

1 1. Introduction and Who Guideline applies to

Clinical guidelines are 'guidelines' only. The interpretation and application of clinical guidelines will remain the responsibility of the individual practitioner. If in doubt consult a senior colleague or expert.

These guidelines are applicable to patients directly under the care of University Hospitals of Leicester NHS Trust. Local guidance (for example for the inpatient care of kidney patients not in a Leicester hospital) may also exist and take precedence.

Peritoneal dialysis (PD) relies on a patient's peritoneal membrane to act as a natural semipermeable dialysis membrane. A permanent flexible silastic catheter is placed surgically in the peritoneal cavity through an abdominal wall tunnel. Dialysis solution is drained into the peritoneal cavity and allowed to dwell there before being drained out and replaced with fresh dialysis solution. Patients perform this dialysis at home after training from the Renal Services Community Team. A number of complications can occur which can impair dialysis therapy or put the catheter at risk. Infectious complications (exit site and tunnel infections and peritonitis) are dealt with in separate Trust protocols, this protocol addresses common noninfectious complications; for example; poor drainage, hernias, leakage, residual flow pain.

The Trust is committed to managing risk and ensuring effective and safe practice throughout dialysis therapy. The aim of this protocol is to ensure that there is a consistent approach to the treatment of peritoneal catheter complications ensuring they are treated safely and effectively and minimising the impact of these complications on patient well being.

2. Guideline Standards and Procedures

2.1 This protocol applies to all individuals employed by the University Hospitals of Leicester NHS Trust including nursing, medical and allied healthcare professionals involved with the care of patients undergoing peritoneal dialysis in hospital or the community setting.

2.2 Indications

Peritoneal dialysis patients who contact the local dialysis unit, renal services community nurse or attend the day case unit with PD catheter complications for example; poor flow, leakage, residual pain or hernia.

2.3 Contraindications

Peritoneal dialysis patients who exhibit signs of infection, for example; redness, swelling, tenderness or exudate around the exit site or pyrexia or cloudy bags should

be treated using the protocols for exit site infections or PD peritonitis. Urokinase should not be used on patients

- Within 72 hours of surgery.
- With any evidence of bleeding.
- With history of anaphylaxis when treated with urokinase or streptokinase

2.3 TREATING BLOCKED CATHETERS

Causes

- Kinked tubing – most common cause of poor drainage is kinked tubing or closed clamps.
- Constipation – this can obstruct the tubing or dislodge the catheter.
- Fibrin – This is caused by an increased amount of fibrinogen in the peritoneal cavity and appears as tiny strands in the tubing.

Steps to unblocking a PD Catheter.

- The line should be checked for obvious kinks or closed clamps.
- Non invasive approaches such as changes of position, or even walking up and down stairs (Gokal et al, 1998) can help move the catheter tip and aid drainage flow and should be tried before more invasive techniques.
- Careful history taking should identify whether there is a possibility of constipation. A plain abdominal x ray is often required to confirm catheter position and help evaluate faecal loading. This can be treated with laxatives, glycerin suppository or an enema, medical advice should be sought to determine treatment required. The patient should be given advice regarding avoiding constipation as it can impair dialysis, dislodge the tubing and increase the risk of peritonitis. Advice regarding diet and exercise should be given and medication reviewed.
- The flow should be checked after these steps by attempting a CAPD exchange. If fibrin can be visibly seen then ‘milking’ the tubing, squeezing gently, can dislodge the fibrin and clear the blockage. The application of steady pressure to the PD in flow bag may also be enough to dislodge any fibrin blocking the catheter.
- If the fluid does not drain out and the blockage is not resolved. The catheter will require flushing in the following way:

Procedure for catheter flush.

- Wash hands and apply apron.
- Clean table with Alcohol wipe (Sani cloth 2%)
- Ensure transfer set roller clamp is closed.
- Alcolgel hands & open sterile dressing pack and extra sterile gloves.
- Open mini cap and place in sterile field.

- Put on sterile gloves and draw up 50 mls 0.9% sodium chloride into a 50ml luer lock syringe, place in sterile area.
- Place sterile field under catheter.
- Remove gloves. Alcogel hands.
- Put on sterile gloves and using strict aseptic technique remove mini cap and connect saline filled syringe.
- Open mini set roller clamp and flush with 50mls 0.9% sodium chloride or dialysate fluid.
- Put on new mini cap.
- Attempt a further CAPD exchange.

N.B. The transfer set can be removed and the catheter flushed directly via the titanium adapter and a new transfer set applied to facilitate a CAPD exchange.

