Northwestern Medicine Antimicrobial Continuous Renal Replacement Therapy Dosing Guidance

*** For acutely ill patients, consider usual dosing for the first 24 hours prior to adjusting for renal dysfunction ***

Antimicrobials			
Acyclovir	Ceftaroline	Ethambutol	Meropenem
Aminoglycosides	Ceftazidime	Fluconazole	Meropenem-vaborbactam
Ampicillin	Ceftazidime-avibactam	Flucytosine	Metronidazole
Ampicillin-sulbactam	Ceftolozane-tazobactam	Foscarnet	Micafungin**
Aztreonam	Cidofovir	Ganciclovir	Oseltamivir
Cefazolin	Ciprofloxacin	Imipenem	Penicillin G
Cefepime	Colistin	Imipenem-relebactam	Piperacillin-tazobactam
Cefiderocol	Daptomycin	Levofloxacin	TMP-SMX
Cefoxitin	Entecavir	Linezolid#	Vancomycin

Footnotes and References

Dosing protocol links:

- Renal Dosing Guidance (non CRRT)
- Aminoglycoside Dosing Protocol ‡ : Gram negative infections, Endocarditis Synergy, Cystic Fibrosis, Surgical Prophylaxis
- Agents not adjusted for renal function
- TDM Dosing Protocol
- HIV Antiretroviral Renal Adjustments

Instructions for using this Table:

1. In patients with no drug in their system, give an initial dose equal to that of a patient with normal renal function***
2. Determine the CRRT flow rate (the rate of Ultrafiltrate Fluid).
3. Add the Dialysate Flow rate to the Ultrafiltrate Flow rate.
4. Select the closest flow rate (e.g. 1 L/hr, 2 L/hr, etc).
5. Ensure that the patient's CRRT has not stopped unpredictably (e.g clotting, etc).

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Medication	Indications & Comments	Anephric Dose	1 L/Hr CRRT	2 L/Hr CRRT	3 L/Hr CRRT	4+ L/Hr CRRT
Acyclovir (AdjBW)	Standard dosing	5 mg/kg q24h	7.5 mg/kg q24h	5 mg/kg q12h	7.5 mg/kg q12h	10 mg/kg q12h
	Less severe mucocutaneous	2.5 mg/kg q24h	5 mg/kg q24h	5 mg/kg q24h	5 mg/kg q12h	5 mg/kg q12h
Aminoglycosides	Dose based on levels					
Ampicillin	Standard dosing	2 g q24h	2 g q8h	2 g q8h	2 g q8h Consider TDM	2 g q6h Consider TDM
	Endocarditis or meningitis	2 g q12h	2 g q8h	2 g q8h	2 g q6h Consider TDM	2 g q4h Consider TDM
Ampicillin-sulbactam	Standard dosing	3 g q24h	3 g q8h	3 g q8h	3 g q6h	3 g q6h
	Carbapenem Resistant *Acinetobacter baumanii*	3 g q12h Infused over 4 hours	3 g q8h infused over 4 hours	3 g q8h Infused over 4 hours	3 g q6h Infusion over 4 hours	3 g q6h infused over 4 hours
Aztreonam	Standard dosing	2 g q24h	1 g q8h	2 g q 12h	2 g q8h	2 g q8h
Cefazolin	Standard dosing	1 g q 24h or 2,2,3 g 3x weekly post-HD	1 g q8h	2 g q12h	2 g q8h	2 g q8h
Cefepime	Severe infections	1 g q 24h or 2 g 3x weekly post-HD	1 g q12h	1 g q8h Consider TDM	2 g q8h Consider TDM	2 g q8h Consider TDM
	Cystitis or less severe infections in patients <55kg or elderly (≥80 years)	1 g q 24h or 2 g 3x weekly post-HD	1 g q12h	1 g q8h Consider TDM	1 g q8h Consider TDM	2 g q8h Consider TDM
Cefiderocol	Standard dosing	750 mg q 12h	1.5 g q12h	2 g q12h	1.5 g q8h	2 g q8h
Cefoxitin	M. *abscessus* Dosing	1 g q24h	2 g q12h	2 g q12h	2 g q8h	2 g q8h
Ceftaroline*	Severe infection, bacteremia, osteo	200 mg q8h	400 mg q12h	300 mg q8h	400 mg q8h	400 mg q8h
Ceftazidime	Standard dosing	1 g q24h or 2,2,2 g 3x weekly post-HD	1 g q12h	2 g q12h	2 g q8h	2 g q8h
Ceftazidime-avibactam	Standard dosing	0.94 g q24h	1.25g q12h	2.5 g q12h	2.5 g q8h	2.5 g q8h
Ceftolozane-tazobactam	Standard dosing	750 mg q8h	1.5 g q8h	1.5 g q8h	3 g q8h	3 g q8h
Cidofovir (IBW)	Alternative dosing regardless of renal function for adenovirus or BK virus: 1 mg/kg 3x weekly without probenecid	5 mg/kg once weekly with probenecid and hydration	CrCl < 50: Risk vs benefit, discuss with ID team, consider 3 mg/kg once weekly			

