PERITONEAL DIALYSIS ASSOCIATED INFECTIONS: MANAGEMENT - SCH

PRACTICE GUIDELINE ©

DOCUMENT SUMMARY/KEY POINTS

- Peritonitis is one of the major complications of peritoneal dialysis (PD). Episodes of peritonitis may result in increased morbidity and even mortality for the patient with acute renal failure or end stage renal disease maintained on peritoneal dialysis. (2)
- This protocol details the management of PD associated peritonitis for both the chronic PD patient managed at home or on ward C1S and the acute renal failure patient treated with PD in the CICU setting at Sydney Children's Hospital, Randwick.
- Clinical presentations have been broken down into categories:

  Ai. Child presenting to the Emergency Department, with peritonitis of unknown aetiology.

  Aii. Child presenting to the Emergency Department, with peritonitis of unknown aetiology, with a history of MRSA.

  B. Child presenting to the Emergency Department with peritonitis of unknown aetiology, with marked systemic features.

  C. Peritonitis occurring while an Inpatient or within 7 days of discharge, (i.e.: Health Care Associated Infection).

  D. CICU inpatient with peritonitis of unknown aetiology.

  E. Geographically isolated child with peritonitis of unknown aetiology.

  F. Child presenting with a peritonitis episode within 4 weeks of ceasing antibiotic treatment for peritonitis.

  G. Line contamination

- Emergency department flow sheet included.
- Children on peritoneal dialysis should receive oral antifungal medication (e.g. nystatin) whenever they receive antibiotic therapy.

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 & Guideline Committee	
Date Effective:	1st January 2020	**Review Period**: 3 years
Team Leader:	CNC Nephrology	**Area/Dept**: Nephrology SCH

Date of Publishing: 9 January 2020 2:34 PM Date of Printing: 9 January 2020

K:\CHW P&P\ePolicy\2019 ePolicy\Dec 19\Peritoneal Dialysis Associated Infections Management.docx

- Exit site and tunnel infections increase the risk of developing peritonitis, therefore should be adequately treated to try to prevent the development of peritonitis.

CHANGE SUMMARY

- Replaces Peritoneal Dialysis Associated Peritonitis: Management – SCH (Document number: 2015-7021).
- Changes made:
  - Clinical presentation for history of MRSA added.
  - Continuing management section updated.
  - Section on modification of automated peritoneal dialysis added.
  - Section of management of exit site and tunnel infections added.
- References updated.

READ ACKNOWLEDGEMENT

- All staff caring for patients with peritoneal dialysis associated peritonitis, including ward C1S, CICU and emergency department nursing and medical staff.

TABLE OF CONTENTS

Indications:

Peritonitis is one of the major complications of peritoneal dialysis (PD). Episodes of peritonitis may result in increased morbidity and even mortality for the patient with acute renal failure or end stage renal disease maintained on peritoneal dialysis. (2)

This protocol details the management of PD associated peritonitis for both the chronic PD patient managed at home or on ward C1S and the acute renal failure patient treated with PD in the CICU setting at Sydney Children's Hospital, Randwick. Identification and management of exit site and tunnel infections is also included.

The recommendations of The International Society of Peritoneal Dialysis (ISPD) Consensus Guidelines for the Prevention and Treatment of Catheter-related Infections and Peritonitis in Paediatric Patients Receiving Peritoneal Dialysis: 2012 Update (1); ISPD Guidelines for Peritoneal Dialysis-Related Infections Recommendations: 2010 Update (2) ISPD Peritonitis Recommendations: 2016 Update on Prevention and Treatment (3), the Caring for Australasians with Renal Impairment (CARI) guidelines Management of peritoneal dialysis – associated peritonitis in adults and children (4) and Catheter removal, adjunct therapies and timing of reinsertion of peritoneal dialysis catheter after peritonitis (5) and ISPD Catheter-Related Infection Recommendations: 2017 Update (11) have been adapted and modified according to local experience (5). Suitable alternative antibiotics are listed.