If fibrin is evident on drainage and cannot be 'milked' down the tube consult with medical staff regarding the use of intra peritoneal heparin. Usual dose 500 units heparin sodium per litre of dialysate fluid

If Heparin is not successful, then Urokinase can be used as a flush to clear fibrin in the lumen of the PD catheter.

Contraindications:

Do not use Urokinase within 72 hours of surgery.

Do not use if any evidence of bleeding.

Do not use if previous allergic reaction to Urokinase or other Fibrinolytic drugs.

Procedure for Urokinase Flush

- Wash hands and apply apron.
- Clean table with Alcohol wipe (Sani cloth 2%)
- Alcogel hands & open sterile dressing pack and extra sterile gloves.
- Put on sterile gloves and draw up Urokinase in the following way.

Use 5000 units of Urokinase in 5mls 0.9% sodium chloride (mix 25,000 units in 5mls 0.9% normal saline. Draw off 1ml = 5000 units and add to 4mls 0.9% normal saline).

- Place sterile field under catheter.
- Place white catheter clamp on the patient side of the titanium and clamp.
- Remove gloves. Alcogel hands.
- Put on sterile gloves and using strict aseptic technique remove transfer set and connect Urokinase filled syringe.
- Open white catheter clamp and flush Urokinase into the catheter.
- Close white clamp to avoid back flow down the tube.
- Connect new transfer set with mini cap attached.
- Leave Urokinase to dwell for 4-6hours then attempt a CAPD exchange.

Should these techniques fail seek medical advice. The International Society for Peritoneal Dialysis and Renal Association recommend that the sequence of steps to resolve catheter blockage should be:

1. Examination and evaluation.
2. Laxatives.
3. Urokinase.
4. Fluoroscopy and manipulation
5. Revision.
6. Replacement.

2.4 TREATING PD LEAKAGE.

Leakage is classed as early leakage if it occurs at <30 days following insertion of PD catheter and late leakage if it occurs >30 days following insertion (Gokal et al, 1998; Maaz, 2004). Early leakage is most likely to occur at the exit site, this can occur if the catheter is used too soon after implantation or if infection is present. However the raised intra-abdominal pressure caused by high volumes of fluid in the peritoneal cavity can cause later leakage following strenuous exercise, lifting or coughing. Causes:

- Catheter implantation technique
- Trauma (including coughing, lifting, or shearing due to catheter not being sufficiently secured).
- Patient related anatomical abnormalities.

Indications:

- Fluid around exit site.
- Oedema of abdomen (monitor girth circumference).
- Scrotal, Penile or Labial oedema (suggests large leak which may require surgical repair).
- Shortness of breath
- Decreased exchange drain volume.
- Decreased ultrafiltration
- Sudden weight gain.

Treatment:

- Should fluid be observed at the catheter exit site this should be tested by applying a urine glucose reagent strip to the area of fluid, a positive result indicates the presence of PD fluid. Dialysate is glucose rich which will increase the possibility of exit site or tunnel infection and peritonitis. Prophylactic antibiotic therapy may be necessary and should be discussed with medical staff. Arrangements should be made for the site to be monitored closely and the dressing type may need changing to accommodate the increased fluid drainage.
- If there are concerns about a pleuroperitoneal leak (e.g shortness of breath, reduced

exchange volume, new unilateral pleural effusion), a diagnostic+/- therapeutic pleural aspiration may be indicated. Contact the medical team if there are suggestive symptoms.

- Continuous ambulatory peritoneal dialysis should stop immediately, abdomen drained dry if leakage is suspected. Medical staff must be consulted and consideration given to suspending PD and using haemodialysis for a period to allow healing. Alternatively limited small-volume supine PD using 500-1500 ml exchanges, i.e. by using automated peritoneal dialysis (Renal Association, 2008) may sufficiently reduce the intra-abdominal pressure to prevent further leakage and allow healing.

The leakage can be identified by fluoroscopy or CT scan after infusion of dialysate fluid containing radio contrast material.

- Persistent leaks may require surgical repair and/or catheter replacement (Maaz, 2004).
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2.5 TREATING ABDOMINAL DISCOMFORT/PAIN DURING PD THERAPY

Infusion pain is usually observed in new patients commencing PD occurring in 56-75% of patients when catheter is first used (Twardowski and Nichols, 2000. p330) but is often transient in nature, spontaneously disappearing over time. However infusion pain can remain a troublesome complication in PD and in most extreme cases can result in the discontinuation of PD. Patients may complain of pain during inflow, outflow or dwell period of the PD exchange. This pain has a multifactorial aetiology which needs investigation to determine relevant solutions.

