



Queensland  
Government

## Adult Peritoneal Dialysis Peritonitis Clinical Pathway

Facility: .....

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 patient.

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

Cloudy effluent  Abdominal pain  
 Febrile  Systemically unwell

Assessment	Completed	Initial	Time	Date
<ul style="list-style-type: none"> <li>Clinically assess the patient and check allergies</li> </ul>				
<ul style="list-style-type: none"> <li>Collect sterile samples of PD effluent fluid to ensure timely culture for analysis:                             <ul style="list-style-type: none"> <li>» One anaerobic (orange top) and one aerobic (green top) blood culture bottles <input type="checkbox"/></li> <li>» Three sterile yellow top container to total of 150mL <input type="checkbox"/></li> <li>» 5mL into EDTA collection tube (purple top) <input type="checkbox"/></li> </ul> </li> <li>Send specimens to microbiology with pathology request:                             <ul style="list-style-type: none"> <li>» Sterile fluid culture + fluid in culture medium for M/C/S, WCC and differential. Body site: Peritoneal dialysis fluid <input type="checkbox"/></li> </ul> </li> </ul>				
<ul style="list-style-type: none"> <li>Commence immediate empiric treatment using below table</li> </ul>				
<ul style="list-style-type: none"> <li>Inspect exit site                             <ul style="list-style-type: none"> <li>» Swab site if signs of infection <input type="checkbox"/></li> </ul> </li> </ul>				
<ul style="list-style-type: none"> <li>If temperature above 38°C collect blood cultures <input type="checkbox"/></li> </ul>				
<ul style="list-style-type: none"> <li>Admit / transfer patient if any of the following (tick as appropriate below):                             <ul style="list-style-type: none"> <li><input type="checkbox"/> Fever <b>or</b> <input type="checkbox"/> Significant pain <b>or</b> <input type="checkbox"/> Unable to perform own dialysis</li> </ul> </li> </ul>				
<ul style="list-style-type: none"> <li>Contact the Nephrologist or Peritoneal Dialysis Unit covering the patient as soon as possible at the time of presentation <input type="checkbox"/></li> </ul>				

### Immediate Empiric Treatment

- Intraperitoneal (IP) administration is preferred route to expedite direct contact with peritoneal membrane as per ISPD guidelines. Negates need for IV access and allows for training of non-clinical personnel to administer.
- Doses must be added to the patient's medication chart to be a valid order.
- Dwell time for PD dialysate fluid bag containing antibiotics must be at least 6 hours.
- Continue APD if clinically appropriate and dosing as per appendix 1 (page 12).
- For automated peritoneal dialysis (APD) with no last fill, instill IP antibiotics in a minimum of 200mL dialysate fluid.

	Drug	Dose	Route	Frequency	Comments
	Nystatin	500,000 international units	PO	QID	Until last antibiotic dose (or 2 days after last aminoglycoside dose and 7 days after last vancomycin dose).
Known hyper-sensitivity to Nystatin	Fluconazole tablets	200mg	PO	Daily	
Optional	Heparin	500units/L	IP	Every PD exchange	If drained bags contain fibrin or clots, instil Heparin into new PD fluid bag.
Known/suspected or community acquired MRSA or Cephalosporin hypersensitivity	Vancomycin*	30mg/kg up to 2grams	IP	In ONE PD dialysate fluid bag stat <sup>†</sup>	Check serum trough levels on day 3 and thereafter every 3–5 days; re-dose Vancomycin when level below 15mg/L as per ISPD guidelines.
	Gentamicin*	0.6mg/kg up to 50mg	IP	In ONE PD dialysate fluid bag every 24 hours <sup>†</sup>	ISPD guidelines report the role of measuring gentamicin levels as controversial.
No MRSA	Cefazolin**	15mg/kg	IP	In ONE PD dialysate fluid bag every 24 hours <sup>†</sup>	As per gentamicin comments above ↗
	Gentamicin**	0.6mg/kg up to 50mg	IP	In ONE PD dialysate fluid bag every 24 hours <sup>†</sup>	

\* Vancomycin and gentamicin may be administered in the same bag without loss of bioactivity.  
 \*\* Cefazolin and gentamicin may be administered in the same bag without loss of bioactivity. Concerns are acknowledged, however there have been no issues identified at Qld Health facilities undertaking this practice.  
<sup>†</sup> Adjust dose to reflect fill volume of PD bag used for last/long dwell.

