

## Protocol for the Management of Peritoneal Dialysis (PD) Associated Peritonitis

**PD-associated peritonitis** can be diagnosed when at least **two** of the following are present:

- Clinical features consistent with peritonitis (abdominal pain, cloudy dialysis fluid)
- Dialysis fluid white cell count  $>100/\mu\text{litre}$  (or  $\text{mm}^3$ ) with  $>50\%$  polymorphonuclear leucocytes (PMNs)
- Positive culture from dialysis fluid

### Confirmation of Peritonitis

Take history, identifying possible episodes of contamination or recent PD-related infections. Clinical assessment of patient observations and examination specifically looking for evidence of exit site/tunnel infection.

#### Essential samples:

- Send 1x universal container to microbiology for **urgent** total/differential white cell counts and gram stain
- Send PD fluid in anaerobic and aerobic blood culture bottles (10mls per bottle) labelled "PD Fluid"
- If exit site exudate present, swab and send for culture.

Ensure sample is taken after a minimum 2 hour dwell. If abdomen dry, fill with 1 litre dwell for 2 hours then sample.

### Initial Antimicrobial Treatment (Day 0)

**Antibiotic therapy is given intra-peritoneally (IP) and should be initiated as soon as possible when WCC is found to be  $>100 \mu\text{litre}$**  but if clinical suspicion is high and/or patient is unwell with evidence of sepsis, antibiotics should be given immediately after samples are taken, without waiting for PD cell count result.

- **Vancomycin 30mg/kg (maximum 3g) IP and**
- **Ceftazidime 1.5g IP in 2 litre bag**
- **Oral anti-fungal prophylaxis Fluconazole 200mg alternate days for duration of antibiotics**

Antibiotic therapy must cover both gram negative and gram positive organisms.

Ceftazidime and Vancomycin can be given in to the same bag and are compatible with standard glucose bags and icodextrin. All IP antibiotics should be given via PD exchanges for a minimum dwell 6 hours. Patients can stay on APD.

**If allergy to Vancomycin**, Teicoplanin 15mg/kg every 5 days or cefazolin 15mg/kg daily can be used instead.

**If allergy to Ceftazidime**, Gentamicin 0.6 mg/kg can be given but note the risk of vestibular/ototoxicity so serum gentamicin levels should be monitored carefully. Please refer to Edren website for further advice.

**If previous clostridium difficile infection**, consider Aztreonam 3g IP daily instead of Ceftazidime.

Alternative antibiotics and their dosing/stability in PD fluid is available on Edren website.

If concerns about fluconazole and drug interactions, give Nystatin 500,000 units QDS instead.

### Ongoing antimicrobial therapy and Vancomycin monitoring (Day 1 onward)

- **Ceftazidime 1.5g IP daily**
- **Vancomycin aiming to keep trough 15-20 mg/l (dose 30mg/kg for subsequent doses)**
- **Oral antifungal prophylaxis for duration of antibiotics**

First Vancomycin trough should be checked 48 hours after initial Vancomycin dose.

- If initial trough  $>20\text{mg/l}$ , a Vancomycin trough should be repeated 24 hours later (and every 24 until  $<20$ ).
- If initial trough 10-20, further Vancomycin 30mg/kg should be given and repeat trough level 48 hours later.
- If initial trough  $<10$ , further Vancomycin 30mg/kg should be given and repeat trough checked 24 hours later.
- Avoid Vancomycin trough  $<12 \text{ mg/l}$  by more frequent monitoring and dosing as appropriate.

Timing of subsequent vancomycin trough check will be guided by how quickly the vancomycin level fell  $<20\text{mg/l}$  (eg if it took 3 days for trough to fall  $<20$  then suggest checking trough 3 days after second dose). Patients with greater residual renal function will clear vancomycin more quickly. Both Ceftazidime and Vancomycin IP should continue until culture results are available.

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### Management when Culture results available

Culture results are normally available by day 3. Note treatment varies according to organism cultured with some organisms requiring 3 weeks therapy or two antibiotics as summarised below: refer to Edren website for more detail.