Aim:

Ensure adequate and successful treatment of infection. Maintain the peritoneum for use as a dialysis membrane and where possible preserve the PD catheter.

Definition of peritonitis:

The diagnosis of peritonitis should be considered in the presence of cloudy peritoneal dialysis effluent (1,2,3)

Empiric diagnosis of peritonitis: effluent white blood cell count greater than 100/mm^3, with at least 50% polymorphonuclear leukocytes. (1,2)

If the eosinophil count exceeds 10% and peritoneal dialysis effluent culture is negative, a diagnosis of eosinophilic peritonitis should be considered. (1)

Recurrent peritonitis is defined as an episode of peritonitis occurring within 4 weeks of completion of therapy for an earlier peritonitis episode, but the organism is different. (1,2,3)

Relapsing peritonitis is defined as an episode of peritonitis occurring within 4 weeks of completion of therapy for an earlier peritonitis episode, with the same organism or a sterile peritonitis.

Repeat peritonitis is defined as an episode of peritonitis occurring more than 4 weeks after completion of therapy for an earlier peritonitis episode, with the same organism. (1,2,3)

Refractory peritonitis is defined as failure to clear after 5 days of appropriate antibiotics. (1,2,3)

Catheter–related peritonitis is defined as peritonitis in conjunction with an exit site or tunnel infection with the same organism (3).

First line management at home:

- During training for home Continuous Ambulatory Peritoneal Dialysis (CAPD) / Continuous Cycling Peritoneal Dialysis (CCPD), peritonitis is emphasised as the main complication of peritoneal dialysis. The patient and / or family are taught the diagnostic features of peritonitis.
- Manifestations of peritonitis include [1,2,3,4]:
  - Cloudy dialysate, with or without abdominal pain, fever, nausea, vomiting or diarrhoea
- When the family identifies a possible episode of peritonitis, they will immediately contact the Sydney Children's Hospital (SCH) on-call nephrologist.
- If able, the family will be asked to collect a specimen of PD fluid and perform three [4] rapid exchanges, leaving a full dwell volume in situ. The patient is then to present to SCH emergency department, or local medical officer / hospital as previously arranged, with the PD fluid specimen.

Note: If the patient has not performed these quick exchanges, they may be performed when the patient arrives by accredited nursing staff.

Initial management:

On arrival in the Emergency department the following should be performed: (See Emergency Department Flow Chart)

- Inoculate one set of blood culture bottles with PD fluid and send for culture and sensitivity.[1,2,3]
- Send the PD effluent bag for urgent gram stain, microscopy and cell count as well as culture and sensitivity. [1,2,3]
- Swabs from both the PD catheter exit site and nose should be obtained from all patients with suspected peritonitis. These should be sent for bacterial culture.
- The patient should be transferred to the ward as soon as possible.

The antibiotics used, and route of administration will depend on the clinical presentation and the individual patient circumstances, for example: allergies and other conditions currently being treated.

Clinical presentations have been broken down into:

Ai. Child presenting to the Emergency Department, with peritonitis of unknown aetiology.

Aii. Child presenting to the Emergency Department with peritonitis of unknown aetiology, with a history of MRSA.

B. Child presenting to the Emergency Department with peritonitis of unknown aetiology, with marked systemic features.

C. Peritonitis occurring while an Inpatient or within 7 days of discharge, (i.e.: Health Care Associated Infection).

D. CICU inpatient with peritonitis of unknown aetiology.

E. Geographically isolated child with peritonitis of unknown aetiology.

F. Child presenting with a peritonitis episode within 4 weeks of ceasing antibiotic treatment for peritonitis

G. Line contamination

Initial management until culture and sensitivity results available:

- After consultation with Nephrologist on-call, commence antibiotics as per categories A, B, C, D, E, F or G.
- Prophylactic oral nystatin drops 1 ml (100,000 units) QID should be commenced with antibiotic therapy and continued for several days after completion of antibiotic treatment. (1,2,4)
- Antibiotic therapy is the same for patients maintained on CAPD and CCPD.
- Other antibiotics may be required depending on the clinical circumstances, see Appendix 1.
- Adjustment to dwell times and last fill volume may be required for CCPD patients.

