, attach a new cap and leave insitu for 10 minutes, replace cap and leave for a further 10 minutes, then</p>

<p>the connection / disconnection of the administration set the patient extension line is dropped, or touches a foreign surface.</p> <p>Note: <i>The clamp on the extension line should always be closed during the connection and disconnection of any administration set. If the clamp is open, potential contamination has occurred⁽⁶⁾.</i></p>	<p>attend dialysis set up and connection procedure.</p> <p>If the clamp on the patient extension line is open a line change may need to be attended and intraperitoneal antibiotic cover may be necessary. Contact the renal team for instructions⁽⁶⁾.</p>
<p>CONTAMINATION of ADMINISTRATION SET.</p> <p>During connection the administration set has touched a foreign surface.</p>	<p>Discard set and bags and recommence with a new set and bags. Ensure that a cap is insitu on the patient extension line</p>
<p>SYSTEM DISCONNECTION.</p> <p>Patient extension line or titanium connector has become disconnected.</p>	<p>Place gauze around catheter and clamp the catheter⁽³⁾. Wrap Povidone Iodine swabs and plastic wrap around end of the catheter⁽³⁾.</p> <p>A line change must be performed ASAP. If titanium connector has been dislodged, a new connector must be applied⁽³⁾ (see procedure).</p> <p>Intraperitoneal antibiotics will be required^(3,6).</p> <p>Contact the renal team for instructions.</p>
<p>CONTAMINATION of PERITONEAL DIALYSIS FLUID.</p> <p>Dialysis fluid bag is cloudy, leaking, expired, outer pouch is open, bung or protector ring is missing.</p> <p>Note:</p> <p><i>If the patient extension line clamp is open, ie. dialysis fluid can run in and out of the catheter, potential contamination has occurred.</i></p>	<p>If you have not yet opened the patient extension line clamp, disconnect and discard lines and bags, apply new cap and leave insitu for 10 minutes, replace with another cap and leave a further 10 minutes prior to attending set up and connection procedure.</p> <p>If infusion of dialysis fluid has commenced drain out any fluid that has been infused this will need to be sent for culture (see below 'Collection of Peritoneal Dialysis Fluid Specimens').</p> <p>Close the patient extension line clamp, disconnect set from the extension line and attach a cap.</p> <p>Intraperitoneal antibiotics will be required^(3,6).</p> <p>Contact the renal team for instructions.</p>

<p>HOLE in CATHETER or EXTENSION LINE.</p> <p>You notice fluid leaking out of the catheter or extension line.</p>	<p>Place gauze around catheter and clamp the catheter prior to the hole⁽³⁾.</p> <p>Wrap Povidone Iodine swabs and plastic wrap around catheter/extension line at the site of the hole⁽³⁾.</p> <p>A line change will need to be performed if the hole is in the extension line ⁽³⁾ (see procedure).</p> <p>The catheter will need to be trimmed and the titanium connector and extension line changed if the hole is in the catheter (see procedure).</p> <p>Intraperitoneal antibiotics will be required^(3,6).</p> <p>Contact the renal team for instructions</p>
<p>VOMITING AND DIARRHOEA.</p> <p>This may or may not be associated with peritonitis.</p>	<p>If vomiting and diarrhoea occurs a peritoneal dialysis specimen should be collected.</p> <p>If vomiting and diarrhoea are present the dialysis regimen may need to be altered to accommodate the increased fluid losses.</p> <p>Contact the renal team for instructions</p>
<p>BLOOD IN DIALYSATE.</p> <p>Dark, or red discolouration of the fluid. (May be associated with menstruation in females.)</p>	<p>Contact the renal team.</p> <p>This occurs only occasionally and usually resolves over a few exchanges.</p> <p>Observe for any increase in severity.</p>
<p>CONSTIPATION.</p> <p>This commonly occurs in patients on PD.</p>	<p>Contact the renal team.</p> <p>Review diet, modification may be required.</p> <p>Aperient may be required⁽¹⁾.</p>

Fibrin

Fibrin is a naturally occurring protein which may be noted in the used dialysate. The reason fibrin occurs is not known, however it does not necessarily indicate problems.

