



SW379



Queensland Government

Paediatric Peritoneal Dialysis Peritonitis Clinical Pathway

Facility:

(Affix identification label here)

URN:

Family name:

Given name(s):

Address:

Date of birth:

Sex: M F I

Clinical pathways *never* replace clinical judgement. Care outlined in this pathway **must be varied** if it is not clinically appropriate for the individual client.

This form is to be used to assess patients on peritoneal dialysis who present with any of the following symptoms (tick as appropriate)

Cloudy effluent Abdominal pain
 Febrile Systemically unwell

Assessment	Completed	Initial	Time	Date
• Clinically assess the patient	<input type="checkbox"/>			
• If temperature above 38°C collect blood cultures	<input type="checkbox"/>			
• Inspect exit site - Swab site if signs of infection and send for M/C/S and fungal culture	<input type="checkbox"/>			
• Collect sterile samples of PD effluent fluid (60 mL) to ensure timely culture for analysis • Send specimen to Pathology QLD • Pathology request: Sterile fluid culture + fluid in blood culture medium for M/C/S, fungal culture, WCC & differential. Body site: Peritoneal dialysis fluid	<input type="checkbox"/>			
• Commence immediate Empiric Treatment using table below	<input type="checkbox"/>			
• Admit/transfer patient if any of the following (tick as appropriate below): <input type="checkbox"/> Fever or <input type="checkbox"/> Significant Pain or <input type="checkbox"/> Unable to perform own dialysis	<input type="checkbox"/>			
• Contact the Paediatric Nephrologist / Peritoneal Dialysis Unit as soon as practical	<input type="checkbox"/>			

Dosing regimen for empiric treatment of suspected peritonitis in children on PD

NB. All antibiotics given intraperitoneally (IP). Empiric therapy cover first 48 to 72 hours of therapy only.

- MRSA **negative** patients - use cefepime as monotherapy or cefazolin + Gentamicin*, if cefepime not available.
- Known/suspected MRSA **positive** patients or immediate Penicillin/ Cephalosporin hypersensitivity (e.g. anaphylaxis) - use Vancomycin + Gentamicin for empiric treatment*.

Antibiotic	Initial Dosing SINGLE DWELL ONLY	Subsequent Dosing		
		APD		CAPD
		All cyclor exchanges	Daytime dwell	
Cephalosporins - cefepime - cefazolin	All doses intraperitoneal 500 mg/L	125 mg/L	125 mg/L; increase last fill volume to 50% of usual night time dwell volume	125 mg/L in each dwell
Gentamicin*		-	Usual last fill volume without antibiotic; 0.6 mg/kg daily in 6 hour manual exchange before starting APD	0.6 mg/kg daily in a single 6 hour dwell
Vancomycin*		-	-	-

*If ongoing Vancomycin or Gentamicin treatment required: Vancomycin - check blood level on day 3 and re-dose Vancomycin if serum level <15 mg/L; Gentamicin - check level daily and redose if serum level <1 mg/L.

For duration of antibiotic treatment, use antifungal prophylaxis:

Nystatin OR	Less than 5 years of age: 200,000 units (2 mL) four times a day (orally or via NGT). If able to swallow tablets: 500,000 units (1 tablet) four times daily.
Miconazole 2% oral gel	2.5 mL to 5 mL four times a day, applied to oral mucosa (gums and tongue). If NGT in-situ: Use Miconazole gel topically on oral mucosa and give Nystatin liquid via NGT.

Signature Log To be completed by all staff who initial this pathway

Name (print)	Designation	Signature	Date



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Immediate Treatment

0–6 hours

- Start intraperitoneal antibiotics as soon as possible
- Allow to dwell for at least 6 hours
- Ensure Gram-positive and Gram-negative coverage
- **Continue usual PD regimen**

6–8 hours

- Determine and prescribe ongoing antibiotic treatment
- Ensure follow-up arrangements are clear or patient admitted
- Await sensitivity results

Transfer

- If patient remains unwell may need to be transferring to other facility

Empiric Treatment following Culture Results

If PD Fluid WCC above $100 \times 10^6/L$ of which 50% are polymorphonuclear neutrophils



Diagnosis of Peritonitis is made

Antibiotic Regimen depends on the results of the culture. Follow the links below to locate the correct regimen.