Ai. Child presenting to the Emergency Department, with peritonitis of unknown aetiology. *(1,2,3,4)*

1. **Loading Dose**:

   Single dose of:

cefazolin 500 mg/L dialysis fluid **AND** **ceftazidime** 500 mg/L dialysis fluid.

These should be added to the peritoneal dialysis fluid (using the patients usual exchange volume) and left to dwell for six (6) hours.

2. **Maintenance dose**:

   Thereafter, peritoneal dialysis is continued with maintenance antibiotics, added to all dialysis fluid.

   These are:

cefazolin 125 mg/L dialysis fluid **AND** **ceftazidime** 125 mg/L dialysis fluid.

Using the patients usual exchange volume, with daytime dwell same as night dwell volume.

Aii. Child presenting to the Emergency Department with peritonitis of unknown aetiology, with a history of MRSA [(1)].

1. **Loading Dose**:

   Single dose of:

vancomycin 1000 mg/L dialysis fluid **AND** **ceftazidime** 500 mg/L dialysis fluid.

These should be added to the peritoneal dialysis fluid (using the patients usual exchange volume) and left to dwell for six (6) hours.

2. **Maintenance dose**:

   Thereafter, peritoneal dialysis is continued with maintenance antibiotics, added to all dialysis fluid.

   These are:

vancomycin 25 mg/L dialysis fluid **AND** **ceftazidime** 125 mg/L dialysis fluid.

Using the patients usual exchange volume, with daytime dwell same as night dwell volume.

B. Child presenting to the Emergency Department with peritonitis of unknown aetiology, with marked systemic features. [(1,2,3,4)]

On presentation at the Emergency Department, the child is to be assessed by the medical officer and the nephrologist on-call contacted immediately. Parenteral antibiotic therapy may then be prescribed at the discretion of the nephrologist for patients with suspected systemic sepsis. Maintenance antibiotics to be given via intraperitoneal route.

1. **Loading dose:**

   <u>IP antibiotic administration:</u>

Single dose of: **vancomycin** 1000 mg/L dialysis fluid **AND** **ceftazidime** 500 mg/L dialysis fluid.

These should be added to the peritoneal dialysis fluid (using the patients usual exchange volume) and left to dwell for six (6) hours.

OR

<u>IV antibiotic administration:</u>

IV dose of: **vancomycin** 15mg/kg body weight to a maximum of 500 mg **AND** **ceftazidime** 25-50 mg/kg body weight to a maximum of 2 gram.

2. Maintenance dose:

Thereafter, peritoneal dialysis is continued with maintenance antibiotics added to all dialysis fluid:

vancomycin 25 mg/L dialysis fluid **AND** **ceftazidime** 125 mg/L dialysis fluid,

Using the patients usual exchange volume, with daytime dwell same as night dwell volume.

C. Peritonitis occurring while an Inpatient or within 7 days of discharge, *(i.e.: Health Care Associated Infection).* (1,2,3,4,6)

1. Loading dose:

Single dose of: **vancomycin** 1000 mg/L dialysis fluid **AND** **gentamicin** 8 mg/L dialysis fluid.

Added to the peritoneal dialysis fluid (using the patients usual exchange volume) and left to dwell for six (6) hours.

2. Maintenance dose:

Thereafter, peritoneal dialysis is continued with maintenance antibiotics added to all dialysis fluid:

vancomycin 25 mg/L dialysis fluid **AND** **gentamicin** 4 mg/L dialysis fluid.

Using the patients usual exchange volume, with daytime dwell same as night dwell volume.