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Ciprofloxacin	Severe infection, *Pseudomonas,* and step-down therapy	400 mg q24h	400 mg q24h	400 mg q12h	400 mg q8h	400 mg q8h
	Less severe infections, UTI, prophylaxis	400 mg q24h	400 mg q24h	400 mg q12h	400 mg q12h	400 mg q12h
Colistin	For urinary source only, use polymyxin B IV for severe infections Polymyxin B does not require dose adjustment in CRRT	1.5 mg/kg q48h	Consult ID			
Daptomycin (AdjBW) (round to the nearest 250 mg, max dose of 1000 mg)	Severe *Staph* Infections	8 mg/kg 3x weekly post-HD	6-8 mg/kg q24h	8 mg/kg q24h	8 mg/kg q24h	8 mg/kg q24h
	Enterococcus infections	10 mg/kg 3x weekly post-HD	8-10 mg/kg q24h Consider twice weekly CK monitoring	10 mg/kg q24h	10 mg/kg q24h	10 mg/kg q24h
Entecavir		0.05-0.1 mg/day	0.1 mg/day	0.2 mg/day	0.3 mg/day	0.4 mg/day
Ethambutol (IBW)	See specific TB or NTM guidelines (round to the nearest 100 or 400 mg tablet)	15 or 25 mg/kg 3x weekly post-HD	15-20 mg/kg PO q24h Consider ID Consult			
Fluconazole	Disseminated infections	400 mg 3x weekly post-HD	800 mg x 1 then 400 mg q24h	800 mg q24h	800 mg q24h	800 mg q24h Consider 12 mg/kg load then 6 mg/kg q24h for patients > 120 kg
	Esophageal candidiasis	200 mg 3x weekly post-HD	200 mg q24h[$]			
	Prophylaxis	100 mg 3x weekly post-HD	100 mg q24h			
Flucytosine		25 mg/kg q48h	25 mg/kg q24h	25 mg/kg q12h	25 mg/kg q6h	25 mg/kg q6h
Foscarnet (AdjBW)		0 mg/kg/day	20 mg/kg/day	45 mg/kg/day	70 mg/kg/day	90 mg/kg/day
Ganciclovir	Induction	1.25 mg/kg q24h	2.5 mg/kg q24h	2.5 mg/kg q12h	5 mg/kg q12h	
	Maintenance	0.625 mg/kg q24h	1.25 mg/kg q24h	2.5 mg/kg q24h	5 mg/kg q24h	
Imipenem	Doses based on imipenem (500 mg)	500 mg q12h	500 mg q12h	500 mg q8h	500 mg q6h	1 g q8h
Imipenem-relebactam	1.25 g dose based on imipenem (500 mg) + cilastatin (500 mg) + relebactam (250 mg)	500 mg q6h	500 mg q6h	750 mg q6h	1 g q6h	1.25 g q6h

