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at Crumlin

TITLE: Peritonitis Guidelines

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1.0 POLICY STATEMENT

The purpose of this document is to standardise procedures in the care of children with suspected peritonitis and to ensure safe evidence based practice. This document will guide health care professionals to care for, recognise and treat peritonitis. It will provide HCP with the knowledge base required to care for a child with peritonitis, ensuring safe, effective and quality care is delivered to our patients.

2.0 SCOPE

This guideline will be used by St. Michael's C ward staff who have undergone training and who are deemed competent in peritoneal dialysis.

3.0 GENERAL RESPONSIBILITIES

- 1.2. All Staff: Adhere to all policies and procedures relevant to their area of work.
- 1.3. Line Manager/Head of Department: to ensure their staff are aware of and compliant with all policies and procedures relevant to their area of work.
- 1.4. Quality Department: Manage all completed policies and procedures via Q-Pulse.

4.0 SPECIFIC RESPONSIBILITIES

It is the responsibility of the Renal Clinical Nurse Specialists and the Clinical Education Facilitators to implement guidelines into practice. Each staff member has a role to play in adhering to these guidelines when caring for a patient with suspected peritonitis.

5.0 GUIDELINE

5.1 Peritonitis description

Peritonitis is inflammation of the thin layer of tissue that covers the abdomen and abdominal organs usually caused from fungal or bacterial infections. It is a common and serious complication of peritoneal dialysis. Peritonitis contributes to major morbidity because of the loss of peritoneal membrane function and technique

failure, particularly in children with repeated episodes of peritonitis. It requires prompt medical attention. Early diagnosis and treatment is essential (ISPD 2016).

5.2 Diagnosis – See section 14

ISPD 2016 recommends that peritonitis should always be diagnosed when at least 2 of the following are present:

- 1) **Clinical features consistent with peritonitis i.e. abdominal pain, pyrexia, and cloudy effluent.**
- 2) **Dialysis effluent with WCC $>100 \times 10^6/L$ and over 50% polymorph cells after a dwell time of over 2 hours.**
- 3) **Positive dialysis effluent culture**

Note: In Temple Street hospital, dwell time may vary depending on how acutely unwell the child has presented.

- Physical examination should include a thorough assessment of the PD exit site. A tunnel infection may occur in the presence of an exit site infection. Take a swab of exit site if it appears infected.
- On examination, the abdominal pain is typically generalized in peritonitis. Localised tenderness should raise suspicion of underlying surgical pathology. Consider possibilities of another diagnosis e.g. constipation, appendicitis, menstruation, or gastroenteritis.

5.3. Taking a Sample (See appendix 1 and 2)

All PD patients presenting with pyrexia, abdominal pain, or cloudy PD fluid must have a sample of PD fluid taken to out rule peritonitis. An exception to this rule is if a patient has a temperature less than 38.5 and there is a clear focus for illness e.g. tonsillitis, a sample may not be required. This must be discussed with the Nephrology team. Blood cultures must also be taken. All PD samples must be sent to the laboratory for urgent microscopy, cell count, differential, gram stain and culture. If out of hours, phone the haematologist on call to run the PD sample urgently.

ISPD (2016) recommend that all patients with cloudy PD fluid should be presumed to have peritonitis until it has been out ruled as cloudy effluent almost always represents infectious peritonitis. Aim for PD sample of **50mls**.



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If less than 50mls obtained, send sample. A repeat sample may be necessary depending on the results. Clinical judgement from the nephrology team should always guide initiation of therapy (ISPD 2016).