- Staphylococcus aureus* → Plan 1 Go to Page 3
- Enterococcus/Streptococcus* → Plan 2 Go to Page 4
- Other Gram-positive organisms → Plan 3 Go to Page 5
- Pseudomonas species* → Plan 4 Go to Page 6
- Single Gram-negative → Plan 5 Go to Page 7
- Polymicrobial peritonitis day 1–3 → Plan 6 Go to Page 8
- Culture negative on day 1 & 2 → Plan 7 Go to Page 9
- If Gram stain shows fungal elements, surgically remove PD catheter** → Plan 8 Go to Page 10

Consider re-training after successful peritonitis treatment

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Plan of Care 1 This plan of care is only valid if signed by a medical officer/nurse practitioner:

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Staphylococcus aureus on culture

Flucloxacillin and/or Cefazolin sensitive *S.aureus*

Methicillin resistant *S.aureus* (MRSA)

- Cease Gram-negative coverage (Gentamicin or Cefepime)
- No allergies: Continue Gram-positive coverage (Cefazolin IP)
- Cephalosporin immediate type hypersensitivity: Seek Infectious Diseases (ID) opinion.
- Assess exit site again

- Cease Gram-negative coverage (Gentamicin or Cefepime)
- Continue Gram-positive coverage (Vancomycin IP)
- Check Vancomycin level on day 3 and re-dose if serum level <15 mg/L.

- Assess clinical improvement, repeat dialysis effluent cell count and culture at days 3–5
- PD fluid collection and send for cell count and culture at day 3–5

Clinical improvement

No clinical improvement by 5 days on appropriate antibiotics

- Continue antibiotics
- Duration of therapy 21 days

Surgically remove PD catheter
Continue antibiotics minimum 14 days

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Plan of Care 2 This plan of care is only valid if signed by a medical officer/nurse practitioner:

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Date:

Enterococcus or *Streptococcus* sp. on culture

- Discontinue empiric treatment
- Start continuous ampicillin IP in each PD dialysate bag

- If ampicillin resistant or immediate type penicillin hypersensitivity, change to Vancomycin IP alone.
- Check blood level on day 3 and re-dose Vancomycin if serum level <15 mg/L
- If Vancomycin Resistant *Enterococcus* (VRE), seek Infectious Disease opinion

Assess clinical improvement, repeat dialysis effluent cell count and culture at days 3–5:

- Symptoms resolved
- PD effluent bags are clear

Clinical improvement

No clinical improvement by 5 days on appropriate antibiotics

- Continue antibiotics
- Duration of therapy:
 - 14 days (streptococcus)
 - 21 days (enterococcus)

- Surgically remove PD catheter
- Patient to remain on treatment for 14 days, after PD catheter removal

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Plan of Care 3 This plan of care is only valid if signed by a medical officer/nurse practitioner:

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Other Gram-positive organisms including coagulase negative *Staphylococcus* on culture

- Stop Cefepime and continue Gram-positive coverage based on sensitivities
- Stop Gram-negative coverage (Gentamicin)

Assess clinical improvement, repeat dialysis effluent cell count and culture at days 3–5:

- Symptoms resolved
- PD effluent bags clear

Clinical improvement

No clinical improvement by 5 days on appropriate antibiotics

- Continue antibiotics
- Duration of therapy: 14 days

- Surgically remove PD catheter
- Patient to remain on treatment for 14 days after PD catheter removal

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Plan of Care 4 This plan of care is only valid if signed by a medical officer/nurse practitioner:

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Pseudomonas sp (e.g. *aeruginosa*) on culture

Without PD catheter infection (exit-site/tunnel)

- Treat with Cefepime IP or Ceftazidime IP if sensitive - otherwise seek ID advice

Assess clinical improvement, repeat dialysis effluent cell count and culture at days 3–5:

- Symptoms resolved
- PD effluent bags are clear

Clinical improvement

- Continue antibiotics
 - Duration of therapy: 21 days*
- *Adult ISPD 2016 guidelines recommend up to 28 days treatment