Fibrin usually looks like strands or clumps of white or yellowish "cotton wool". It may clump in the drainage bag giving the appearance of a "jelly fish". The rest of the dialysate will appear clear.

Some patients will develop more fibrin than others, and may sometimes result in a blockage of the catheter or dialysis tubing. If a blockage has occurred, it can usually be moved by milking the lines. If continual blocking occurs, Heparin may need to be added to the dialysis fluid. Fibrin occurs commonly in peritonitis ^(1,2,6).

Dose: Usual dose of heparin is 500 units / Litre ^(1,6)

- Notes:**
- i. Heparin must be ordered by the Medical Staff
 - ii. Infection should be excluded.

Peritoneal Dialysis Catheter Exit Site Care

New Catheters

(first two weeks post catheter insertion)

Indications:

- Dressing should be attended weekly for the first two weeks^(6,7,8).
- To clean catheter exit site in the event of bleeding, leakage or infection

Collect equipment:

- Pkt. gauze squares,
- Aqueous 0.5% chlorhexidine acetate,
- Transparent occlusive dressing.
- YU-KI Ban tape.

Procedure:

1. Basic procedure as outlined above
2. Remove old dressing
3. Inspect exit site for redness or any ooze
4. Examine catheter tunnel for redness or tenderness along tract
5. Aseptic hand hygiene
6. Clean with aqueous 0.5% chlorhexidine acetate starting at the catheter exit site and working outward in a circular motion extending to the outer edge of the dressing to be applied. Repeat this step until area is visibly clean using a fresh sterile swab each time. Allow skin to dry.
7. Cover with sterile gauze and transparent occlusive dressing^(6,8).
8. Retape catheter to immobilise it. Tape should be 2 - 5 cm from the exit site^(2,6,8).

Note: Sponge baths only. No shower until exit site is healed completely, approximately 4- 6 weeks^(3,6).

Subsequent Catheter Care

(from 2 weeks after catheter insertion)

Dressing technique broken into two categories:

1. Catheters between 2-6 weeks post insertion (also used for non-ambulant patients).
2. Established catheters greater than 6 weeks post insertion.

Indications:

- To clean catheter exit site daily⁽²⁾.
- To clean catheter exit site anytime exit site is wet or dirty

Catheters Between 2 - 6 Weeks Old

(Also use for non-ambulant patients)

Collect equipment:

- Pkt. gauze squares
- Aqueous 0.5% chlorhexidine acetate (for non-ambulant patients) ⁽⁶⁾.
- Mupirocin
- Cotton wool tip for Mupirocin
- YU-KI Ban tape

Procedure:

1. Basic procedure as outlined above
2. Inspect exit site for redness or any ooze
3. Examine catheter tunnel for redness or tenderness along tract
4. Clean with aqueous chlorhexidine acetate starting at the catheter exit site and working outward in a circular motion extending to the outer edge of the dressing to be applied. Repeat this step until area is visibly clean using a fresh sterile swab each time. Allow skin to dry.
5. Apply Mupirocin with cotton wool tip as prescribed^(6,10).
6. Cover with sterile gauze and secure with YU-KI Ban tape^(6,8).
7. Retape catheter to immobilise it. Tape should be 2 - 5 cm from the exit site^(2,6,8).

Catheters Older Than 6 Weeks:

(Procedure for ambulant patients with)

Collect equipment:

- Pkt. gauze squares
- Antibacterial soap (for ambulant patients able to shower)
- Mupirocin^(6,10).
- Cotton wool tip for Mupirocin
- YU-KI Ban tape.

Procedure:

1. Ensure patient has had shower and has washed around exit site using liquid antibacterial soap⁽⁸⁾.
2. Ensure patient has dried exit site after shower
3. Inspect exit site for redness or any ooze
4. Examine catheter tunnel for redness or tenderness along tract
5. Apply Mupirocin with cotton wool tip as prescribed^(6,10).
6. Apply new dressing and tape in position, if required⁽⁸⁾.
7. Retape catheter to immobilise it. Tape should be 2 - 5 cm from the exit site^(2,6,8).