The following tables are a guide on how and when to get a sample:

Table A

PERITONITIS POSSIBLE BUT UNLIKELY

If a patient has a temperature less than 38.5 with NO clear focus of other illness and is clinically stable:

- **If day time dwell** - apply sample bag to catheter and immediately obtain sample volume. Send sample for urgent microscopy. If patient had night off dialysis and day dwell in peritoneum has been longer than 24 hours drain peritoneum and follow step below – 'if no day time dwell'.
- **If no day time dwell** - instil patients normal fill volume of Physioneal 1.36% and drain after 2 hours. Send for urgent microscopy.
- **If collecting a sample whilst patient on the Claria machine** - Apply sample bag to drainage line. Keep sample bag clamped, when drain occurs allow 70mls – if low flow cassette and 100mls – if standard cassette, to drain into drainage bag before opening the clamp on the sample bag. Dwell time may be shorter in this patient therefore; the clinician should use the percentage of PMN rather than the absolute WCC to diagnose peritonitis. A proportion above 50% PMN is strong evidence of peritonitis even if the WCC is less than 100×10^6 .
- If drainage looks cloudy, treat as definite peritonitis. Follow table B. Initiate antibiotics immediately. Do not wait for results.

Table B

PERITONITIS DEFINITE OR STRONGLY SUSPICIOUS

(Including any temperature over 38.5)



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If patient has temperature more than or equal to 38.5 and/or moderate to severe abdominal pain and/or cloudy PD fluid:

NOTE: If patient displaying signs of sepsis (see sepsis 6 protocol) or if child's presentation requires urgent medical assessment to identify source of infection, start IV antibiotics without delay. If sepsis is secondary to peritonitis, start IV Vancomycin and IV Ciprofloxacin without delay.

- **If day time dwell** - apply sample bag to catheter and immediately drain. Send for urgent microscopy. If patient had night off dialysis and day dwell in peritoneum has been longer than 24 hours drain peritoneum and follow step below – 'if no day time dwell'.
- **If no day time dwell** - instil patients 75% - 100% of normal fill volume of Physioneal 1.36% and allow dwell for **5 minutes**. Send for urgent microscopy.
- **If collecting a sample whilst the patient is on the Claria machine** - keep sample bag clamped, when drain occurs allow 70mls – if low flow cassette, and 100mls – if standard cassette, to drain into drainage bag before opening clamp on sample bag. A manual drain may be required via the Claria machine to obtain an urgent sample.
- **Treatment must be initiated within one hour of arriving to ward.** Do not wait for results to start treatment. An exception to this is if the fluid from the drain appears clear and there is strong suspicion of other illness, waiting for results is permitted.
- **If delay in administering IP (intraperitoneal) antibiotics, give IV Vancomycin and IV Ciprofloxacin immediately.**

5.4. Contamination Episode (see appendix 3 and 4)

If a contamination episode occurs by accidental disconnection during PD treatment or if break in line, (for example, a hole in the solution bag, leak in tubing), treatment should consist of both a sterile transfer set change, sample and antibiotic prophylaxis as soon as possible to reduce the risk of peritonitis. If an immediate contamination episode has occurred at the navy tip and the blue twist clamp on the transfer set has been clamped, antibiotics and PD specimen are not required. A change of transfer set only is required in this instance.



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5.5. Results of PD Effluent

- **WCC above $100 \times 10^6/L$** with over 50% polymorphonuclear cells – initiate treatment immediately.
- **WCC 50-100 WBC $\times 10^6/L$** and symptomatic of peritonitis - initiate treatment immediately.
- **WCC below $50 \times 10^6/L$** and asymptomatic of peritonitis – treatment not indicated.
- **WCC below $50 \times 10^6/L$** and symptomatic discuss with Consultant Nephrologist.

NOTE - Polymorphonuclear (PMN) cells (neutrophils or eosinophils) indicate the presence of inflammation, with peritonitis being the most likely cause. The normal peritoneum has very few polymorphonuclear cells. A percentage above 50% is strong evidence of peritonitis (ISPD 2016).

5.6. Treatment for Peritonitis (See appendix 5)

MEDICATION	DOSE
Vancomycin	25mgs/L of PD fluid
Ciprofloxacin	25mgs/L of PD fluid
Preservative free heparin	500iu/L of PD fluid

Treatment consists of gram positive and gram negative cover.

If vancomycin allergy: give IP teicoplanin 20mg/L of PD fluid.

If ciprofloxacin allergy: give IP ceftazadime 125mg/L of PD fluid.