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Medication	Indications & Comments	Anephric Dose	1 L/Hr CRRT	2 L/Hr CRRT	3 L/Hr CRRT	4+ L/Hr CRRT
Levofloxacin	Standard dosing	750 mg x 1 then 500 mg q48h	750 mg x 1 then 250 mg q24h	750 mg x 1 then 500 mg q24h	750 mg q24h	750 mg q24h
Linezolid#	Standard dosing	600 mg q12h	600 mg q12h	600 mg q12h	600 mg q12h Consider 600 mg q8h in cases of MIC ≥ 2 mcg/mL or unknown in critical illness, CNS infections	
Meropenem	Systemic Infection (CNS, Sepsis, severe infections)	1 g q24h	500 mg q8h	1 g q8h	1 g q8h	1 g q8h 2 g q8h (CNS, pseudomonas)
Meropenem-vaborbactam	Doses based on combination	1 g q12h	1 g q8h	2 g q8h	2 g q8h	4 g q8h
Metronidazole	Standard dosing	500 mg q12h	500 mg q12h	500 mg q8h		
Micafungin**	Standard Dosing	100 mg q24h	CRRT or ECMO alone: 150 mg load x 1 then 100 mg q24h ECMO and CRRT: consider 200 mg load x 1 then 150 mg q24h			
Oseltamivir	Treatment	75mg x 1, then 30 mg 3x weekly post-HD	30 mg q24h	30 mg q12h	75 mg q12h	75 mg q12h
Penicillin G	Standard dosing	2 MU q8h	4 MU load then 2 MU q4h	4 MU q6h	4 MU q4h	4 MU q4h
Piperacillin-tazobactam	Standard dosing (4h infusion)	4.5 g q12h	4.5 g q12h	4.5 g q8h	4.5 g q8h	4.5 g q8h
TMP/SMX (AdjBW) Dose in mg based on TMP. Round PO doses to the nearest DS tab (160 mg)	Severe systemic infection	2.5 mg/kg q24h (max 320 mg)	5 mg/kg q24h	7.5 mg/kg q24h	5 mg/kg q12h	5 mg/kg q12h
	PJP Treatment	5 mg/kg q24h (max 320 mg)	7.5 mg/kg q24h	5 mg/kg q12h	5 mg/kg TMP q12h	5 mg/kg q8h (max 320 mg/dose)
Vancomycin (Round to the nearest 250 mg)	PharmD to Dose per AUC See Pharmacy Protocol	Dose per AUC	Provide loading dose 20-25 mg/kg then dose patient 10-15 mg/kg q24h and adjust based on levels			

Northwestern Medicine Antimicrobial Continuous Renal Replacement Therapy Dosing Guidance

Agents not renally adjusted:

- Amphotericin
- Azithromycin
- Baloxavir *(not studied in CrCl <50, but limited risk given single dose)*
- Ceftriaxone^
- Clindamycin
- Doxycycline
- Eravacycline
- Fosfomycin
- Itraconazole
- Isavuconazole
- Letermovir
- Linezolid#
- Maribavir
- Metronidazole
- Micafungin**
- Minocycline
- Molnupiravir
- Omadacycline
- Oxacillin/nafcillin
- Penicillin VK (PO
- Refer to Clinical Pharmacology for Polymyxin B Dosing
- Posaconazole
- Remdesivir
- Rifampin
- Tigecycline
- Voriconazole

Footnotes and References

† For obesity dosing, see Obesity Dosing for Weight-Based Antimicrobials

^ Although data do not suggest alterations in ceftriaxone clearance/half-life with CRRT, consideration for higher doses (e.g. 2 g q12h) may be warranted in cases of hypoalbuminemia. Most patients will ***not*** require increases in adjustment.

* Ceftaroline has been associated with clinically significant leukopenia. As data regarding CRRT flow rates is limited, particularly when >2 L/hr, closely monitor patient for signs and symptoms of toxicity

Linezolid dose adjustments to 600 mg q8h should be considered if MIC are ≥2 mcg/mL at high (>3 L/hr CRRT) in definitive, deep-seated infections (e.g CNS, endocarditis, undrained abscess) or initially when infections are suspected and risk of mortality is high

** Micafungin doses should be increased in clinically relevant indications (e.g. endocarditis, esophageal candidiasis, resistant organisms)

$ Loading doses of fluconazole should be utilized when clinically appropriate

Acronyms: HD = hemodialysis, PD = peritoneal dialysis, TMP/SMX = trimethoprim/sulfamethoxazole, MU = million units, URTI = upper respiratory tract infection, XR = extended release

For questions regarding this document (contact your primary pharmacist patient specific concerns) please contact: NMHPharmAntimicrobialStewardship@nm.org

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