**If culture negative**, send further samples and discuss with microbiology to consider extended culture.

<i>Culture negative</i>	2 weeks vancomycin <u>and</u> ceftazidime
<i>Gram positive cocci</i>	2 weeks vancomycin, stop ceftazidime
<i>MSSA or MRSA</i>	3 weeks vancomycin, stop ceftazidime
<i>Streptococcus</i>	2 weeks vancomycin, stop ceftazidime
Enterococci	3 weeks vancomycin (or oral amoxicillin if sensitive)
VRE	3 weeks oral linezolid
<i>Corynebacterium</i>	2 weeks vancomycin, stop ceftazidime (If repeat episode, give 3 weeks vancomycin)
<i>Pseudomonas</i>	3 weeks, stop vancomycin, needs <u>2 antibiotics</u> against gram negative
<i>Acinetobacter</i>	3 weeks, stop vancomycin (IP meropenem or oral ciprofloxacin)
<i>Stenotrophomonas</i>	3 weeks, stop vancomycin, 2 antibiotics (according to sensitivities)
<i>Polymicrobial</i>	3 weeks (consider GI pathology), antibiotics to cover all organisms
<i>Enteric gram negative</i>	3 weeks, stop vancomycin, ceftazidime IP pending sensitivities
<i>Serratia marcescens</i>	3 weeks, stop vancomycin, stop ceftazidime give IP meropenem or oral ciprofloxacin
<i>Citrobacter</i>	3 weeks, stop vancomycin, stop ceftazidime give IP meropenem or oral ciprofloxacin
<i>Morganella morganii</i>	3 weeks, stop vancomycin, stop ceftazidime give IP meropenem or oral ciprofloxacin
<i>Enterobacter cloacae</i>	3 weeks, stop vancomycin, stop ceftazidime give IP meropenem or oral ciprofloxacin
<i>ESBL- producing</i>	3 weeks, stop vancomycin, stop ceftazidime give IP meropenem or oral ciprofloxacin
<i>CPE</i>	3 weeks, stop vancomycin, seek microbiology advice
<i>Fungal</i>	Catheter removal ASAP then 2 weeks treatment as per sensitivities
<i>Pasteurella multocida</i>	2 weeks, stop vancomycin, ceftazidime IP or co-amoxiclav (PO)
<i>Gordonia</i>	3 weeks, stop vancomycin, 2 antibiotics (meropenem +gentamicin)
Mycobacteriae	Discuss with microbiology and infectious diseases specialist

### Assessing response to Treatment

If inpatient, send samples daily for WCC and culture. If outpatient send samples minimum Day 2 and Day 5 for WCC and culture hoping to see a falling WCC. If the patient is not improving and the WCC is not falling by day 5 despite appropriate antibiotics PD catheter removal is advised.

### Indications for Catheter Removal

PD catheter removal is a clinical decision but is recommended in the following circumstances:

- Fungal peritonitis (catheter must be removed in all cases, as soon as possible)
- Refractory peritonitis (ie no clinical improvement by day 5)
- Relapsing, recurrent or repeat peritonitis\*
- Refractory exit site and/or tunnel infection

\*At the discretion of the treating clinician but recommendation is after 2<sup>nd</sup> episode of staphylococcus aureus, 2<sup>nd</sup> episode pseudomonas, 3<sup>rd</sup> episode coagulase negative staphylococci (even if responding to treatment).

If catheter is removed, appropriate antibiotic (minimum 14 days) or fungal therapy (minimum 14 days) should be continued. This could be iv or oral according to clinical condition and microbiology advice.

### Notes:

- Treatment can be inpatient or outpatient at the discretion of the treating team, based on the patient's clinical condition, frailty, social factors and practicalities of providing outpatient antibiotics.
- Inform community dialysis team ext 21219/21220 as soon as possible if a PD patient presents with infection.
- This Protocol has been agreed nationally. Peritonitis and its management are audited by the Scottish Renal Registry quarterly and this data will inform future protocol revisions.
- (This version updated February 2025 by Dr M Petrie)