Automatic Renal Dosing Protocol

Our Lady of the Lake Regional Medical Center (Last Reviewed April 2019)

Creatinine Clearance (CrCl) will be calculated based on the Cockcroft-Gault equation for all renal dose adjustments

**Use measured SCr to calculate the creatinine clearance

**If patient weighs less than Ideal Body Weight (IBW) use Actual Body Weight (ABW) for calculating CrCl

***If patient weights >120% of IBW then use Adjusted Body Weight (AdjBW) for calculating CrCl

CrCl (male) = $\frac{(140\text{-Age}) \times IBW}{72 \times SCr}$ CrCl (female) = $\frac{(140\text{-Age}) \times IBW}{72 \times SCr}$ (x0.85)

Antibiotic	Usual Dose	Renal Adjustment	HD	CAPD	CRRT: Consult Pharmacy Clinical Specialist for Dose Determination
Acyclovir (IV) (Treatment doses based on **IBW**)	Herpes simplex virus: 5 mg/kg q8h HSV encephalitis/zoster: 10 mg/kg q8h	CrCl 25-50: same dose q12h CrCl 10-25: same dose q24h CrCl <10: 50% of dose q24h	2.5-5 mg/kg q24h	50% of dose q24h	CVVH: 5-10 mg/kg q24h CVVHD/CVVHDF: 5-10mg/kg q12-24h (give 10mg/kg q12h for CVVHDF for viral meningocephalitis and zoster virus infections)
Amoxicillin/ clavulanate	875 mg q12h OR 500 mg q8h	CrCl 10-30: 500 mg q12h CrCl < 10 mL/min: 500 mg q24h	500 mg q24h ***(Dose after HD on HD days)***	500 mg q24h	500 mg q12h
Amikacin	*See pharmacy aminoglycoside dosing protocol*				
Ampicillin (IV)	2 g q6 h Endocarditis/meningitis 2 g q4h	CrCl 10-50: 2g q8h CrCl <10: 2g q24h Endocarditis/meningitis CrCl 10-50: 2 g q6h CrCl <10: 2 g q12h	1 g q12h Endocarditis/ meningitis 2 g q12h	250 mg q12h	2 g q8h Endocarditis/meningitis CRRT: 2 g q6
Ampicillin/ sulbactam	1.5 - 3g q6h	CrCl 30-50: same dose q8h CrCl 15-29 same dose q12h CrCl <15: same dose q24h	1.5-3g q24h ***(Dose after HD on HD days)***	3g q24h	1.5-3g q8h
Aztreonam	2 g q8h	CrCl 10-30:1 g q8h CrCl <10: 500 mg q8h	500mg q12h	500mg q8h	1 g q8h
Cefazolin	2 g q8h	CrCl 11-34: 1 g q12h CrCl <10: 1 g q24h	1 g q24h ***(Dose after HD on HD days)***	500 mg q12h	2 g q12h
Cefepime Severe infections: Febrile neutropenia, critically ill, meningitis, Pseudomonas,CF, endocarditis, PNA	2 g q12h Severe infections: 2 g IV q8h	CrCl 30-60: 2 g q24h CrCl 10-29: 1 g q24h CrCl <10: 500mg q24h Severe infections: CrCl 30-60: 2 g q12h CrCl 10-29: 2 g q24h CrCl <10: 1 g q24h	500 mg q24h Severe infections: 1 g q24h ***(Dose after HD on HD days)***	2 g q48h	2 g q12h

