CLINICAL GUIDELINE

Peritoneal Dialysis Related Peritonitis

A guideline is intended to assist healthcare professionals in the choice of disease-specific treatments.

Clinical judgement should be exercised on the applicability of any guideline, influenced by individual patient characteristics. Clinicians should be mindful of the potential for harmful polypharmacy and increased susceptibility to adverse drug reactions in patients with multiple morbidities or frailty.

If, after discussion with the patient or carer, there are good reasons for not following a guideline, it is good practice to record these and communicate them to others involved in the care of the patient.

Version Number:	6
Does this version include changes to clinical advice:	Yes
Date Approved:	14th May 2024
Date of Next Review:	31st May 2027
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Approval Group:	Antimicrobial Utilisation Committee

Important Note:

The Intranet version of this document is the only version that is maintained.
Any printed copies should therefore be viewed as 'Uncontrolled' and as such, may not necessarily contain the latest updates and amendments.

Contents

1. Definitions

Peritoneal dialysis associated peritonitis is diagnosed if at least two of the following are present:

- clinical features consistent with peritonitis, i.e. abdominal pain and/or cloudy dialysis effluent
- the peritoneal effluent contains more than 100 white cells per microlitre with more than 50% polymorphonuclear leucocytes. (after a dwell time of at least 2 hours)
- positive dialysis effluent culture the peritoneal effluent contains more than 100 white cells per microlitre with more than 50% polymorphonuclear leucocytes.

*****We recommend that PD patients presenting with cloudy effluent be presumed to have peritonitis and treated as such until the diagnosis can be confirmed or excluded*****

Relapsing peritonitis is defined as further episode of peritonitis caused by the same organism (or sterile culture) occurring within 4 weeks of completing antibiotic therapy for peritonitis.

Repeat peritonitis is a further episode of peritonitis more than 4 weeks after completing antibiotics, with the same organism.

Recurrent peritonitis is a further episode of peritonitis caused by a different organism, occurring within 4 weeks of completing antibiotics for peritonitis.

Outcome following an episode of peritoneal dialysis related peritonitis is classified as:

- Cure defined as resolution of evidence of peritonitis following antimicrobial therapy and without the need for catheter removal.
- Peritoneal dialysis catheter removal
- Patient death. This includes patients who die within 28 days of presentation of peritonitis even if the effluent WCC had cleared.

References:

ISPD Peritonitis Recommendations: 2022 Update on Prevention and Treatment 1.
Li PK-T, Chow KM, Cho Y, et al. ISPD peritonitis guideline recommendations: 2022 update on prevention and treatment. Peritoneal Dialysis International. 2022;42(2):110-153. doi:10.1177/08968608221080586

Scottish Renal Registry
http://www.srr.scot.nhs.uk/Projects/PDF/2017/SRR_Peritoneal_Dialysis_Audit_Definitions.pdf

UK Renal Association Guidelines
https://ukkidney.org/sites/renal.org/files/final-peritoneal-dialysis-guideline667ba231181561659443ff000014d4d8.pdf

Pharmacokinetics of once daily intra-peritoneal aztreonam and vancomycin in the treatment of CAPD peritonitis
Brown J et al. J Antimicrobial Chemotherp 1990; 25; 141-147

Guideline updated by J Traynor, consultant nephrologist and reviewed by Heather Black, Renal Pharmacist May 2024 and approved by PD MDT.
Review Date May 2027

2. Diagnosis (day 0)

Routine observations (temperature, BP, pulse rate)
PD effluent in **small universal container (with grey lid)** AND **in Blood culture** bottles to bacteriology for **URGENT** WCC, Gram stain and C&S
Check CRP and consider blood cultures if febrile
Record details of the initial assessment, including urgent WCC result, in the case notes or clinical history on EPR.

Remember to consider predisposing causes:

a) exit site or tunnel infection
b) break in sterile dialysis procedure or equipment (without subsequent administration of prophylactic antibiotics)
c) diverticulosis or other bowel disease

3. Initial antimicrobial therapy (day 0)

The aim of initial therapy is provide cover against both gram positive and negative organisms.
All intermittent (bolus) intraperitoneal (IP) dosages of antibiotics should be administered via peritoneal dialysis exchanges with a minimum dwell time of 6 hours. IP antibiotics are compatible with Icodextrin (Extraneal) dialysis fluid.

The loading dosages of intraperitoneal vancomycin and ceftazidime are as follows:

Vancomycin – 30mg/Kg body weight to a maximum of 3g intraperitoneally in a minimum 6hr dwell.
NB Use vancomycin prescription chart for peritoneal dialysis to record doses administered and levels.
For patients allergic to vancomycin teicoplanin intraperitoneally is an alternative (see page 7)
Ceftazidime – 1.5 g intraperitoneally in a minimum 6 hr dwell. Administer daily

If previous know *Clostridium difficile* infection not for ceftazidime. Give aztreonam.
Aztreonam – 3g intraperitoneally in a minimum 6 hour dwell. Administer daily

Treatment should start immediately after the WCC is found to be >100/ul. Automated Peritoneal Dialysis (APD) patients require a CAPD exchange, with antibiotics added.