With PD catheter infection (exit-site/tunnel) current or prior to peritonitis

- Surgically remove PD catheter
- Patient to remain on treatment for 21 days after PD catheter removal

No clinical improvement by 5 days on appropriate antibiotics

- Surgically remove PD catheter
- Patient to remain on treatment for 21 days after PD catheter removal

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Plan of Care 5 This plan of care is only valid if signed by a medical officer/nurse practitioner:

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Other single Gram-negative organism on culture

E. coli, Proteus, Klebsiella

Stenotrophomonas

- Adjust antibiotics to sensitivity pattern
- If Cefepime IP is used empirically, consider rationalizing therapy to Cefazolin IP if sensitive

Oral Trimethoprim / Sulphamethoxazole 4 mg/kg of trimethoprim component twice daily orally (max. 160 mg/dose)

- Assess clinical improvement, repeat dialysis effluent cell count and culture at days 3–5:
- Symptoms resolved
 - PD effluent bags are clear

- Assess clinical improvement, repeat dialysis effluent cell count and culture at days 3–5:
- Symptoms resolved
 - PD effluent bags are clear

Clinical improvement

No clinical improvement by 5 days on appropriate antibiotics

Clinical improvement

- Continue antibiotics
- Duration of therapy 21 days

- Surgically remove PD catheter
- Patient to remain on treatment for 14 days after PD catheter removal

- Continue antibiotics for 28 days
- No need to change

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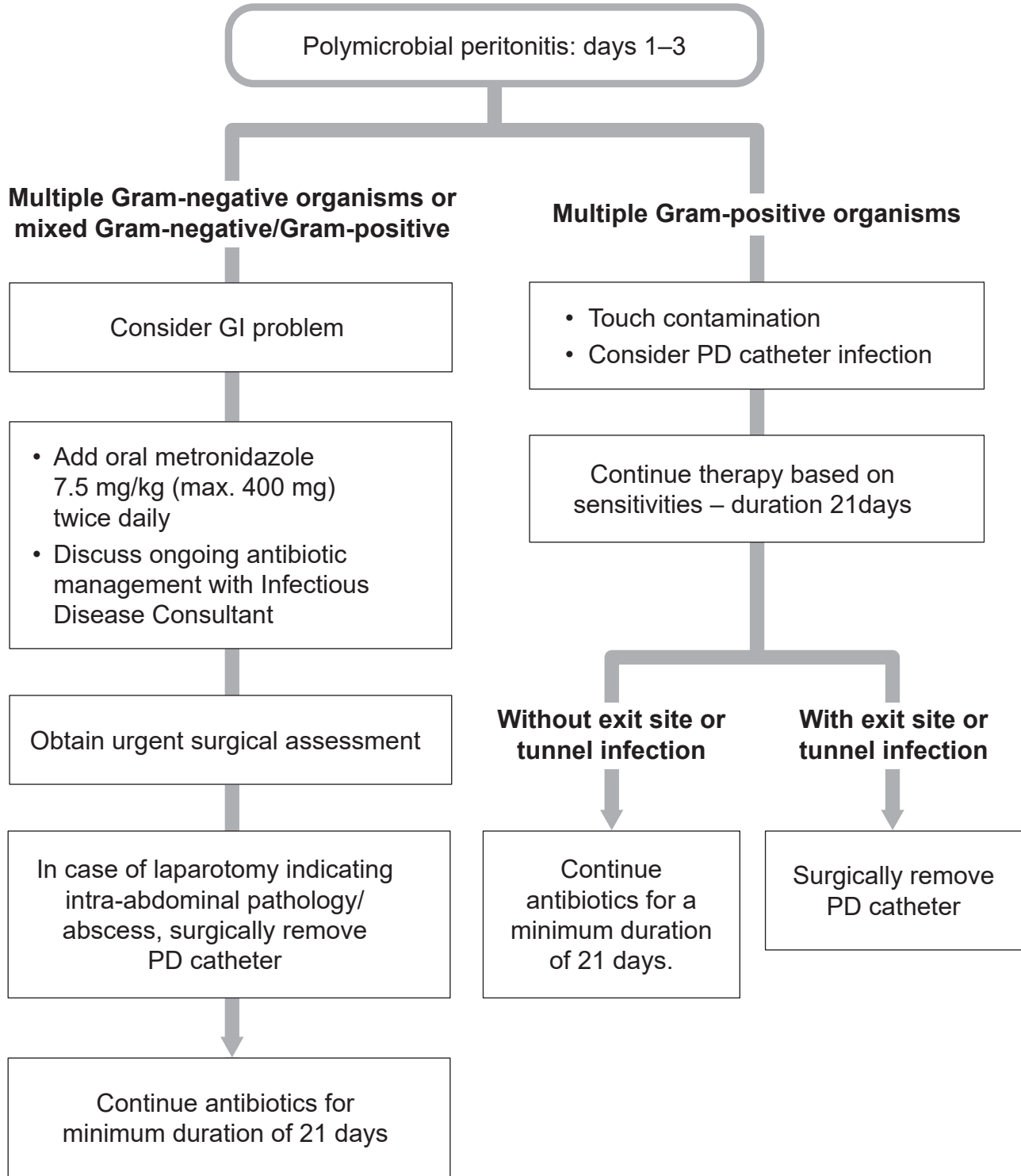
Sex: M F I