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

Name (print)	Designation	Signature	Date	Name (print)	Designation	Signature	Date

DO NOT WRITE IN THIS BINDING MARGIN

v3.00 - 11/2020



SW203

ADULT PERITONEAL DIALYSIS PERITONITIS CLINICAL PATHWAY



## Adult Peritoneal Dialysis Peritonitis Clinical Pathway

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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

##### 24 hours for remote areas

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

#### Transfer

- If patient remains unwell may need to be transferred to another facility

### Empiric treatment following culture results

- If PD effluent 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*

*Streptococcus*  **Plan 2** *Go to Page 4*

*Enterococcus*  **Plan 3** *Go to Page 5*

Other Gram-positive organisms  **Plan 4** *Go to Page 6*

Single Gram-negative  **Plan 5** *Go to Page 7*

*Pseudomonas* species  **Plan 6** *Go to Page 8*

Polymicrobial peritonitis: day 1–3  **Plan 7** *Go to Page 9*

Culture negative on day 1 and 2  **Plan 8** *Go to Page 10*

Fungi  **Plan 9** *Go to Page 11*

**If Gram stain shows fungal elements, surgically remove PD catheter**

### PD catheter treatment

- Consult with nephrologist as soon as possible
- Continue

### Plan of care

Consider re-training patient after successful peritonitis treatment

DO NOT WRITE IN THIS BINDING MARGIN

Medical Officer (print name):

Designation:

Signature:

Date:



# Adult Peritoneal Dialysis Peritonitis Clinical Pathway

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## Plan of Care 1 This plan of care is only valid if signed by a Medical Officer

Medical Officer / Nurse Practitioner (print name):	Designation:	Signature:	Date:
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**Staphylococcus aureus on culture**

- Continue Gram-positive coverage based on sensitivities
- Stop Gram-negative coverage (gentamicin)
- Assess exit site again

If methicillin resistant (MRSA) change to vancomycin intraperitoneal

- 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

- Surgically remove PD catheter

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# Adult Peritoneal Dialysis Peritonitis Clinical Pathway

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## Plan of Care 2 This plan of care is only valid if signed by a Medical Officer

Medical Officer / Nurse Practitioner (print name):

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Date:

**Streptococcus on culture**

- Continue cefazolin intraperitoneal
- Cease gram-negative coverage (gentamicin)

If resistant or allergic to penicillin / cephalosporin, change to cefazolin intraperitoneal to vancomycin intraperitoneal

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 14 days

- Surgically remove PD catheter
- After surgical PD catheter removal patient to remain on treatment for 14 days