ISPD guidelines now recommend anti-fungal prophylaxis. Patients should receive 500,000 units (FIVE mls) oral nystatin four times daily for the duration of treatment.

Note:
APD patients do not need to convert to CAPD but, if peritonitis is severe enough to require inpatient stay APD patients should be converted to CAPD.

4. Management on day 1

a) Monitor routine observations as on day 0
b) Record the result of WCC on overnight or long day dwell dialysate effluent in the case notes or under clinical history on EPR
c) Administer 1.5 g ceftazidime IP in a long dwell. If previous *C.difficile* infection give aztreonam 3g IP in a long dwell.

5. Management on day 2

a) Monitor routine observations as on day 0
b) Record the result of WCC on overnight or long day dwell dialysate effluent in the casenotes or clinical history on EPR.
c) Administer 1.5 g ceftazidime IP in a long dwell. If previous *C.difficile* infection give 3 g aztreonam IP in long dwell.
d) If residual renal function (RRF) >5ml/min, check vancomycin level after 48hrs. (Vancomycin and aminoglycoside levels fall more quickly in patients with residual urinary output. Patients with significant residual renal function will require more frequent monitoring of serum vancomycin levels.)
Give vancomycin 15 mg/kg IP into long dwell when level <20mg/l (note different level to that used in haemodialysis). If level <10mg/l discuss with pharmacist/doctor as dose may require to be altered.

6. Management on day 3

a) Monitor routine observations as on day 0
b) Monitor WCC on overnight dialysate effluent, CRP and serum vancomycin levels if RRF ≤5mls/min. Give vancomycin 15mg/kg IP into long dwell when level <20mg/l.
c) Review bacteriology and clinical response (serial results of effluent WCC, CRP and serum vancomycin level).

1) **Gram +ve**
Continue vancomycin
15mg/kg intraperitoneally (minimum 6 hour dwell) when level <20mg/l

2) **Gram -ve**
Continue ceftazidime
daily dosing, 1.5g intraperitoneally (minimum 6 hour dwell)
If previous *C.difficile infection f*or 3g aztreonam (minimum 6 hour dwell)

3) **Multiple Gram -ve organisms and/or anaerobes**
Consider surgery (likely intra-abdominal pathology) and add metronidazole

4) **Culture negative**
Continue vancomycin/teicoplanin and ceftazidime/aztreonam

5) **No clinical improvement**

Most patients should be improving by 48 hours

If not responding by 72 hours, consider

Check of antimicrobial sensitivities
Tunnel infection / exit site infection (commonly Gram +ve)
Unusual organism – treat as per microbiology advice
Catheter removal if dialysate WCC not decreasing
Fungal infection – arrange catheter removal
Recurrent *Staphylococcus aureus* or persistent coagulase negative staphylococcus (from PD fluid) - add rifampicin 600 mg/day. NB rifampicin many drug interactions see British National Formulary (BNF)

7. Management from day 4 onwards

Continue Vancomycin/teicoplanin and ceftazidime/aztreonam or change antibiotic therapy depending on bacteriology results.

Review interval at the PD unit will depend on progress and the need to monitor WCC of effluent and serum levels of antibiotics.

8. Management to minimise complications

Duration of treatment depends on clinical response and is usually at least 14 days
Longer duration of treatment (21 days) is required for more severe infections caused by *Staphylococcus aureus* and Gram –ve organisms.

Remember, ultrafiltration may be affected and PD regime may need altered to maintain adequate fluid removal. Icodextrin (Extraneal) is useful in maintaining net ultrafiltration volumes.

Consider catheter removal after first episode of recurrent peritonitis

If catheter removal is required appropriate IV or oral antibiotics or antifungal drugs should continue to be prescribed.

9. Alternative anti-microbials

Alternatives include gentamicin or teicoplanin details of which are below. However, the use of gentamicin or other anti-microbials is best discussed with senior medical and microbiology staff.

Use of intra-peritoneal Teicoplanin

Teicoplanin dose. 15 mg/kg every 5 days. Usually a 21 day course
(Source ISPD)

Use of intra-peritoneal Gentamicin

Intermittent – (in 2 litre exchange with a dwell time of at least 6 hours)
Dosage - One exchange a day - 0.6 mg / Kg body weight for 14 days
Dosage monitoring – to avoid toxicity serum gentamicin levels should be monitored at 24 hours and 48 hours along with effluent WCC and culture.
Further dose may be required if level is < 2 the result should be interpreted in the light of the time period between dose and blood level.