Note: If the exit site or tunnel is red or oozing, take a swab for m/c/s; notify R.M.O. – who will organise a request form. After the swab is taken, redress the site twice daily with Mupirocin and gauze. Treatment may require changing when the swab results become available.

No baths allowed. Infants may have baths, only once the catheter site is healed, approximately 6 weeks, however the catheter and the catheter exit site must not be immersed in the water. If the minicap has been sitting in the bath water this will need to be changed – see contamination of the patient extension line.

- Catheter must be effectively immobilised at all times^(2,6,8).

Nasal Carriage of Staphylococcus Aureus

Staphylococcus aureus nasal carriage has been associated with an increased risk for Staphylococcus aureus exit site infections, tunnel infections and potentially catheter loss. The child and any family members attending peritoneal dialysis should have nasal swabs attended after the first documented episode of Staphylococcus aureus infection⁽⁶⁾. Eradication of nasal carriage should then be attempted using the “5 day plan” for decolonisation” as follows:

- Nasal mupirocin
 - Wash hands before use
 - 2% nasal mupirocin (Bactroban) is applied to each nostril, three times a day for 5 days
 - If on an antibiotic for MSSA or MRSA therapy, the “5 day decolonisation” should coincide with the last 5 days of antibiotic treatment
 - Place a small amount (size of match head) of ointment onto a clean cotton bud tip and massage gently around the inside of nostril. Do not insert too deeply.
 - Use a new cotton bud for each nostril
 - After applying the ointment, press finger against the nose next to the nostril opening and use a circular motion to spread the ointment within the nose
 - Wash hands after application
- Body wash
 - Suitable body washes are either 1% triclosan (PhisoHex) or a chlorhexidine-based wash like Microshield (2) TM which is a 2% chlorhexidine gluconate wash. If however the child has eczema, then Oilatum Plus should be used instead.
 - Apply the antiseptic body wash in the bath or shower daily for the same 5 days as nasal mupirocin
 - Take care to wash hair, under the arms, inguinal region and in any skin folds
 - Allow the antiseptic to remain on the skin for at least 5 minutes before washing off

Care of the Infected Peritoneal Dialysis Catheter Exit Site

The International Society of Peritoneal Dialysis (2005), defines an exit-site or tunnel infection as purulent drainage from the site, with or without erythema⁽¹¹⁾. Catheter sites older than 2 weeks must be assessed daily⁽⁶⁾ and scored against the following table ([appendix 1](#))⁽¹²⁾.

Treatment should continue for a minimum of 2 weeks, and at least 7 days following complete resolution of symptoms⁽⁶⁾. As a general rule the following antibiotics are used:

Topical:

Topical treatments may be used after approval from Infectious Diseases Consultant, or equivalent.

Oral:

- Flucloxacillin - first choice, (100 mg/kg/day in 4 divided doses – Maximum 2 gram/day), or

Note: Flucloxacillin should be given on an empty stomach.

- Cephalexin (100 mg/kg/day in 4 divided doses – Maximum 2 grams/day)
- Rifampicin Oral: 10 to 20 mg / kg / day (Max 600mg) in one or two divided doses with Sodium Fusidate Oral: Tablets: 10 – 15mg/Kg/dose (adult 500mg) three times a day. Round dose to part or whole tablet (tablets 250 mg).

Note: Rifampicin should never be given alone due to the risk of resistance developing. Approval from Infectious Diseases Consultant, or equivalent required.

If not already prescribed, oral Nilstat should be considered due to the risk of fungal overgrowth with prolonged antibiotic therapy⁽⁶⁾.

Systemic: Used if oral therapy not tolerated.

