PERITONEAL DIALYSIS (PD) – COMPATIBILITY AND STABILITY OF INTRAPERITONEAL MEDICATIONS

Cross References (including NSW Health/ SESLHD policy directives)	Peritoneal Dialysis – Peritonitis Management And Treatment; Renal Department CBR
1. What it is	A guideline for the compatibility and stability of medications and peritoneal dialysis fluid for safe intra-peritoneal administration in PD patients.
2. Risk Rating	Medium
3. Employees it Applies to	Registered Nurses (RN) Medical Officers (MO)

4. Process

For patients on PD, some medications can be mixed with the PD fluid and administered through the intra-peritoneal route. It is important to know that the administered medication is compatible and stable in the PD solution and with another medication to prevent complications and peritoneal membrane damage.

All WPIs and CLBRs related to the dosage and administration of most commonly used IP additives are found on the hospital intranet under Renal Medicine

*Each IP medication listed on the table should be prepared using a separate syringe.
*Do not administer admixed intraperitoneal medications if precipitation occurs.

Medication and stability in PD fluid	Compatible additives in PD fluid	Incompatible additives in PD fluid
Ampicillin 50 mg/L is stable in 4.25% dialysate for 2 days in room temperature (≤25℃)	Heparin sodium (compatible for 5 minutes only) Sulbactam	Amikacin Gentamicin Tobramycin Clindamycin Fluconazole **Tobramycin is inactivated by penicillin and cephalosporin antibiotics. Separate the administration by several hours.*
Cefepime is stable in dialysis solution for 14 days if the solution is refrigerated (<4℃)	Compatible in extraneal PD fluid	Amikacin Gentamicin Tobramycin Ciprofloxacin Erythromycin

Ceftazidime 1g/L is stable for 16 hours in room temperature (≤25℃) or 2 hours in higher temperature (>26℃) or 6 days at 4℃ 125 mg/L is stable for 4 days in room temperature (≤25℃) or 7 days at ≤4℃	Vancomycin (in ≥ 1 Litre PD fluid volume) Tobramycin Teicoplanin	Vancomycin (in < 1 Litre PD fluid volume) Amikacin Gentamicin Tobramycin Erythromycin Fluconazole **Tobramycin is inactivated by penicillin and cephalosporin antibiotics. Separate the administration by several hours.*
Ceftriaxone 1000 mg/L is stable for 1 day in room temperature (≤23℃) or 6 hours only in higher temperature (>23℃)		Amikacin Gentamicin Tobramycin Fluconazole **Tobramycin is inactivated by penicillin and cephalosporin antibiotics. Separate the administration by several hours.*
Cephazolin 125mg/L is stable for 8 days in room temperature (≤26℃) or 8 hours in higher temperature (>27℃) or 14 days if refrigerated (4℃) ≥750mg/L is stable for 24h in room temperature (≤25℃) or 4 hours in higher temperature (>26℃)	Gentamicin (Combination of Cephazolin and Gentamicin is stable for 4 days in room temperature (≤25℃) Heparin Vancomycin Compatible in extraneal PD fluid *Vancomycin, aminoglycosides and cephalosporins can be mixed in the same dialysis solution bag without loss of bioactivity	Erythromycin Amikacin Tobramycin **Tobramycin is inactivated by penicillin and cephalosporin antibiotics. Separate the administration by several hours.*
Ciprofloxacin 25 mg/L is stable for 7 days in room temperature (≤25℃) or 2 days in higher temperature (>26℃) or 14 days at 4℃	Fluconazole Ceftriaxone (observe and do not administer if precipitation occurs) *Administer first and 2 hours away from sevelamer , calcium, oral iron, zinc	Heparin Vancomycin Penicillins Alkaline solutions Amoxycillin Cefepime5 Clindamycin Flucloxacillin