D. CICU inpatient with peritonitis of unknown aetiology. (1,2,3,4)

If peritonitis is suspected (cloudy effluent or febrile / symptomatic child), obtain a specimen of PD fluid. This specimen should be collected from the port below the drain burette, after thoroughly cleaning with Povidone Iodine or Aqueous 0.5% chlorhexidine acetate. Inoculate a set of blood culture bottles with PD fluid. These should be sent with the PD fluid specimen for cell count, microscopy culture and sensitivity.

Loading dose:

IV dose of: **vancomycin** 15 mg/kg body weight to a maximum of 500 mg **AND** **ceftazidime** 25-50 mg/kg body weight to a maximum of 2 gram.

3. **Maintenance dose:**

   Peritoneal dialysis is then continued with maintenance antibiotics of:

vancomycin 25 mg/L peritoneal dialysis fluid **AND** **ceftazidime** 125 mg/L peritoneal dialysis fluid.

Using the patients usual exchange volume, until culture results available. Peritoneum should not be left empty when on intraperitoneal antibiotics

Notes:

- Dependent of patient circumstances Intraperitoneal antibiotics may be more appropriate than intravenous, this should be discussed with the CICU director.
- Patients maintained on manual PD are to have antibiotics loaded into every exchange.
- Once cultures are available, treatment should be discussed with the CICU director and/or treating nephrologist so that it can be individualised according to the specific patient circumstances as well as the culture results.

E. Geographically isolated child with peritonitis of unknown aetiology[1,2,3,4].

The geographically isolated child with peritonitis will present to his / her local medical officer or local hospital as arranged. Assessment will be made and the nephrologist on-call at SCH contacted by the local treating medical officer. Generally first line management will depend on the clinical situation.

1. **Loading dose:**

   Administration route for initial loading doses of antibiotic therapy will be at the discretion of the nephrologist on-call, generally IMI or IVI. The choice of drug will be dependent on the individual patient situation and drug availability. The usual drugs used will be:

A first generation cephalosporin:

Drug	Dose	Maximum dose
cefazolin	50 mg / kg body weight	2 gram (IV, IM)
OR		
cefalotin	50 mg / kg body weight	2 gram (IV, IM)

AND one of the following

Drug	Dose	Maximum dose
ceftazidime	25-50 mg / kg body weight	2 gram for (IV, IM)
OR		
gentamicin	2 mg / kg body weight	80 mg (IV, IM)

The nephrologist may request intraperitoneal antibiotics (see previous Ai or Aii section), parents can attend exchange if antibiotics have been loaded into twin bag system by the local health team.

2. The child will generally be transferred to Sydney Children's Hospital for further management.

F. Child presenting with recurrent peritonitis episode within 4 weeks of ceasing antibiotic treatment for peritonitis. (1,2,3)

A child who presents with peritonitis within 4 weeks of ceasing antibiotic treatment for a previous peritonitis episode is considered to have recurrent or relapsing peritonitis.

Initial treatment should be as per protocol A to E, not the original culture. Once the organism has been identified treatment should be tailored and the patient treated for at least 3 weeks. A second agent may be indicated, check with Infectious Diseases Consultant.

G. Line Contamination (1,2,3)

If a patient has significantly contaminated his/her dialysis lines, luer lock, or catheter, the patient is to have an emergency line change and antibiotic cover.

The antibiotic cover is to be a once only dose of:

Cefazolin 500 mg/L

AND

ceftazidime 500 mg/L

Added to the usual dwell volume of peritoneal dialysis fluid. This exchange should dwell for six hours.

All antibiotics are to be given intra-peritoneally, not intravenously.

Patients to have their temperature checked 4 hourly.

Observe for cloudy bags.