Causes

- Rapid inflow of dialysis fluid.
- Dialysis solution temperature.
- Acidity of dialysis solutions (most have a pH of 5.5).
- Peritonitis.
- Hypertonic solutions.
- Catheter related discomfort (often due to catheter pressing on organs).
- Rectal discomfort may be caused if the intraperitoneal segment of the catheter is too long (Prowant. 2001).
- Omental (peritoneal fold) wrapping can cause outflow pain.

Assessment

- Dialysate (effluent) should be observed and peritonitis suspected if cloudy.
- Sample sent for M, C & S.
- Check patient's TPR and BP and act on abnormalities, if pyrexial, hypotensive or tachycardic suspect peritonitis.
- Monitor pain/discomfort and note duration, level of discomfort and when it occurs.
- Check temperature of dialysis in flow solution.

- Monitor and document drain volume.

Treatment:

- Treat suspected peritonitis as per the Trust peritonitis protocol.
- Treat suspected leakages as per the above protocol for treatment of leakage.

Consider:

- Reducing dialysis fill volume when patient is standing and increasing volume when supine (this may help abdominal distension).
- Checking for constipation and treating if present.
- Consider automated peritoneal dialysis (APD) which allows smaller and more frequent exchanges in supine position.
- Try weaker dextrose concentration.
- Change position during infusion or drain.
- Reduce infusion rate (lower bag height, partially close transfer set clamp).
- Ensure proper dialysis solution temperature at in flow (warm to body temperature).
- Always leave small amount of dialysis fluid in patient between exchanges (tidal PD).
- Should pain be persistent and not related to infection a more biocompatible dialysis solution should be considered (Renal Association, 2008), and discussed with the patient's consultant.

2.6 TREATING CATHETER SPLIT

Peritoneal catheters can be damaged through trauma, unsuitable cleaning agents or unsuitable clamps or may tear due to a defective manufacturing process. Patients may notice wetness on their clothing or around catheter, a decreased drain volume or a crack or hole may be visible. Prophylactic antibiotics will be required so medical advice will need to be sought.

- Stop dialysis immediately.
- Clamp catheter proximal to damage.
- If catheter length is adequate use sterile technique to disinfect catheter above damaged area as per Trust set change protocol.
- Trim catheter above damaged area using sterile scissors.
- Fit new sterile adapter and transfer set following Trust set change protocol.

3. Education and Training

Limitations of Practice.

This protocol should not be undertaken by an inexperienced nurse without direct supervision from a renal nurse.

Criteria for Competence

This protocol is for the use of all medical staff and suitably qualified registered nurses,

NON INFECTIOUS COMPLICATIONS OF PERITONEAL DIALYSIS Trust Ref: C39/2009

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Contact: Dr Osasuyi Iyasere, Consultant Nephrologist

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Author: Nicky Nichols, Specialist Nurse; Approved at RRCV Q&S Board Nov 2021

who have achieved competency in peritoneal dialysis or are under direct supervision of a peritoneal dialysis competent nurse.

Evidence of competence in peritoneal dialysis should be evidenced by completed and signed peritoneal dialysis competencies within the practitioner's portfolio.

4. Monitoring Compliance

Exit site infections and peritonitis rates will be audited annually and results shared with the infection control department and the renal network. (Renal Association, 2008).

Use of biocompatible solutions (physioneal) and indications (Renal Association, 2008).

5. Supporting References (maximum of 3)

Crabtree et al (2019) ISPD Guidelines and recommendations: Creating and Maintaining Peritoneal dialysis Access in the Adult Patient. *Peritoneal Dialysis International*, Vol. 39, pp. 414–436 Available at: <https://journals.sagepub.com/doi/pdf/10.3747/pdi.2018.00232>
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6. Key Words

Peritoneal, Urokinase, Leak, Split, Blockage, Pain.

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Author / Lead Officer:	Nicky Nichols	Job Title: Specialist Nurse
Reviewed by:	Nephrology Consultants	
Approved by:		Date Approved:

REVIEW RECORD			
Date	Issue Number	Reviewed By	Description Of Changes (If Any)
Oct 2011	2	J Medcalf	Reformatted to new guideline template. This document did not get into the DMS as intended in 2009. Now in Sharepoint.
Sept 2015	3	J Medcalf	Integrated into new UHL guideline template.
Dec 2018	4	O Iyasere	UV flash section removed. Biocompatible fluid removed.