	preparations, sucralfate, magnesium-aluminium antacids and/or milk to prevent chelation interactions reducing quinolone absorption	Piperacillin Tazobactam Warning: Do not administer concurrently with Theophylline due to risk of increased Theophylline plasma concentration
Extraneal (Icodextrin) dialysate	Vancomycin 1000 mg/L in icodextrin is stable for 7 days in room temperature (≤24℃) Cephazolin Ampicillin Cloxacillin Ceftazidime Gentamicin Amphotericin	
Fluconazole Unknown stability. Best to administer immediately.	Ciprofloxacin Gentamicin Vancomycin	Ampicillin Cefotaxime Ceftazidime Ceftriaxone Clindamycin
Gentamicin (Aminoglycosides) ≤8mg/L is stable for 14 days in in room temperature (≤25℃). >8mg/L is stable for 1 day in room temperature (≤25℃). Duration of stability is reduced if added with heparin Gentamicin's stability is similar in Nutrineal, Extraneal (icodextrin) and Dianeal <u>but not</u> in Physioneal.	Cephalosporin i.e. Cephazolin (Combination of Cephazolin and Gentamicin is stable for 4 days in room temperature (≤25℃) Vancomycin Fluconazole Ciprofloxacin Metronidazole Clindamycin Vancomycin, aminoglycosides and cephalosporins can be mixed in the same dialysis solution bag without loss of bioactivity	Flucloxacillin Heparin Penicillin Piperacillin
Heparin 2500 U/L is stable for ≤24 hours in room temperature (≤25℃) or 4 hours in higher temperature (>26℃) in	Ampicillin* Ceftazidime (in 100 mg/L dosage only) Cefotaxime* Cephazolin	Amikacin Benzylpenicillin Ciprofloxacin Erythromycin Gentamicin

Physioneal, Nutrineal, Extraneal (Icodextrin) and Dianeal fluid 500-1000 U/L does not affect the stability of various antibiotics admixed in PD solutions	Clindamycin* Fluconazole Gentamicin (in 8mg/L dosage only) Piperacillin Vancomycin (in 50mg/L dosage only **Compatible and stable for 5 minutes only*	Tobramycin Vancomycin
Icodextrin or extraneal dialysis solutions	Cephazolin 500 mg/L in icodextrin is stable for 7 days in room temperature (≤25℃) Cefepime 500 mg/L in icodextrin is stable for 2 days in room temperature (≤20℃) Ceftazidime in icodextrin is stable for 2 days in room temperature (≤25℃) Gentamicin 60 mg/L in icodextrin is stable for 14 days in all temperatures Heparin 2500 U/L in icodextrin is stable for 24 hours in room temperature (≤25℃) Tobramycin 60 mg/L in icodextrin is stable for 24 hours in room temperature (≤25℃) Vancomycin 1000 mg/2L in icodextrin is stable for 14 days in room temperature (≤25℃) and 4 days at higher temperature (>25℃) Ampicillin 250mg/L Ceftazidime up to 1500 mg/2L Flucloxacillin 2g/2L	

	Amphotericin (may cause infusion pain) Potassium Chloride (6-8 mmol/L in 2 L icodextrin)	
Meropenem Once reconstituted, administer immediately	Dianeal Icodextrin/extraneal fluid	
Piperacillin 200 mg/L is stable for 2 days in room temperature (≤25℃).	Tazobactam	Gentamicin Tobramycin Amikacin Ciprofloxacin **Tobramycin is inactivated by penicillin and cephalosporin antibiotics. Separate the administration by several hours.*
Potassium		Amikacin Amoxycillin Benzylpenicillin Cephalotin
Tobramycin 60mg/L is stable for ≤24 hours in room temperature (≤25℃) or 8 hours at higher temperature (>25℃) in Nutrineal and Extraneal (Icodextrin) <u>but not</u> in Physioneal and Dianeal	Cefapirin Ceftazidime Ciprofloxacin Fluconazole Metronidazole Vancomycin	Ampicillin Cephalosporins* Clindamycin Heparin sodium Penicillins* Piperacillin **Tobramycin is inactivated by penicillin and cephalosporin antibiotics. Separate the administration by several hours.*
Vancomycin 25mg/L is stable for 28 days in in room temperature (≤20℃). Higher temperature and drug concentration in dialysis fluid will reduce duration of stability i.e. Vancomycin (1000mg/L) is only stable for 8 hours in higher temperature (>25℃)	Fluconazole Ceftazidime (in ≥ 1 Litre PD fluid volume) Aminoglycosides i.e. Amikacin, Gentamicin and Tobramycin Cephalosporins Heparin *Vancomycin, aminoglycosides and cephalosporins can be mixed in the same dialysis solution bag without loss of bioactivity	Ciprofloxacin Ceftazidime (in < 1 Litre PD fluid volume) Moxifloxacin