Continuing management once culture and sensitivities are available:

Once cultures and sensitivities are available, treatment is to be individualised according to the results, where possible use narrow spectrum agents. In general, treatment durations are: (1,2,3)

Organism	***Recommendations and Duration of Treatment***
Staphylococcus aureus	3 weeks Add rifampicin and sodium fusidate if there is a delayed response to initial therapy (>72 hours), after discussion with ID.
Coagulase-negative staphylococci	2 weeks Add rifampicin and sodium fusidate if there is a delayed response to initial therapy (>72 hours), after discussion with ID.
Enterococcus species	3 weeks

Streptococcus species	2 weeks
Escherichia coli Klebsiella species Resistant to third-generation cephalosporins	2 weeks 3 weeks
Enterobacter, Citrobacter, Serratia, and Proteus species	2–3 weeks
Acinetobacter species	2-3 weeks
Pseudomonas species	3 to 4 weeks Use two agents
Stenotrophomonas maltophilia	3 to 4 weeks
Anaerobes	3 weeks
Multiple organisms	3 weeks
Fungal organism	Removal of catheter. Antimycotic therapy should be administered for 2 weeks or longer after complete resolution of the clinical symptoms of infection after catheter removal. Catheter should not be replaced for 2 weeks. If catheter not removed, treat for at least 6 weeks
Peritonitis relapse (same organism or sterile culture)	Any second relapse of any organism should be treated with removal of the PD catheter. Antibiotics should be continued for 2 weeks after removal of catheter. Catheter should not be replaced for 2 to 3 weeks.
Refractory peritonitis (failure to clear after 5 days of appropriate antibiotics)	Removal of catheter
Culture negative (sterile at 72 hours)	Empiric antibiotic therapy continued for 2 weeks. Aminoglycoside should be discontinued at 72 hours in patients with a sterile culture and clinical improvement.

CAPD patients have antibiotics added to every exchange.

CCPD patients have antibiotics loaded into all PD fluid. The day-time dwell volume should be the same as the night time dwell volume for the duration of the treatment for peritonitis.

Consider removal of peritoneal dialysis catheter for refractory peritonitis. [1,2,3,4] and non-tuberculous mycobacterial peritonitis [3]. It may also be appropriate to consider removal of peritoneal dialysis catheter for repeat and relapsing peritonitis. [1,2,3]

Modification of Automated Peritoneal Dialysis:

There is a knowledge gap in regards to antibiotic dosing for peritonitis in APD. The rapid cycles in APD may result in inadequate time to achieve therapeutic drug levels [3].

If patient circumstances permit, consider changing patients with short dwell times to dwell times of 3 to 6 hours until effluent clears, typically within 72 hours of commencing treatment. This change will allow partial normalization of the peritoneal “milieu”, helping improve the function of peritoneal macrophages, leukocytes and mesothelial cells[1].

Intermittent antibiotic dosing, which dwells for a minimum of 6 hours allows adequate systemic absorption. However short dwell cycles of APD may restrict subsequent re-entry into the peritoneal cavity, resulting in sub therapeutic intraperitoneal levels during the APD session. In patients who receive intermittent antibiotic dosing consider increasing dwell times for the duration of peritonitis treatment [(1)].

MRSA (methicillin resistant Staphylococcus aureas) peritonitis (after consultation with Infectious Diseases consultant):

- **Rifampicin** and sodium fusidate (orally) may be added for the treatment of *Staphylococcus aureus* if the peritoneal cultures remain positive for MRSA despite 5 to 7 days of treatment with IP **vancomycin**. Treat for a period of 3 weeks [(1,2,3)]. Do not add rifampicin as a single agent.
    - Warn patient and parents of the likely change in colour of the PD fluid due to rifampicin.