- If patient has a history of multi resistant organisms, consult with nephrology and ID team re treatment.
- Oral antifungal medication must be prescribed to all patients on PD receiving antibiotics. The majority of fungal peritonitis episodes are preceded by courses of antibiotics. ISPD guidelines recommend mycostatin® prophylactically – 100,000iu QDS. Must be started within 24 hours.

- Consider continuous dialysis for 24-48 hours. Dwell time may be adjusted according to biochemistry / how severe the peritonitis (may require longer dwells) / or if fluid overloaded (may require shorter dwells).
- After 48 hours of treatment the patient should show signs of clinical improvement. The effluent should be visibly inspected to ensure clearing is occurring. Send repeat PD sample at 48 hours to ensure patient is responding to treatment.

If peritonitis positive (based on WCC and symptoms) but culture is negative after 48 hours – Complete 2 weeks of IP Vancomycin and PO Ciprofloxacin (after receiving IP ciprofloxacin x 48hours).

If culture positive - Modify IP antibiotics depending on sensitivities as per Nephrology and ID team.

- Administer pain relief as necessary. Administer IP lignocaine 1% (1ml/L of PD fluid) on discussion with renal team to relieve abdominal pain.
- Oral ciprofloxacin BD can be commenced after 48 hours of treatment instead of IP ciprofloxacin. Oral ciprofloxacin must not be given within 2 hours of phosphate binders as they can reduce the absorption of ciprofloxacin by up to 50%. Ensure the parents are informed to observe for and report any signs of candida (thrush). Prophylactic mycostatin® must be prescribed until 48 hours after stopping antibiotics.

5.7 Indications for Catheter Removal

- a. **Refractory peritonitis** – defined as failure of the PD effluent to clear up after 5 days of appropriate antibiotics. Catheter removal is indicated in all cases of refractory peritonitis or earlier if the patients clinical condition is worsening.
- b. **Fungal peritonitis** - Catheter removal is indicated immediately if fungi are identified by microscopy in the PD effluent. Anti-fungal agents should be commenced immediately and continued for two weeks. Treatment for fungal peritonitis is oral Fluconazole 6mgs/kg 24 hourly (max 200mgs).

- c. **Relapsing peritonitis** – defined as an episode of peritonitis that occurs within 4 weeks of completion of antibiotics which is caused by the same organism that occurred in the preceding episode of peritonitis. Catheter removal is indicated in all cases of relapsing peritonitis (ISPD 2012).

Catheter removal should also be considered for:

- a. Recurrent episodes of peritonitis
- b. Mycobacterial peritonitis
- c. Multiple enteric organisms

6.0 CONTINUOUS REVIEW

This policy and procedure shall be reviewed and updated at least every two years by the Author in order to determine its effectiveness and appropriateness. It shall be assessed and amended as necessary during this period to reflect any changes in best practice, law, substantial organisational change and professional or academic change.

7.0 AUDIT AND EVALUATION

In order to ensure the effectiveness of this policy and procedure the Author shall complete an audit annually to review and monitor compliance with this policy and procedure. The Author must further provide a systematic process for the reporting and investigation of compliance breaches, or potential breaches, to enable proactive prevention in the future.

8.0 KEY STAKEHOLDERS

The following Key Stakeholders were consulted/involved in the development of this document:

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8.0 REFERENCES

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9.0 APPENDICES

Appendix 1 - How to take a Sample using Twin bag of Physioneal

Appendix 2 - Taking a Sample Using the Claria machine

Appendix 3 - Set Change Procedure

Appendix 4 - Adding Medication to Peritoneal Dialysis Fluid

Appendix 5 - Repairing a split Tenckhoff Catheter

Appendix 6 - Set Change Procedure

Appendix 1

How to get a sample using Twin bag of Physioneal

Equipment

- a) Twin bag physioneal
- b) Connection shield
- c) Minicap
- d) 2 Blue clamps
- e) Azowipes
- f) Hibiscrub/Betadine hand wash solution
- g) Hanging scales
- h) Claria machine to warm solution if needed