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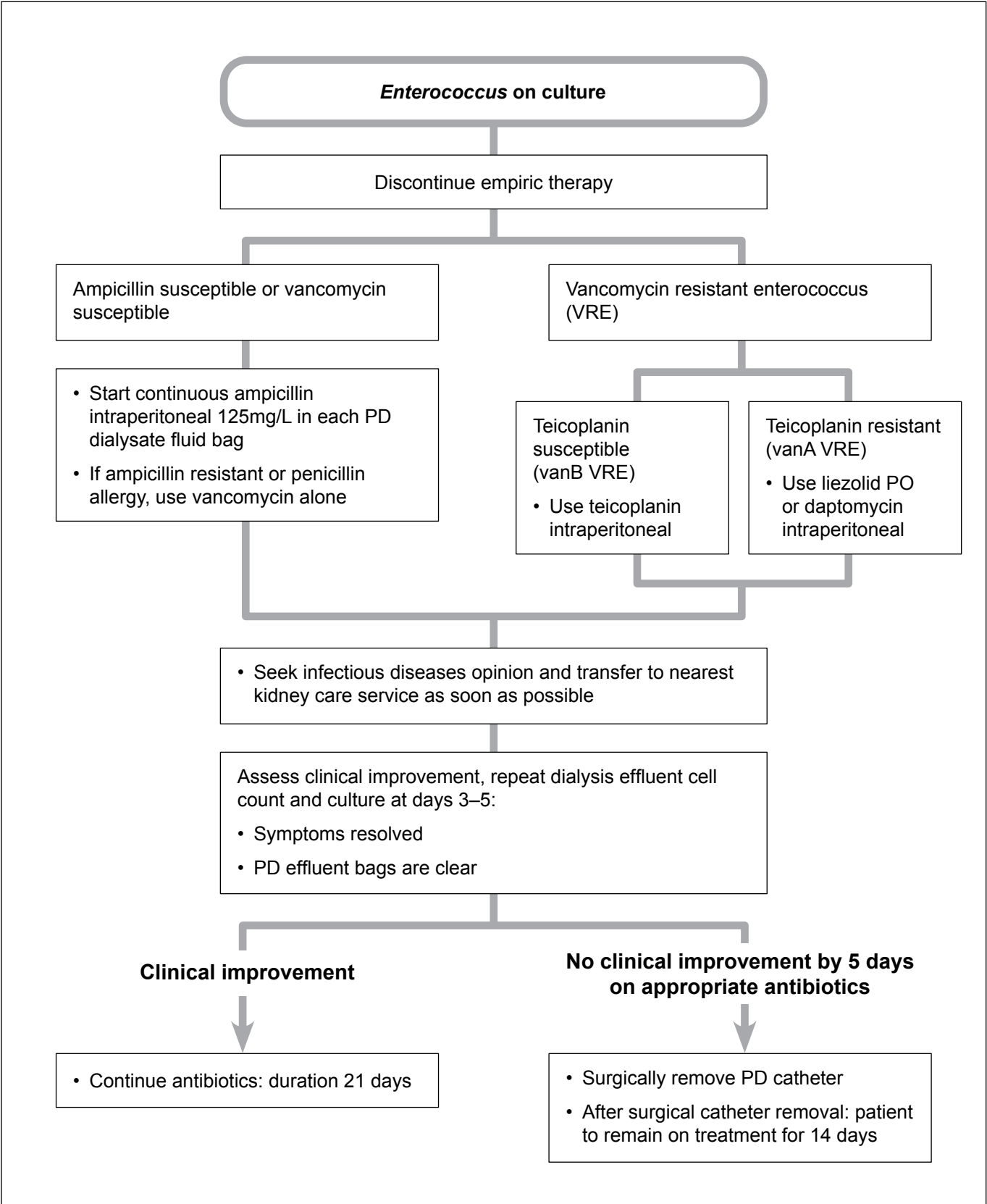
Date of birth:

Sex:  M  F  I

## Plan of Care 3 This plan of care is only valid if signed by a Medical Officer

Medical Officer / Nurse Practitioner (print name):	Designation:	Signature:	Date:
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### Adult Peritoneal Dialysis Peritonitis Clinical Pathway

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**Plan of Care 4** This plan of care is only valid if signed by a Medical Officer

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Date:

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

- 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 are clear

**Clinical improvement**

- Continue antibiotics: duration 14 days

**No clinical improvement by 5 days on appropriate antibiotics**

- Surgically remove PD catheter
- After surgical catheter removal: patient to remain on treatment for 14 days

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# Adult Peritoneal Dialysis Peritonitis Clinical Pathway

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## Plan of Care 5 This plan of care is only valid if signed by a Medical Officer

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### Other single gram-negative organism on culture (e.g. *klebsiella pneumoniae*)

*Aeromonas* or 'ESCPM':  
*Enterobacter sp.*  
*Serratia sp.*  
*Citrobacter freundii*  
*Proteus vulgaris*  
*Morganella morganii*

*Acinetobacter sp.*

*Stenotrophomonas sp.*

Other gram-negative organisms

- Ciprofloxacin PO or cefepime intraperitoneal

- Ciprofloxacin PO

- Trimethoprim sulfamethoxazole PO

- Cefazolin susceptible: continue cefazolin, intraperitoneal and cease gentamicin
- Cefazolin resistant: treat according to susceptibilities either ceftazidime intraperitoneal OR cefepime intraperitoneal OR ciprofloxacin PO or seek infectious diseases advice

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:
  - 28 days for *Stenotrophomonas*
  - 21 days for other Gram-negatives

- Surgically remove PD catheter
- After surgical catheter removal: patient to remain on treatment for 21 days

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## Plan of Care 6 This plan of care is only valid if signed by a Medical Officer

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### *Pseudomonas aeruginosa*

**Without PD catheter infection (exit site / tunnel)**

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

- Use two different antibiotics as guided by sensitivities which differ in their mechanism of action (i.e. ceftazadine intraperitoneal *OR* cefepime intraperitoneal *AND* gentamicin intraperitoneal *OR* tobramycin intraperitoneal *OR* ciprofloxacin PO

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

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 21–28 days as per 2016 ISPD guidelines update

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

Prolonged treatment with gentamicin should be avoided and treatment greater than 7 days should only proceed following direct advice from nephrologist or infectious diseases physician.