Decolonisation of Staphylococcus aureus [(7)]

- If *Staphylococcus aureus* is cultured from either the PD catheter exit site or nasal swabs, and the organism isolated is the same as the organism isolated in the PD fluid, eradication of nasal carriage should be attempted using the "5 day decolonisation plan".
- Nasal mupirocin
    - 2% mupirocin nasal ointment applied inside each nostril, twice 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
- Body wash
    - Suitable body washe is a chlorhexidine-based wash like Microshield (2) TM which is a 2% chlorhexidine gluconate wash.
    - If however the child has eczema, then Oilatum Plus® (benzalkonium chloride 6% and triclosan 2% in liquid paraffin) 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.
- Alternatively use a bleach bath.
    - Older child or adult: Add to a full bath tub of water (150-180 L), ½ of a cup (125 mL) of ~ 4% bleach. *This is normal household bleach and should be the unperfumed, unscented variety.
    - The child or adult can spend a normal time in the bath, generally 5-10 minutes. The bleach baths are given daily for 5 days

- Do not immerse the child's head under the water. Tip: For young children, wet scalp areas and behind ears using a small / facial towel or flannelette. Older kids – tip head back and drench scalp/head area with the bleach bath water, take care to avoid eyes
- Once the bath is finished, partially dry the skin by patting it with a towel. Do not rub the skin and don't dry completely.
- Use moisturiser after the bath as the bleach bath can be drying. Using moisturiser from a pump pack will decrease the chance of contamination of the moisturiser with Staphylococcus aureus; such as "QV Skin Lotion" which is readily available from chemists and not greasy.
- Newborns or very small infant: Add 1 ml of ~ 4% bleach* to 1 L of water in a spray bottle. Spray on skin. AVOID head area (including avoid eyes, face and scalp). Leave for 5 – 10 minutes. Either rinse and dry off or just dry off. Follow daily for 5 days
- Use moisturiser after the bath as the bleach can be drying. Using moisturiser from a pump pack will decrease the chance of contamination of the moisturiser with Staphylococcus aureus, such as "QV Skin Lotion" which is readily available from chemists and not greasy.
- Use bleach baths for the same 5 days as nasal mupirocin.

Exit site and tunnel infections:

Some studies have identified that patients with exit site or tunnel infections have twice the risk of developing peritonitis [(1)], it is therefore essential that any infection is adequately diagnosed and treated.

Definitions:

Equivocal exit site:

An equivocal exit site may be an early indication of infection. Features include: liquid drainage in the sinus only, slight granulation tissue in sinus or around exit site, crust formation, slight redness, with sinus epithelium absent or partially covering sinus.

Acutely infected exit site:

Features of an acutely inflamed or infected site include tenderness around site, redness, drainage from sinus, crust formation, granulation tissue around exit site or in the sinus, less than 4 weeks duration.

Chronic exit site infection:

The features of the chronically infected exit site include drainage from the sinus, crust and scab formation (often difficult to remove), granulation tissue around exit site or in the sinus, greater than 4 weeks duration of symptoms. Pain and redness are generally absent.

Tunnel infection:

Features of a tunnel infection include erythema along the catheter tract, oedema, purulent discharge from tract, tenderness when tract palpated.

Colonisation of exit site:

Positive cultures obtained from a normal looking exit site indicate colonization [(1,11)].

Monitoring peritoneal dialysis catheter exit site and tunnel:

Catheter sites older than 2 weeks must be assessed daily and scored against the following table:

Exit Site Scoring System: (Warady et al 2012 [1])

Indication	Score		
	0	1	2
Swelling	No	Exit only (<0.5 cm)	Including part of or the entire tunnel
Crust	No	<0.5 cm	>0.5 cm
Redness	No	<0.5 cm	>0.5 cm
Pain on pressure	No	Slight	Severe
Secretion	No	Serous	Purulent

A diagnosis of exit site or tunnel infection should be made with a score of 2 with a positive culture, or a score of 4 regardless of culture results [1,11]. **Note**: A positive culture is not necessary to diagnose and exit site infection [1], also a positive culture from a non inflamed exit site generally indicates colonisation [1].