Procedure

1. Wash hands for 30secs with hibiscrub. Dry thoroughly.
2. Clean machine and work surface with azowipes.
3. Turn on machine at back.
4. Wash hands for 30 seconds and dry thoroughly.
5. Open twin bag packaging and check
 - a) Volume
 - b) Concentration
 - c) Expiry date
 - d) Leaks
 - e) Solution is clear
 - f) Seals are intact
6. Place bag on empty heater plate to warm solution for 10 minutes. Do not break seal. Then hang on weighing scales.
7. Wash hands for 30secs with hibiscrub. Dry thoroughly.
8. Peel open connection shield and leave in packet.
9. Decontaminate hub of tenckhoff catheter by thoroughly cleaning with an azowipe.
10. Decontaminate gel with alcohol gel for 15 seconds.
11. Apply connection shield to the end of the twin bag line.
12. Remove minicap from the child's catheter and connect twin bag.
13. Open child's catheter clamp and drain peritoneum.
14. When fully drained, close catheter clamp.
15. Ensuring child's catheter is still clamped, break seal on bag of fluid and flush line. Then clamp inflow line.
16. Note weight of bag hanging on scales to determine how much to fill patient.
17. Open clamp on catheter and inflow line of twin bag and fill the child with the appropriate amount of fluid.
18. Close patient clamp, clamp on inflow line and clamp on outflow line.
19. Allow to dwell for requested time as per Consultant Nephrologist.
20. Drain patient following dwell time by opening patient line and clamp on drain line.
21. Wash hands for 30 seconds and apply gloves.
22. Using alcohol wipe, clean sample port.
23. Using a 50 ml syringe, obtain a 50ml sample and insert directly into the PD specimen container.
24. Send sample for WCC, differential count, gram stain and culture.
25. Disconnect patient using the standard disconnect procedure. N.B Occasionally you may need to wait for the sample result before you disconnect as another sample maybe warranted.
26. Measure all fluid removed and document accordingly.



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Appendix 2

Taking a sample on the Claria machine

Equipment

- a) Sample bag
- b) Alcowipes
- c) 50ml syringe
- d) Blue needle
- e) PD specimen container
- f) Hibiscrub handwash

Procedure

1. Wash hands with hibiscrub for 30 seconds and dry thoroughly
2. Gather equipment required.
3. Clean trolley.
4. Wash hands for 30 seconds with hibiscrub. Dry thoroughly.
5. Open sample bag and keep in packaging
6. Decontaminate hands using alcohol gel x 15 seconds.
7. Attach sample bag to Y port on drainage line using ANTT.
8. Keep sample bag clamped. When drain occurs allow 70mls – if low fill cassette, and 100mls – if standard cassette, to drain into drainage bag before opening clamp on sample bag. This is to ensure that the sample obtained comes directly from the peritoneum and not from the fluid that has been resting in the drainage bag.
9. When the bag is full, close clamps. Observe effluent for clarity
10. Wash hands for 30 seconds and apply gloves. Clean sample port with an alcohol wipe. Allow 30 seconds for it to dry. Obtain 50-100ml sample and insert into PD specimen container.
11. Send for WCC, differential count, gram stain and culture.



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Appendix 3 **Adding medication to PD fluid**

MEDICATION	DOSE
Preservative free heparin	500iu/L of PD fluid
Lignocaine	1ml/L of PD fluid
Vancomycin	25mg/L of PD fluid
Ciproflaxacin	25mg/L of PD fluid
Potassium chloride in renal patients	
➤ K+ less than 3mmol/L	4mmol/L of PD fluid
➤ K+ less than 2.5mmol/L	5mmol/L of PD fluid
Potassium chloride in cardiac patients	
➤ K+ less than 5mmols	3mmols/L of PD fluid
➤ K+ less than 4.5mmols	3.5mmols/L of PD fluid
➤ K+ less than 4.0mmols	4mmols/L of PD fluid