Ceftaroline	600 mg q12h	CrCl 30-50: 400 mg q12h CrCl 15-30: 300 mg q12h CrCl <15: 200 mg q12h	200 mg q12h ***(Dose after HD on HD days)***	not studied	not studied
Ciprofloxacin (formulary restriction for confirmed/ suspected Pseudomonas infxn)	<u>Severe Pseudomonas infections/HCAP:</u> 400 mg IV q8h 750 mg PO q12h <u>Pseudomonas UTI:</u> 400 mg IV q12h 500 mg PO q12h	<u>Severe Pseudomonas infections/HCAP:</u> CrCl 30-50: 400 mg IV q12h CrCl <30: 400 mg IV q24h CrCl 10-50: 500 mg PO q12h CrCl <10: 250 mg PO q12h <u>Pseudomonas UTI:</u> CrCl <30: 400 mg IV q24h CrCl <30: 500 mg PO q24h	<u>Severe Pseudomonas infections/HCAP:</u> 400 mg IV q24h 500 mg PO q24h ***(Dose after HD on HD days)*** <u>Pseudomonas UTI:</u> 200 mg IV q24h 250 mg PO q24h ***(Dose after HD on HD days)***	<u>Severe Pseudomonas infections/HCAP</u> 400 mg IV q24h 250 mg PO q12h <u>Pseudomonas UTI:</u> 200 mg IV q24h 250 mg PO q24h	<u>Severe Pseudomonas infections/HCAP</u> 400 mg IV q12h N/A <u>Pseudomonas UTI:</u> 400 mg IV q24h N/A
Daptomycin	<u>SSTI:</u> 4 mg/kg q24h <u>Bacteremia/Endocarditis/ Osteomyelitis/PJI:</u> 8 mg/kg q24h	<u>SSTI:</u> CrCl <30: 4 mg/kg q48h <u>Bacteremia/Endocarditis/ Osteomyelitis/PJI:</u> CrCl <30:8 mg/kg q48h	Same as CrCl <30 ***(Dose after HD on HD days)***	Same as CrCl <30	8 mg/kg q48h
Ertapenem	1 g q24h	CrCl<30: 500 mg q24h	500 mg q24h ***(Dose after HD on HD days)***	500 mg q24h	1 g q24h
Fluconazole	400-800 mg LOAD then 200-400 mg IV q24h	CrCl <50: 50% of dose q24h	100% of dose post-HD 3 times/week	50% of dose q24h	800 mg LOAD then 400-800 mg q24h (depending on type of CRRT and flow rate)
Flucytosine	25mg/kg Q6H	CrCl 20-40: 25mg/kg Q12H CrCl10-20: 25mg/kg Q24H CrCl <10: 25mg/kg Q48H	25 mg/kg Q48-72H; after HD	1000mg Q24H	25 mg/kg Q12
Levofloxacin <u>Severe infections:</u> PNA, complicated SSTI, osteomyelitis, intra-abdominal	500 mg q24h <u>Severe infections:</u> 750 mg q24h	CrCl 20-49: 500 mg x1, then 250 mg q24h CrCl 10-19: 500 mg x1, then 250 mg q48h <u>Severe infections:</u> CrCl 20-49: 750 mg q48h CrCl 10-19: 750 mg x1, then 500 mg q48h	500 mg x1, then 250 mg q48h <u>Severe infections:</u> 750 mg x1, then 500 mg q48h	same as HD	500 mg x1, then 250-500 mg q24h <u>Severe infections:</u> 750 mg x1, then 500-750 mg q24h