Treatment of exit site infections:

- 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 [1]
- Application of topical antibiotics after consultation with Infectious Diseases Team (Mupirocin, Gentamicin, or neomycin in combination), **Note:** Topical therapy is generally not effective with purulent exit site infections, as the secretions tend to dilute or wash away the antibiotic.
- Exuberant granulation tissue should be cauterised with silver nitrate sticks. Care must be taken to ensure that surrounding normal epithelium is not harmed [1]
- Infants should not have baths until exit site has a healthy appearance
- Crust formation should be gently removed
- Antibiotic therapy should be commenced prior to receipt of culture results. Initial antibiotic choice should be reviewed on receipt of cultures [1].
- Once cultures and sensitivities are available use narrow spectrum agents where possible.

Note: Combinations of antibiotics 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

- Treatment should continue for a minimum of 2 weeks of effective antibiotics, and at least 7 days following complete resolution of symptoms [1,11]. As a general rule the following antibiotics are used:

Oral

o Flucloxacillin - first choice, (50 - 75 mg/kg/day in 3 or 4 divided doses – maximum 2 gram/ day),

Note: *flucloxacillin should be given on an empty stomach.*

OR

o Cefalexin 25 mg/kg/day, once daily or in 2 divided doses– Maximum 2 grams/day)

o Rifampicin with sodium fusidate

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

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

Intravenous:

Used if oral therapy not tolerated.

IV flucloxacillin (100 mg/kg/day in 4 divided doses – *usual* maximum 4 grams/day)

OR

IV cefazolin (25 mg/kg/day once daily or in 2 divided doses– *usual* maximum 1 - 2 gram/day)

OR

IP – see appendix 1

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

- If infection does not clear consider removal of PD catheter
- If not already prescribed, oral nystatin should be considered due to the risk of fungal overgrowth with prolonged antibiotic therapy [1,2,4].

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 above, however, consider ultrasonographic examination following completion of treatment.

Ultrasonographic examination of the catheter tunnel can help with a diagnosis for tunnel infections. The indications are: initial evaluation of suspected tunnel infection, evaluation of an exit site infection (especially S. aureus) without clinical features of tunnel infection, follow-up after treatment for exit site and tunnel infections, and in context of relapsing peritonitis.

Established tunnel infections may be treated with intraperitoneal antibiotics.

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.

References:

1. Warady, B.A. et al (2012) Consensus guidelines for the Prevention and Treatment of Catheter-Related Infections and Peritonitis in Pediatric Patients Receiving Peritoneal Dialysis:2012 Update Peritoneal Dialysis International, Vol 32, pp S32-S86.
2. Li, P. K. et al (2010) Peritoneal Dialysis-Related Infections Recommendations: 2010update. Peritoneal Dialysis International, Vol 30, pp 393-423.
3. Li, P.K. et al (2016) ISPD Peritonitis Recommendations: 2016 Update on Prevention and Treatment. Peritoneal Dialysis International, Vol 36, pp 481-508
4. CARI guideline: Management of Peritoneal dialysis-associated peritonitis in adults and children. 2013. http://www.cari.org.au/Dialysis/dialysis%20peritonitis/management_of_PD_associated_peritonitis_final_26Feb2014.pdf
5. CARI guideline: Catheter removal, adjunct therapies and timing of reinsertion of peritoneal dialysis catheter after peritonitis. 2013. http://www.cari.org.au/Dialysis/dialysis%20peritonitis/Catheter_removal_adjunct_therapies_final_15April2014.pdf
6. SCH patient peritonitis statistics from September 1999 to January 2015.
7. Multi Resistant Staphylococcus Aureus (MRSA): Management – SCH http://webapps.schn.health.nsw.gov.au/epolicy/policy/2857. Accessed 9 December 2019.
8. Warady, B.A. et al (2000) Consensus guidelines for the Treatment of Peritonitis in Pediatric Patients Receiving Peritoneal Dialysis. Peritoneal Dialysis International, Vol 20, pp 610-624.
9. Piraino, B. et al (2005) Peritoneal Dialysis-Related Infections Recommendations: 2005 update Peritoneal Dialysis International, Vol 25, pp 107-131.
10. Keane, W.F. et al (2000) Adult peritoneal dialysis-related peritonitis treatment recommendations: 2000 update. Peritoneal Dialysis International, Vol 20, pp
11. Szeto, C.C. et al (2017) ISPD Catheter-Related Infection Recommendations: 2017 Update. Peritoneal Dialysis International, Vol 37, pp 141-154