- IV flucloxacillin (100 mg/kg/day in 4 divided doses – Maximum 12 gram/day)
- IV cephalothin (100 mg/kg/day in 4 divided doses – Maximum 12 gram/day)

If not already prescribed, oral Nilstat should be considered due to the risk of fungal overgrowth with prolonged antibiotic therapy

Note: Initial antibiotic choice should be reviewed once culture results available.

Equivocal exit site

A site, which changes to resemble an equivocal exit site, may be an early indication of infection⁽¹²⁾.

Features of the equivocal exit site include:

- Liquid drainage in the sinus only
- Slight exuberant granulation tissue around the exit site and / or in the sinus
- Crust formation daily, or exudate visible on the dressing
- Redness with diameter <13 mm
- Sinus epithelium absent, or partly covering sinus

Treatment:

- Take swab for microscopy, culture and sensitivity (M/C/S) from exit site and send peritoneal dialysis fluid for M/C/S.
- Intensified local care, dressings to be attended twice daily^(6,8).

- Application of topical antibiotics⁽⁸⁾ after consultation with Infectious Diseases Team (Mupirocin, Gentamicin, or neomycin in combination), if there is excessive drainage, systemic antibiotics may be required.
- Monitor progress of exit site carefully.
- Continue antibiotic therapy for 7 days after the exit site achieves a healthy appearance⁽⁶⁾.

Acutely infected exit site

Features of an acutely inflamed or infected site include⁽¹²⁾:

- Pain
- Induration
- Redness > 13 mm
- Liquid drainage - external
- Crust formation
- Exuberant granulation tissue around the exit and / or in the sinus
- Duration < 4 weeks

Treatment:

- Take swab for microscopy, culture and sensitivity (M/C/S) from exit site and send peritoneal dialysis fluid for M/C/S.
- Intensified local care, increase frequency of dressings to twice daily. Aseptic dressing technique must be utilised for an infected site^(6,8).
- Infants should not have baths until exit site has a healthy appearance.
- Crust formation should be gently removed with hydrogen peroxide
- Exuberant granulation tissue may be cauterised with silver nitrate sticks. Care must be taken to ensure that surrounding normal epithelium is not harmed⁽⁶⁾.
- Systemic antibiotic therapy should be commenced prior to receipt of culture results. Initial antibiotic choice should be reviewed on receipt of cultures^(6,8).
- Topical therapy is generally not effective with purulent exit site infections, as the secretions tend to dilute or wash away the antibiotic
- Antibiotics should be continued for 7 days after the exit site achieves a healthy appearance⁽⁶⁾.

Chronic exit site infection

The features of the chronically infected exit site include⁽¹²⁾:

- Liquid drainage - external
- Crust and scab formation, crust is often difficult to remove
- Exuberant granulation tissue around the exit, and or in the sinus
- Duration of inflammation > 4 weeks
- Generally pain, induration and redness are absent; any inflammation around the exit site is < 13 mm.

Treatment:

- Take swab for microscopy, culture and sensitivity (M/C/S) from exit site and send peritoneal dialysis fluid for M/C/S.
- General treatment is similar to that of the acutely infected exit site
- An increased number of cauterisations will be required to eliminate exuberant granulation tissue⁽⁶⁾.
- Combinations of antibiotics⁽⁸⁾ may be useful to prevent the emergence of resistant bacteria after discussion with ID
- Repeat cultures will be necessary as bacterial flora and or antibiotic sensitivities may change over time
- Antibiotics should be continued for 7 days after the exit site achieves a healthy appearance.⁽⁶⁾
- If infection does not clear consider removal of PD catheter

Traumatised Exit Site

- In cases of severe trauma to the peritoneal dialysis catheter exit site, prophylactic antibiotics should be used, and the exit site monitored for any changes

Tunnel infections

- Generally established tunnel infections are an indication for removal of the peritoneal dialysis catheter. If conservative management is to be used, treatment is the same as for the chronically infected exit site^(6,8)

Flushing, Or Heparin Locking PD Catheter

Usual concentration is 1000 units heparin diluted to 10 mL with 0.9% sodium chloride.