Gather equipment

- Physioneal bags
- Clean trolley
- Clean tray
- Appropriate size syringes to draw up medication
- Green needles or needle free devices
- Blue needles
- Alcohol swabs
- Medication

Steps

1. Work out dose / calculations.
2. Wash hands for 30 seconds and dry thoroughly.
3. Open PD packaging and leave in plastic cover – check drug name, expiry date, leaks etc.
4. Clean tray.
5. Decontaminate hands with alcohol gel. Apply gloves if drawing up antibiotics for own protection.
6. Attach needles to syringes using ANTT.
7. Using alcohol wipe, swab top of medication bottles
8. Dilute medication if needed.
9. Draw up required amount of medication.
10. Replace needle free device with blue needles.
11. Decontaminate hands with alcohol gel.
12. Remove bung from PD bags if 5L bags.
13. Clean bung with alcohol wipe for 30 seconds and allow dry for 30 seconds.
14. Add medication to bags. Seals are broken post insertion of medication.



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Appendix 4

Set change procedure

A set change is performed every 6 months or if a contamination episode has occurred.

Gather Equipment

- a) Dressing pack
- b) 1 new miniset
- c) 5ml syringe
- d) 1 green needle
- e) 10ml vial of 0.9% sodium chloride
- f) Betadine antiseptic solution
- g) 1 new minicap
- h) 1 sterile clamp
- i) Sterile gloves
- j) Alcowipes
- k) Hibiscrub/Betadine handwash solution
- l) Timer

Procedure

1. Wash hands for 30 seconds and dry thoroughly.
2. Clean trolley in preparation for sterile field.
3. Decontaminate hands with alcohol gel and allow to dry.
4. Open out sterile field on trolley and open sterile gloves, needle, syringe, minicap, clamp and miniset on sterile field.
5. Pour betadine into large section on sterile tray.
6. Wash hands with hibiscrub for 1 minute and dry thoroughly.
7. Apply sterile gloves.
8. Draw up 5mls of 0.9% sodium chloride and prime miniset, clamp the line and apply minicap.
9. Place sterile drape under the child's catheter and extension line.
10. Using one piece of gauze to hold the catheter, clean connection site with betadine soaked gauze.
11. Place the container of betadine onto sterile towel and fully submerge the connection. Soak for three minutes.
12. Remove from the betadine and disconnect the old extension set from the catheter, discard and connect the new set securely.

Appendix 5

Repairing a split tenckhoff Catheter

Equipment

- a) Dressing pack
- b) 1 new miniset
- c) 5ml syringe
- d) 1 green needle
- e) 10ml vial of 0.9% sodium chloride
- f) Betadine antiseptic solution
- g) 1 new minicap
- h) 1 sterile clamp
- i) Sterile gloves
- j) Alcowipes
- k) Hibiscrub/Betadine handwash solution
- l) Timer
- m) Titanium connector

Procedure

1. Wash hands with hibiscrub for 30 seconds and dry thoroughly
2. Clamp above the split.
3. Clean trolley.
4. Decontaminat hands with alcohol gel.
5. Open out sterile field on trolley and open sterile gloves, needle, syringe, minicap, clamp and miniset on sterile field.
6. Pour betadine into large section on sterlile tray.
7. Wash hands with hibiscrub for 1 minute and dry thoroughly.
8. Apply sterile gloves
9. Draw up 5mls of 0.9% sodium chloride and prime miniset, clamp the line and apply minicap.
10. Place sterile drape under the child's catheter and extension line.
11. Using one piece of gauze to hold the catheter, clean split with betadine soaked gauze.
12. Place the container of betadine onto sterile towel and fully submerge the connection. Soak for three minutes.
13. Remove from the betadine and using a sterile scissors cut above the split.
14. Place titanium connector onto line- 2 pieces of titanium connector to be used.
15. Ensure that the 2 pieces of titanium connectors are screwed tightly together.
16. When titanium connector is secure attach the new set securely.
17. The patient will need intra peritoneal antibiotics for 48 hours. A sample of peritoneal fluid should be taken for culture and sensitivity prior to administration of antibiotics



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