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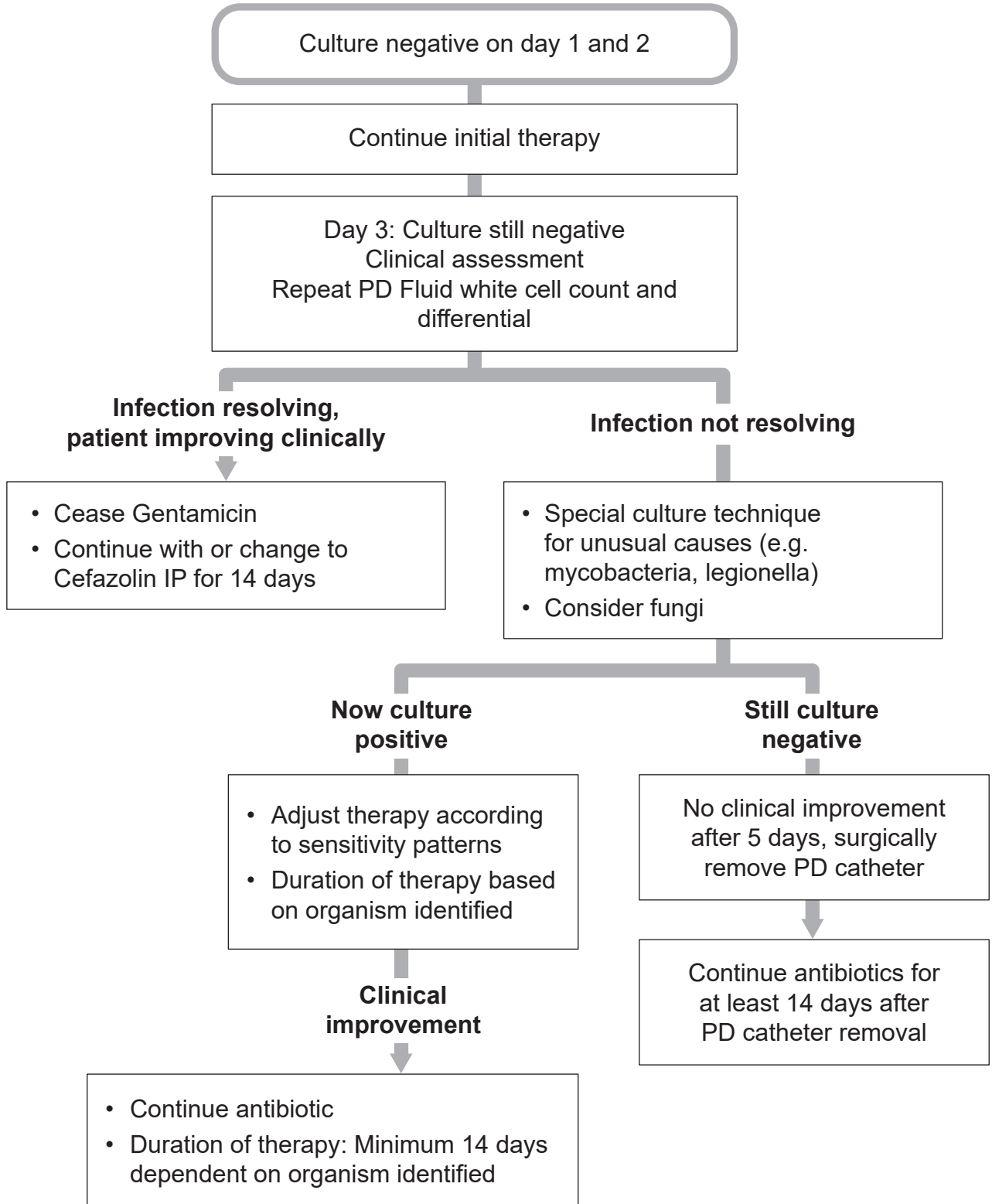
Plan of Care 7 This plan of care is only valid if signed by a medical officer/nurse practitioner:

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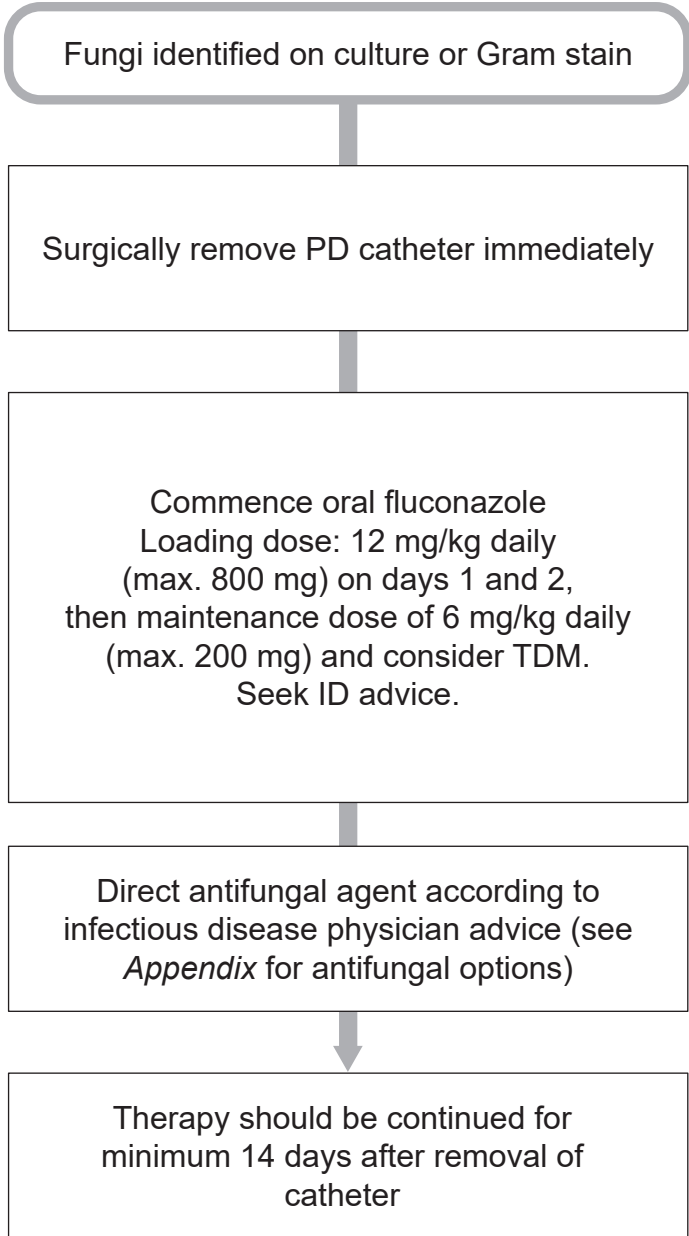
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Plan of Care 8 This plan of care is only valid if signed by a medical officer/nurse practitioner:

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Adapted from the International Society for Peritoneal Dialysis. Dialysis- ISPD Guidelines / Recommendations. Consensus Guidelines for the Prevention and treatment of catheter-related infections and peritonitis in pediatric patients receiving peritoneal dialysis: 2012 update