5. Keywords	Peritoneal dialysis, dialysis solutions, dialysate, drug compatibility, drug stability, intraperitoneal
6. Functional Group	Renal, Peritoneal Dialysis
7. External References	Amirmokri, P., Morgan, P., & Bastani, B. (2007). Intra-peritoneal administration of potassium and magnesium: a practical method to supplement these electrolytes in peritoneal dialysis patients. Renal Failure, 29(5):603-5. PMID: 17654324 Ballinger, A. P., Suetonia; Wiggins, Kathryn; Craig, Jonathan; Johnson, David; Cross, Nicholas; Strippoli, Giovanni (2014). Treatment for peritoneal dialysis-associated peritonitis. *Cochrane Database of Systematic Reviews, 4.* doi: 10.1002/14651858.CD005284.pub3 Anderson, D. M., Pesaturo, K. A., Casavant, J., & Ramsey, E. Z. (2013). Alteplase for the Treatment of Catheter Occlusion in Pediatric Patients. *Annals of Pharmacotherapy, 47*(3), 405-410. doi: 10.1345/aph.1Q483 Bailie, G., & Kane, M. (1995). Stability of drug additives to peritoneal dialysate. *Peritoneal Dialysis International, 15*(8), 328-335. Cullis, B., Abdelraheem, M., Abrahams, G., Balbi, A., Cruz, D. N., Frishberg, Y., . . . Finkelstein, F. O. (2014). ISPD Guidelines/Recommendations - Peritoneal Dialysis for Acute Kidney Injury. *Peritoneal Dialysis International*, 34(5), 494-517. doi: 10.3747/pdi.2013.00222 De Vin, F., Rutherford, P., & Faict, D. (2009). Intraperitoneal Administration Of Drugs In Peritoneal Dialysis Patients: A Review Of Compatibility And Guidance For Clinical Use. *Peritoneal Dialysis International, 29*(1), 5-15. Deslandes, G., Gregoire, M., Bouquié, R., Le Marec, A., Allard, S., Dailly, E., . . . Navas, D. (2016). Stability And Compatibility Of Antibiotics In Peritoneal Dialysis Solutions Applied To Automated Peritoneal Dialysis In The Pediatric Population. *Peritoneal Dialysis International*. doi: 10.3747/pdi.2015.00018 Li, P. K., Szeto, C., Piraino, B., Bernardini, J., Figueiredo, A., Gupta, A., Johnson, D., Kuijper, E., Lye, W., Salzer, W., Shaefer, F., and Struijk, D. G. (2010). Peritoneal Dialysis – Related Infections Recommendations 2010 Update. *Peritoneal Dialysis International*, 30(4), 393-423. doi: 10.3747/pdi.2010.00049

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8. Consumer Advisory Group (CAG) approval of patient information brochure (or related material)	N/A
9. Implementation and Evaluation Plan Including education, training, clinical notes audit, knowledge evaluation audit etc	- Included in the education tools developed to assist nurses in increasing their knowledge to the care of patients on peritoneal dialysis i.e. Renal care flip chart, advance and basic PD learning package and PD orientation package - Monthly inservice education by PD CNC/nurses to all renal nurses - PD tutorial to Junior Medical Officers by the PD CNC at the beginning of renal rotation
10. Knowledge Evaluation	Q1: What would you consider before administering or admixing IP medications A: Drug stability in PD fluid and drug compatibility with other drugs Q2: What affects the stability of IP medications in PD fluid A: PD fluid temperature and type of dialysis solution Q3: How do you prepare IP medications A: Each IP medication should be prepared using a separate syringe.
11. Who is Responsible	Director of St George and Sutherland Renal Service. Nursing Unit Manager, Dialysis Unit

St George/Sutherland Hospitals And Health Services (SGSHHS)

Approval for (Insert Clinical Business Rule Title)	*** N/A where appropriate**
***Specialty/Department Committee**	Committee title: Peritoneal Dialysis Committee Chairperson name/position: Franziska Pettit, Staff Specialist Signature Date
***Nursing/Midwifery Co-Director**	Name/position Christine Day, Nurse Manager Medicine Signature Date
***Medical Co-Director**	Name /position: Mark Brown, Department Head Renal Services Signature Date
***Drug and Therapeutics Committee (SGH)**	Chairperson's Name: Winston Liauw Signature Date
Executive Sponsor	Name/Position: Clinical Group Manager Medicine & Critical Care Signature Date
Contributors to CIBR development e.g. CNC, Medical Officers (names and position title/specialty)	

Revision and Approval History

Date	Revision number	Author (Position)	Revision due
July 2016	0	Anna Claire Cuesta (PD CNC)	July 2019

General Manager's Ratification		
Name Leisa Rathborne	Signature	Date