Indications:

- Inflow and/or outflow problems during P.D.
- To remove fibrin from catheter
- To "lock" catheter if not being used for over 48 hours

Collect equipment:

- Sterile gauze
- 10 mL Luer lock syringe
- Blunt fill 18G needle
- 1 ampoule Heparin 1000 units per mL
- 10 mL 0.9% Sodium Chloride
- Minicap / minicap x 2
- Opticap if disconnecting lines and re-commencing therapy
- Non-sterile gloves

Procedure:

Use gauze squares to handle lines and tubing - this enables better torque and control over connection/disconnection

1. Basic procedure as outlined above
2. Ensure that catheter is clamped
3. Prepare flush or heparin lock
4. If disconnecting administration set
 - Aseptic hand hygiene
 - Open minicap package / opticap if re-commencing therapy
 - Aseptic hand hygiene (Alcohol rub)
 - Don non-sterile gloves
 - Attach minicap / opticap, leave for 10 minutes prior to attending line change.
5. Aseptic hand hygiene
6. Don non-sterile gloves
7. Remove minicap from patient line
8. Holding P.D. catheter without touching end connect syringe containing heparin or saline flush
9. Open twist clamp on patient line
10. Firmly push heparin solution or saline flush into P.D. catheter. Do not instil any air into catheter during procedure
11. Remove syringe from catheter
12. Connect new minicap or administration set
13. Commence/recommence dialysis procedure
14. Ensure that administration set has not been contaminated
15. Document results of flush or heparin lock into progress notes

Note: Heparin lock and saline flush must be ordered by the medical staff.

DO NOT draw back on syringe at ANY time during procedure

Titanium Connectors:

(Connection or disconnection to peritoneal dialysis catheter at)

Whenever handling the peritoneal dialysis catheter at the titanium connector, the connection must be cleaned, then soaked in Povidone Iodine for 10 minutes and sterile gloves must be worn for the disconnection / connection procedure.

Indications:

- To attend routine patient extension line change (6 monthly)
- To change a contaminated or damaged patient extension line
- To connect an administration set to PD catheter when not using a patient extension line
- To disconnect an administration set from PD catheter when not using a patient extension line.

Collect equipment:

- 4 Povidone Iodine swabs
- Dressing pack
- Sterile gauze
- Sterile gloves
- Sterile plastic drape x 2
- Extension line / primed administration set
- Minicap if changing extension line and not commencing dialysis
- Needle free valve port if not using a patient extension line and not commencing dialysis (CICU)
- Catheter clamp
- Tape

Procedure:

Use gauze squares to handle lines and catheter - this enables better torque and control over connection and disconnection.

1. Basic procedure as outlined above
2. Clamp peritoneal dialysis catheter
3. Using two Povidone Iodine swabs, scrub around titanium connector and patient extension line
4. Place two Povidone Iodine swabs around titanium connector (ensure overlap)
5. Wrap in gauze and wrap in plastic drape
6. Leave Povidone Iodine swabs in place for 10 minutes
7. Unwrap plastic drape leaving Povidone Iodine swabs and gauze in place

8. Aseptic hand hygiene
9. Don sterile gloves
10. Place sterile sheet next to catheter
11. Using sterile gauze, remove Povidone Iodine swabs
12. Place catheter and line on sterile sheet
13. Using sterile gauze, separate the old extension line / old administration set / cap from the catheter at the titanium connector and replace with new extension line / new dialysis administration set /needle free valve port (CICU)
14. To prime new patient extension line, unclamp catheter, allow fluid from peritoneum to fill extension line, close clamp on extension line
15. Place new minicap on patient extension line
16. If connecting an administration set, commence therapy
17. Check PD catheter exit site, attend dressing if necessary
 - Do not apply any traction to P.D. catheter.
 - Ensure that the catheter is clamped prior to procedure
 - Ensure catheter is immobilised at all times.