Related Documents

- Antimicrobial Stewardship – SCH
  http://chw.schn.health.nsw.gov.au/o/documents/policies/policies/2012-7002.pdf
- Vancomycin – SCH
  http://chw.schn.health.nsw.gov.au/o/documents/policies/guidelines/2012-7003.pdf
- Multi Resistant Staphylococcus Aureus (MRSA): Management – SCH
  http://chw.schn.health.nsw.gov.au/o/documents/policies/procedures/2015-7017.pdf
- Peritoneal Dialysis: Care of the Paediatric PD Patient – SCH:
  http://chw.schn.health.nsw.gov.au/o/documents/policies/guidelines/2015-7020.pdf

Appendix 1: Antibiotic Dosing Recommendations

Administration should be via intra-peritoneal route unless otherwise specified.

	Continuous Therapy Loading dose	Continuous therapy Maintenance dose	Intermittent therapy
Glycopeptides:			
Vancomycin	1000 mg/L	25 mg/L	30 mg/kg every 5-7 days (re-dose < 15 mg/L)
Teicoplanin	400 mg/L	20 mg/L	15 mg/kg every 5-7 days (re-dose < 8 mg/L)
Cephalosporins:			
Cefazolin/cefalotin	500 mg/L	125 mg/L	20 mg/kg daily
Cefotaxime	500 mg/L	250 mg/L	30 mg/kg daily
Ceftazidime	500 mg/L	125 mg/L	20 mg/kg daily
Cefepime	500 mg/L	125 mg/L	15 mg/kg daily
Antifungals:			
Fluconazole -	-	-	6-12 mg/kg IP, IV or PO Once daily (max dose 400 mg)
Caspofungin	70 mg/m^2 IV daily (max dose 70 mg)	50 mg/m^2 IV daily (max dose 50 mg)	-
Aminoglycosides:			
Amikacin	25 mg/L	12 mg/L	-
Gentamicin	8 mg/L	4 mg/L	-
Tobramycin	8 mg/L	4 mg/L	-
Penicillins:			
Ampicillin	-	125 mg/l	-
Quinolones:			
Ciprofloxacin	50 mg/L	25 mg/L	-
Combinations:			
Trimethoprim/ Sulfamethoxazole (Co-trimoxazole)	320/1600 mg/L	80/400 mg/L	-
Others:			
Clindamycin	300 mg/L	150 mg/L	-
Metronidazole -	-	-	Intravenous: 7.5 mg/kg/DOSE (max 500 mg) IV 3 times a day or 12.5 mg/kg/DOSE (max 500 mg) twice daily Oral: 30 mg/kg/day PO in 3 divided doses (max dose 1.2 g daily)
Rifampicin	-	-	Discuss with ID
Aztreonam	1000mg/L	250 mg/L	-

Table adapted from Table 5 Warady, B.A. et al (20002012) Consensus guidelines for the Prevention and Treatment of Catheter-Related Infections and Peritonitis in Pediatric Patients Receiving Peritoneal Dialysis. :2012 Update Peritoneal Dialysis International, Vol 2032, pp 610-624S32-S86; and Warady, B.A. et al (2000) Consensus guidelines for the Treatment of Peritonitis in Pediatric Patients Receiving Peritoneal Dialysis. Peritoneal Dialysis International, Vol 20, pp 610-624.

All patients treated with vancomycin, gentamicin and tobramycin should have levels attended after 48 hours of treatment, then weekly or as required by the levels.

Intermittent dosing of glycopeptides are not recommended for patients with residual renal function unless serum levels can be easily monitored.

Appendix 2: Treatment for peritoneal dialysis associated peritonitis