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## Plan of Care 7 This plan of care is only valid if signed by a Medical Officer

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### Polymicrobial peritonitis: days 1–3

#### Multiple Gram-negative organisms or mixed Gram-negative / Gram-positive

- Consider gastrointestinal problem

- Change therapy to metronidazole PO in conjunction with either ampicillin intraperitoneal and gentamicin intraperitoneal; or ceftazidime intraperitoneal

- Obtain urgent surgical assessment

- In case of laparotomy indicating intraabdominal pathology / abscess, surgically remove PD catheter

- Continue antibiotics: duration minimum of 21 days

#### Multiple Gram-positive organisms

- Consider touch contamination
- Consider PD catheter infection

- Continue therapy based on sensitivities: duration minimum of 21 days

#### Without exit site or tunnel infection

- Continue antibiotics
- Duration of treatment for a minimum 21 days

#### With exit site or tunnel infection

- Remove PD catheter

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## Plan of Care 8 This plan of care is only valid if signed by a Medical Officer

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**Culture negative on day 1 and 2**

- Continue initial therapy

Day 3: culture still negative

- Clinical assessment
- Repeat PD fluid WCC and differential

**Infection resolving, patient improvement clinically**

- Discontinue gentamicin and continue with cefazolin for 14 days

**Infection not resolving**

- Special culture technique for unusual causes (*e.g.* mycobacteria, *Legionella*)
- Consider fungi

**Now culture positive**

- Adjust therapy according to sensitivity patterns
- Duration of therapy based on organism identified

**Clinical improvement**

- Continue antibiotics
- Duration of therapy: minimum 14 days dependent on organism identified

**Still culture negative**

- No clinical improvement after 5 days, surgically remove PD catheter

- Continue antibiotics for at least 14 days after PD catheter removed

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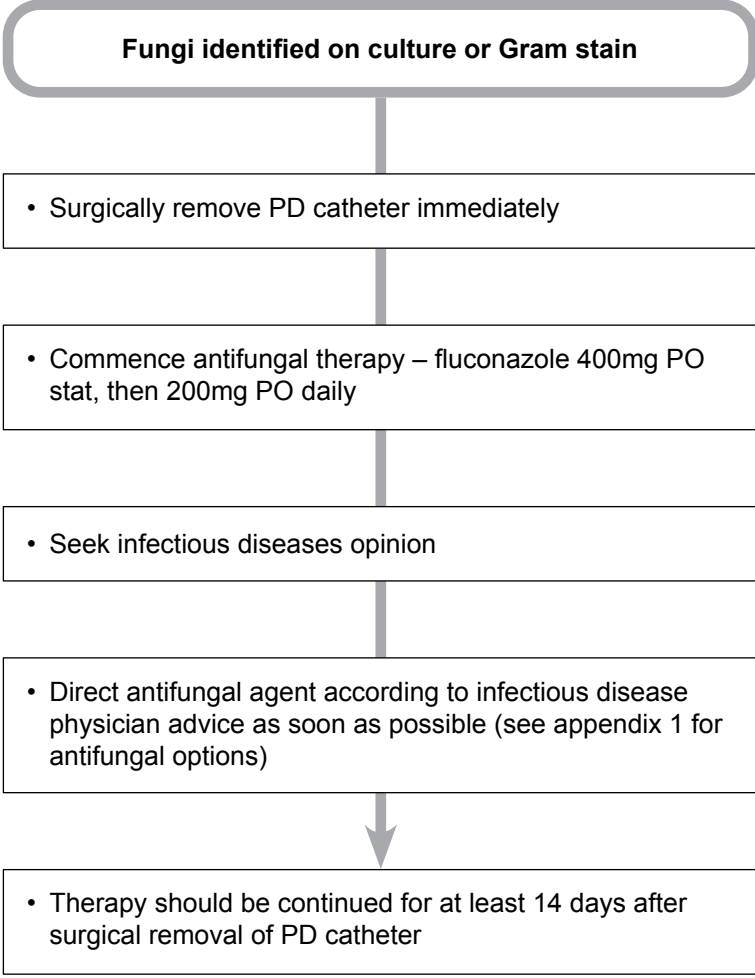
Date of birth:

Sex:  M  F  I

**Plan of Care 9** This plan of care is only valid if signed by a Medical Officer

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## Appendix 1 (Advise discuss with nephrologist as soon as possible)

Intraperitoneal Antibiotic Dosing Recommendations for CAPD patients*						
Dose calculation: dose prescribed in mg per kg of patient weight on presentation = dose per bag						
Antibiotic Type		Intermittent (per exchange, once daily)	Continuous (mg / L; all exchanges)	Oral Dosing		
Gram-negative cover only	Aminoglycosides	Amikacin	2mg / kg	LD25, MD12		
		Gentamicin OR	0.6mg / kg	LD 8, MD 4		
		Tobramycin	0.6mg / kg	LD 8, MD 4		
	Cephalosporins	Cefepime	1000mg	LD 500, MD 125		
		Ceftazidime	1000–1500mg	LD 500, MD 125		
		Cefazolin	15–20mg/kg			
		Ceftriaxone	1000mg			
	Quinolones	Ciprofloxacin	ND	MD 50	500mg PO daily OR 750mg PO daily for pseudomonas	
	Others	Aztreonam	2grams	LD 1000, MD 250		
	Gram-positive cover only	Penicillins	Amoxicillin	ND	LD 250-500, MD 50	
Ampicillin			ND	MD 125		
Benzylpenicillin			ND	LD 50,000 units, MD 25,000 units		
Others		Daptomycin (115)	ND	LD 100, MD 20		
		Linezolid (41)	ND	LD 600, MD 300	200–300mg once daily	
		Teicoplanin	15mg / kg every five days	LD 400, MD 20		
		Vancomycin	15–30mg / kg every 5–7 days	LD 1000, MD 25		
Gram-negative AND Gram-positive	Cephalosporin	Cefazolin	15mg / kg			
	Others	Trimethoprim / Sulfamethoxazole			800/160mg BD	
Antifungals	Fluconazole		200mg every 24–48 hours		400mg stat, then 200mg once daily	
	Variconazole					

\* Icodextrin-containing dialysis solution is compatible with vancomycin, cefazolin, gentamicin, ampicillin, cloxacillin and amphotericin. However exercise caution when prescribing amoxicillin, cefepime, ceftazidime and imipenem due to lack of stability.

Intermittent Dosing of Antibiotics in Automated Peritoneal Dialysis (APD)	
Drug	Intraperitoneal dose into last fill or daytime exchange <i>NB: Consider volume of last fill. For example: dose ordered 1000mg in fill volume of 1500mL to be injected into a 2500mL bag – calculate 1000 divided by 1500, then multiply by 2500 = 1.666 grams per bag. If no last fill – instill intraperitoneal antibiotics / antimicrobials in a minimum of 200mL dialysate.</i>
Cefazolin	15mg / kg intraperitoneal every day, in long day dwell (112)
Cefepime	1gram intraperitoneal in one exchange per day ( <i>NB: Unstable in Icodextrin containing dialysis solution</i> )
Fluconazole	200mg intraperitoneal in one exchange per day every 24–48 hours
Tobramycin	LD 1.5mg / kg intraperitoneal in long dwell, then 0.5mg / kg intraperitoneal each day in long dwell (112)
Vancomycin	LD 30mg / kg intraperitoneal in long dwell; repeat dosing 15mg / kg intraperitoneal in long dwell every 3–5 days (aim to keep serum trough levels above 15mcg / mL)

<b>LEGEND</b>	<b>BD</b> Two times per day	<b>LD</b> Loading dose in mg / L	<b>MD</b> Maintenance dose in mg / L
	<b>N/A</b> Not applicable	<b>ND</b> No data	

Acknowledgement: International Society for Peritoneal Dialysis. Table adapted from Dialysis-related Infections Recommendations: 2018 Update.