Insertion of Titanium Connector

Indications:

- To change a damaged titanium connector
- To change the titanium connector on a damaged catheter

Collect equipment:

- Dressing pack
- Sterile gauze x 2 pkt.
- Povidone Iodine solution
- Sterile container for Povidone Iodine
- Sterile scissors
- Sterile gloves
- Titanium connector
- Catheter clamp
- Patient extension line
- Minicap

Procedure:

1. Basic procedure as outlined above
2. Open required equipment, fill container with Povidone Iodine
3. Clamp catheter prior to damaged area

4. Soak the damaged area of the peritoneal dialysis catheter in Povidone Iodine solution for 10 minutes
5. Aseptic hand hygiene
6. Don sterile gloves
7. Remove catheter from Povidone Iodine and place on plastic drape
8. With sterile scissors cut catheter proximal to the area of damage
9. Thread the locking nut (small end first) along the catheter
10. Insert the titanium adaptor into the catheter - ensure that there is a tight fit to the shoulder of the adaptor
11. Inspect catheter tubing to ensure integrity, i.e.: no splits
12. Slide the locking nut along the catheter to the titanium adaptor; fully screw the locking nut onto the adaptor until secure
13. Connect new patient extension line to titanium connector
14. Using gauze remove catheter clamp, allow fluid from peritoneum to fill extension line, close twist clamp on the extension line
15. Place new mini cap on patient extension line
16. Dispose of used equipment
17. Basic hand hygiene
18. Check PD catheter exit site, attend dressing if necessary

Collection of Peritoneal Dialysis Fluid Specimens

When to Send a Specimen

Specimens of peritoneal dialysis fluid should be sent for microbiological examination, only for the following indications:

1. Diagnosis of a new episode of peritonitis
2. Peritonitis which has failed to respond to antibiotic therapy
3. Relapse of peritonitis whilst on antibiotic therapy
4. Monitoring response to therapy

As a general rule repeat specimens of P.D. fluid should not be sent to microbiology for examination; unless 48 hours has elapsed since the last specimen was sent.

Collection and Sending of Samples

Samples from patients on standard CAPD:

- Drain the patient's abdomen and send the whole bag to the microbiology department for microscopy, cell count, culture and sensitivity.
- Prior to sending the whole bag off, remove enough fluid to inoculate one ⁽¹⁾ set of blood culture bottles, these are to be sent to microbiology for culture and sensitivity.

Samples from patients on manual dialysis:

Note: The connection needs to be soaked in Povidone Iodine. To achieve this disconnect line and apply minicap and allow 10 minutes before the connection to the new set of lines.

- Disconnect manual set from patient extension line, cap with opticap, and leave for 10 minutes prior to collecting sample. After 10 minutes attach sample bag (for HomeChoice machine) directly onto patient extension line, open twist clamp and collect sample.
- Remove enough fluid to inoculate one (1) set of blood culture bottles. Send sample bag and blood culture bottles to pathology for microscopy, cell count, culture and sensitivity
- Attach minicap and leave for 10 minutes before reconnecting manual set and recommencing dialysis.

Samples from "HomeChoice" cyclers:

- The specimen is collected using the specimen bag that attaches to the effluent sampling port on the "HomeChoice" drain line
- Open the sample bag package
- Aseptic hand hygiene
- Close clamp of sample bag
- Connect sample bag to the effluent sampling port on the HomeChoice drain line.
- Ensure that the sample bag is lower than the Y junction of the "HomeChoice" drain line
- After the patient has drained at least 100 mL; open the clamp on both the effluent sample bag and effluent sample port to collect the specimen
- When the bag is full, close clamps on the effluent sample port and effluent sample bag.
- Disconnect sample bag, replace cap on HomeChoice drain line port.
- Send the effluent bag to the pathology department for microscopy, cell count, culture and sensitivity.
- Prior to sending the whole bag off, remove enough fluid to inoculate one (1) set of blood culture bottles, these are to be sent to microbiology for culture and sensitivity.
- Continue with drain phase
- Alternatively; if the patient is not in drain phase, a manual drain may be used to collect a sample, technique as above.