Appendix

Intraperitoneal antimicrobial dosing recommendations for patients with PD-associated peritonitis				
Antimicrobial	Intermittent (per exchange, once daily)	Continuous (LD = loading dose, exchange dwell of 3 to 6 hours) (MD = maintenance dose)	PD dialysis solution stability at room temperature and 37 degrees C (1, 2)	Drug-Heparin compatibility# (at 37 degrees C)
Aminoglycosides				
Gentamicin	0.6 mg/kg (max. 50 mg)	-	Stable for up to 4hrs in P2 and EI	Incompatible
Tobramycin	0.6 mg/kg (max. 50 mg)	-	Stable for up to 4hrs in P2 and EI	Incompatible
Aminoglycosides and penicillins/cephalosporins should not be mixed in the same PD bag due to the potential inactivation of the aminoglycoside. Check level daily and re-dose if serum level is <1 mg/L.				
Cephalosporins				
Cefazolin	-	LD 500 mg/L MD 125 mg/L	Stable for up to 24hrs in P1, P2 and EI	Compatible with MD concentrations of Cefazolin
Cefepime	-	LD 500 mg/L MD 125 mg/L	Stable for up to 12hrs in EI, only 5 hrs in P2 and 10 hrs in P1	Compatible
Ceftazidime	-	LD 500 mg/L MD 125 mg/L	Stable for up to 24hrs in EI, only 6 hrs in P2 and 12 hrs in P1	Compatible with MD concentrations of Ceftazidime
Cefotaxime	-	LD 500 mg/L MD 125 mg/L	Limited data. Stable for up to 6 hrs in F	
Glycopeptides				
Vancomycin	Load: 30 mg/kg (max. 1.5 g) Repeat dosing 15 mg/kg based on levels*	LD 1000 mg/L MD 25 mg/L	Stable for up to 24hrs in P1, P2 and EI	Conflicting reports. Unknown.
Teicoplanin (seek ID advice)	15 mg/kg every 5 days	LD 400 mg/L MD 20 mg/L	Stable for up to 24hrs in P1 and EI	Incompatible
In patients with residual renal function, glycopeptide elimination may be accelerated. If intermittent therapy is used in such setting, the second dose should be time-based on a blood level obtained 2-4 days after the initial dose. For vancomycin, re-dosing should occur when the blood level is <15 mg/L. For teicoplanin, re-dosing should occur when the blood level is <20 mg/L. Seek ID advice. Intermittent glycopeptide therapy is not recommended for patients with residual renal function unless serum levels of the drug can be monitored in a timely manner.				
Penicillins and others				
Ampicillin	-	MD 125 mg/L		Incompatible
Aztreonam	-	LD 1000 mg/L MD 250 mg/L	Stable for up to 24hrs in EI	Compatible
Imipenem-cilastatin	-	LD 250 mg/L MD 50 mg/L	Stable for up to 6hrs in EI, 2 hrs in P1 and P2	Compatible
In patients on APD, increase the last fill volume to 50% of usual dwell volume to maintain ongoing antibiotic exposure.				
Antifungals				
Fluconazole (seek ID advice)	6 mg/kg (max. 200mg) In one exchange per day 24-48 hrly	-		Compatible
Voriconazole (seek ID advice)	2.5 mg/kg (max. 200mg) in once exchange per day 24 hrly	-		Unknown
Intraperitoneal dosing recommendations from Sanford Antimicrobial guidelines 2021. Peritoneal dialysis (PD) fluids: Physioneal 1.36% = P1; Physioneal 3.86% = P2; Extraneal (Icodextrin) = EI, Fresenius = F PD dialysis solution stability references: (1) Deslandes G et al. Peritoneal dialysis International. 2016; 36(6): 676-679 (2) Yousaf F et al. Peritoneal dialysis International. 2016; 36(4): 457-459 (3) De Vin F et al. Peritoneal dialysis International. 2009; 29:5-15 #Heparin compatibility should be assessed on a case by case basis – consider type of PD fluid and antimicrobials used IP.				

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