Meropenem	500 mg q6h <u>CNS/Eye/GNR MIC≥ 4</u> 2 g q8h	CrCl 26-50: 500 mg q8h CrCl 10-25: 500 mg q12h CrCl <10: 500 mg q24h <u>CNS/Eye/GNR MIC≥ 4</u> CrCl 26-50: 2 g q12h CrCl 10-25: 1 g q12h CrCl <10: 1g q24h	500 mg q24h ***(Dose after HD on HD days)***	500 mg q24h <u>CNS/Eye/GNR MIC≥ 4</u> 1 g q24h	500 mg q6h <u>CNS/Eye/GNR MIC≥ 4</u> 1 g q12h
Oseltamivir (Tamiflu) (influenza treatment)	75 mg q12h	CrCl 30-60: 30 mg q12h CrCl 10-30: 30 mg q24h	30 mg q24h ***(Dose after HD on HD days)***	30 mg once weekly	30 mg q24h
Piperacillin/ Tazobactam (Prolonged infusion) ****First dose should be given over 30 min for all patients****	4.5 g over 30 min x1; then 3.375 g over 4 hrs q8h	CrCl <20: 3.375 g over 4 hrs q12h	3.375 g over 4 hrs q12h	same as HD	3.375 g run over 4 hrs q8h
Piperacillin/ Tazobactam (Standard infusion- alternative ONLY for patients unable to receive prolonged infusion)	3.375 g q6h <u>HCAP/Severe Pseudomonas infxn:</u> 4.5 g q6h	CrCl 20-40: 2.25g q6h CrCl <20: 2.25g q8h <u>HCAP/Severe Pseudomonas infxn:</u> CrCl 20-40: 3.375g q6h CrCl <20: 2.25g q6h	2.25 g q12h <u>HCAP/Severe Pseudomonas infxn:</u> 2.25 g q8h	same as HD	3.375g q6h
Trimethoprim/ Sulfamethoxazole (dose based on TMP component)	<u>PCP:</u> 15-20 mg/kg/day divided q6h	<u>PCP:</u> CrCl 15-30: 5 mg/kg q12h CrCl <15: 10 mg/kg q24h	5-10 mg/kg q24h ***(Dose after HD on HD days)***	10 mg/kg q24h	<u>PCP:</u> 10 mg/kg q12h
Vancomycin	See vancomycin dosing protocol				
Renally Adjusted OLOL Formulary Oral Cephalosporins					
Cephalexin (PO)	500 mg q6h	CrCl 10-50: 500 mg q12h CrCl <10: 250 mg q12h	250 mg q24h ***(Dose after HD on HD days)***	250 mg q24h	N/A
Cefuroxime (PO)	500 mg q12h	CrCl 10-50: 500 mg q12h CrCl <10: 500 mg q24h	500 mg q24h ***(Dose after HD on HD days)***	500 mg q24h	N/A
Cefdinir (PO)	CrCl >30: 300 mg q12h	CrCl <30: 300 mg q24h	300 mg q48h ***(Dose after HD on HD days)***	300 mg q48h	N/A

Modify the order in the EMR, place comment "Renal dose adjustment per P&T approved dosing protocol for CrCl __ mL/min"

References:
1. Lexi-Comp Online™ , Lexi-Drugs Online™ , Hudson, Ohio: Lexi-Comp, Inc.; April 9, 2019.
2. Aronoff G, Bennett W, Berns J. Drug Prescribin in Renal Failure 2007, Dosing Guidelines for Adults and Children, 5th edition. American College of Physicians 2007; 52-68.
3. Heintz B, Matzke G, Dager W. Antimicbrobial dosing concepts in renal replacement therapy. Pharmacotherapy 2009; 29:562-577.
4. Trotman R, Williamson J, Shoemaker D, Salzer W. Antibiotic dosing in critically ill adult patients receiving continuous renal replacement therapy. Clin Infect Dis 2005; 41:1159-66.
5. Crandon J, Bulik C, Kuti J, Nicolau D. Clinical Phrarmacodynamics of cefepime in patients infected with Pseudomonas aeruginosa. Antimicrob Agents Chemother 2010; 54:1111-1116.
6. Alves M et al. Effect of cefepime dose on mortality of patients with Gram-negative bacterial bloodstream infections: a prospective cohort study. J Antimicrob Chemother 2014 (advanced online publishing)
7. Cheatham SC, Kays MB, Smith DW, et al. Steady-state pharmacokinetics and pharmacodynamics of meropenem in hospitalized patients. *Pharmacotherapy*. 2008;286:691-8.
8. Arnold HM, McKinnon PS, Augustin KM, et al. Assessment of an alternative meropenem dosing strategy compared with imipenem-cilastatin or traditional meropenem dosing after cefepime failure or intolerance in adults with neutropenic fever. *Pharmacotherapy*. 2009;298:914-23.