Removal of peritoneal dialysis catheters:

Peritoneal dialysis catheters are removed when no longer required, due to return of renal function, or following renal transplantation. Catheters may also need to be removed / replaced due to technical issues or infection. The timing of reinsertion is dependent on the individual and reason for removal, and will be decided in consultation with surgeons and nephrologists.

Fibrous and granulation tissue forms around the peritoneal dialysis catheter Dacron cuffs within 1 month following catheter insertion (1), thus anchoring the catheter. Surgical dissection is therefore necessary to remove chronic peritoneal dialysis catheters.

Related Documents

1. **Infection Control Isolation and Transmission Based Precautions – SCH**
<http://chw.schn.health.nsw.gov.au/o/documents/policies/guidelines/2015-7005.pdf>
2. **Hand Hygiene** <http://chw.schn.health.nsw.gov.au/o/documents/policies/policies/2013-9031.pdf>
3. **Infection Control – NSW Health**
<http://chw.schn.health.nsw.gov.au/o/documents/policies/policies/2013-9042.pdf>
4. **Medication: Administration & Handling (Non-Cytotoxic) – SCH**
<http://chw.schn.health.nsw.gov.au/o/documents/policies/guidelines/2015-7011.pdf>
5. **Safe Prescribing Guidelines – SCH**
<http://chw.schn.health.nsw.gov.au/o/documents/policies/guidelines/2012-7007.pdf>

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Appendix 1: Peritoneal Dialysis Catheter Exit Site Classification

	PERFECT	GOOD	EQUIVOCAL	ACUTE INFECTION < 4 WEEKS	CHRONIC INFECTION > 4 WEEKS
CARE PLAN	MAINTAIN	REVIEW/MAINTAIN	REVISE CARE PLAN	REVISE CARE PLAN	REVISE CARE PLAN
External	PAIN / TENDERNESS	None	None	None	None
	COLOUR	Natural, pale pink or dark	Natural, pale pink, purplish or dark, bright pink < 13 mm	Bright pink or red < 13 mm	Bright pink or red > 13 mm
	CRUST	None or small, easily detached or specks of crust on dressing	None or small, easily detached or specks of crust on dressing	Present, may be large and difficult to detach	Present, may be difficult to detach
	SCAB	None	None	None	None
	DRAINAGE (external)	None	None	None, even with pressure on the sinus; dried exudate on dressing	Purulent, or bloody, spontaneous or after pressure on sinus, wet exudate on dressing
	GRANULATION TISSUE (external)	None	None	Plain or slightly exuberant	Exuberant "proud flesh" may be present
SWELLING	None	None	None	None	
Sinus	DRAINAGE (sinus)	None, or barely visible, clear or thick	None or barely visible, clear or thick	Purulent or bloody, sometimes clear	Purulent or bloody
	GRANULATION TISSUE (sinus)	None	Plain beyond epithelium	Slightly exuberant	Slightly exuberant "proud flesh" may be present
	EPITHELIUM	Strong, mature, covers visible sinus	Strong, mature at rim, fragile, or mucosal deeper	Absent or covers part of sinus	Absent or covers only part of sinus
MUST BE ABSENT FOR UNINFECTED CATEGORIES	Any visible granulation tissue or fragile epithelium. Red, bright pink or purplish colour of any diameter. Difficult to remove crust	Any external drainage. Purulent or bloody drainage in sinus. Exuberant granulation tissue. Pain, swelling, red colour	Purulent or bloody drainage. Distinct exuberant granulation tissue. Erythema > 13 mm. Pain, swelling	Indications Often Seen With Trauma: Pain, bleeding, scab, deterioration of exit site appearance. Exit site appearance will depend on the intensity of the trauma and the length of time before evaluation.	

Appendix 1: adapted from "Peritoneal Catheter Exit Site Classification Guide, Baxter Healthcare" originally adapted from : Twardowski, ZJ & Prowant, BF, Classification of Normal and Diseased Exit-Sites, Peritoneal Dialysis International, Vol. 16, Supp 3, 1996