Renally Adjusted Anticoagulants					
Anticoagulant	**Usual Dose**	**Renal Adjustment**	**HD**	**CAPD**	**CRRT**
Apixaban (Eliquis)	DVT/ PE Treatment 10mg q12h for 7 days 5mg q12h for up to 6 mo 2.5mg q12h after 6 mo Nonvalvular A fib: 5 mg q12h Post-op VTE prophylaxis (hip/knee replacement surg) 2.5 mg q12h	DVT, PE Treatment: no dosage adjustment is recommended. Note that patients with SCr >2.5 mg/dL or CrCl <25mL/min were excluded from trials Nonvalvular A fib: Any 2 of the following: Age ≥80, weight ≤60 kg, SCr ≥1.5 mg/dL: 2.5 mg q12h Post-op VTE prophylaxis (hip/knee replacement surg): No dosage adjustment is recommended by the manufacturer. Note that patient's with CrCl < 30 mL/min were excluded from trials	DVT/ PE Treatment: not studied, use not recommended. Note that patients with SCr >2.5 mg/dL or CrCl <25mL/min were excluded from trials Nonvalvular A fib: Adjust dose to 2.5 mg q12h if age ≥80 and/or weight ≤60 kg Post-op VTE prophylaxis (hip/knee replacement): not studied, use not recommended. Note that patient's with CrCl < 30 mL/min were excluded from trials		
Dabigatran (Pradaxa)	Nonvalvular A fib: 150 mg q12h Treatment and Reduction in the Risk of Recurrence of DVT and PE: 150 mg q 12h after 5-10 days of parenteral anticoagulation	Nonvalvular A fib: CrCl 15-30: 75 mg q12h CrCl <15: not recommended Treatment and Reduction in the Risk of Recurrence of DVT and PE: CrCl < 30: not recommended	Not recommended		

	Post-op VTE ppx (hip/knee): 110 mg given 1 to 4 hrs post –op 220 mg daily maintenance dose	Post-op VTE ppx (hip/knee): 110 mg given 1 to 4 hrs post –op 220 mg daily maintenance dose	Post-op VTE prophylaxis (hip/knee replacement): not studied, use not recommended. Note that patient's with CrCl < 30 mL/min were excluded from trials
Rivaroxaban (Xarelto)	DVT/PE Treatment, reduction of risk of recurrent DVT/PE: 15 mg BID x 21 days Then 20 mg daily for 6-12 mo Nonvalvular A fib: 20 mg daily Post-op VTE ppx (hip/knee): 10 mg daily CAD or PAD: 2.5 mg BID	DVT/PE Treatment, reduction of risk of recurrent DVT/PE: CrCl <30: not recommended Nonvalvular A fib: CrCl 15-50: 15 mg daily CrCl <15: not recommended Post-op VTE ppx (hip/knee): CrCl <30: not recommended CAD or PAD: CrCl ≥15: No dosage adjustment necessary CrCl <15: No dosage adjustment is recommended by the manufacturer. Note that patient's with CrCl < 15 mL/min were excluded from trials this indication	DVT/PE Treatment, reduction of risk of recurrent DVT/PE: Use not recommended
Enoxaparin (Lovenox)			
DVT prophylaxis (general)	40 mg daily	CrCl <30: 30 mg daily	Not recommended--unfractionated heparin preferred. If enoxaparin is used, consider monitoring anti-Xa levels.
DVT prophylaxis (abdominal surgery)	40 mg daily	CrCl <30: 30 mg daily	
DVT prophylaxis (bariatric surgery) *unlabeled	40 mg BID	CrCl <30: 30 mg daily	
DVT prophylaxis	30 mg BID	CrCl <30: 30 mg daily	

(trauma, hip/knee replacement*)	(*40mg daily also used)		
DVT/PE treatment, NSTEMI/STEMI treatment	1 mg/kg q12h	CrCl <30: 1 mg/kg q24h	
DVT/PE Treatment option	1.5 mg/kg daily	CrCl <30: 1 mg/kg q24h	
Miscellaneous Renally Adjusted Medications			
Famotidine (stress ulcer ppx)	20 mg BID	CrCl <50: 20 mg daily	20 mg daily

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References:

1. Lexi-Comp Online™ , Lexi-Drugs Online™ , Hudson, Ohio: Lexi-Comp, Inc.; April 14, 2019.
2. Product Information: PRADAXA(R) oral capsules, dabigatran etexilate mesylate oral capsules. Boehringer Ingelheim Pharmaceuticals, Inc. (per manufacturer), Ridgefield, CT, 2014.