

Renal Dosage Adjustment Guidelines for Antimicrobials

The pharmacists will automatically adjust the doses of any of the antimicrobials included in the protocol according to the estimated creatinine clearance (generally using the Cockcroft-Gault equation for patients ≥ 18 years old and the Schwartz equation for patients < 18 years old). This protocol does NOT include patients in the neonatal intensive care unit. For other pediatric patients less than 1 year of age the pharmacist must discuss the dose adjustment with the medical team who initiated the order. When a change is necessary, the pharmacist will write a new order in the Orders section of the medical record indicating the new dosage “per protocol” and enter the order in Carecast as a protocol (“P”) order. No physician signature will be required to authorize the revised dosing order.

The adjustments listed in the dosing guidelines will be made unless the physician writes “Do not adjust” when ordering the antimicrobial. For vancomycin and the aminoglycosides, a pharmacokinetic consult will be performed by the pharmacist, and the ordering physician will be contacted for dosage changes unless ordered as “pharmacy to dose.” If written as “pharmacy to dose” dosing will be ordered by the pharmacist.

The most current version of the Renal Dosage Adjustment Guidelines for Antimicrobials and associated antimicrobial policies can be found online at the antimicrobial stewardship program (ASP) website: www.nebraskamed.com/asp

Please note:

- If there are no clear recommendations available, the pharmacist will not perform any automatic dosage adjustment. Consult with the physician.
- Accurate estimation of creatinine clearance and glomerular filtration rate from the Cockcroft-Gault and Schwartz equations require serum creatinine concentrations to be at steady-state. Acute changes in renal function (indicated by changes in urine output & serum creatinine) render the Cockcroft-Gault and Schwartz equations unreliable as serum creatinine is a delayed indicator of renal function. Furthermore, CrCl calculations may be significantly overestimated in patients with decreased muscle mass (e.g. elderly, paralysis). The pharmacist should use their clinical judgment regarding these changes and communicate their recommendations with the team as appropriate.
- Inclusion of an agent within this guideline **does not** necessarily indicate TNMC formulary status

Antimicrobial	Normal Dose	Renal Dosage Adjustment Based on CrCl Estimate (in ml/min)*
Abacavir (ABC)	<u>Adult</u> 600 mg PO q24h or 300 mg PO q12h <u>Pediatric</u> 8 mg/kg PO q12h	No adjustment necessary.
Acyclovir	<u>Adult</u> <u>PO</u> 200 mg PO 5x/day 400 mg PO 5x/day 800 mg PO 5x/day 400 mg PO q12h <u>IV</u> Mucocutaneous	CrCl 0-10: same dose q12h CrCl 11-25: same dose q8h CrCl 0-10: same dose q12h CrCl 11-25: same dose q8h CrCl 0-10: same dose q12h CrCl 0-10: 200 mg PO q12h

	<p>5 mg/kg IV q8h Immunocompromised: 6.2 mg/kg q8h</p> <p>HSV encephalitis or varicella zoster virus 10 mg/kg IV q8h Immunocompromised: 12.4 mg/kg IV q8h</p> <p>-----</p> <p><u>Pediatric</u> <i>PO</i> 6.25-20 mg/kg PO q6h</p> <p><i>IV</i> 15-20 mg/kg IV q8h</p>	<p>CrCl 25-50: same dose q12h CrCl 10-24: same dose q24h CrCl <10: 2.5-3.1 mg/kg IV q24h</p> <p>CrCl 25-50: same dose q12h CrCl 10-24: same dose q24h CrCl <10: 5-6.2 mg/kg IV q24h</p> <p>HD: Dose daily as CrCl <10. Give after dialysis on dialysis days. CAPD: dose as CrCl <10 CVVH: See dosing at end of this document</p> <p>-----</p> <p>CrCl 10-25: same dose q8h CrCl <10: same dose q12h</p> <p>CrCl 25-50: same dose q12h CrCl 10-24: same dose q24h CrCl <10: 50% IV q24h^F</p> <p>HD/CAPD: No data.</p>
Amantadine	<p><u>Adult</u> 100 mg PO q12h or 200 mg daily</p> <p>-----</p> <p><u>Pediatric</u> 1-9 years: 5 mg/kg/day PO in 2 divided doses (maximum dose: 150 mg/day)</p> <p>≥10 years and < 40 kg: 5 mg/kg/day PO in 2 divided doses (maximum dose: 150 mg/day)</p> <p>≥10 years and ≥40 kg: 100 mg PO q12h</p>	<p>CrCl 30-50: Administer 200 mg on day 1, then 100 mg/day</p> <p>CrCl 15-29: Administer 200 mg on day 1, then 100 mg on alternate days</p> <p>CrCl <15: Administer 200 mg every 7 days</p> <p>HD: Administer 200 mg every 7 days CAPD: No supplemental dose is needed.</p> <p>-----</p> <p>No clear recommendations.</p>
Amikacin	<p><u>Adult</u> Extended interval dosing (most indications*): 15 mg/kg once daily</p> <ul style="list-style-type: none"> adjusted by serum level 6-14 hrs after start of infusion and Hartford nomogram (see PK training packet on ASP website^S) 	<p>Extended interval dosing frequency determined by levels/Hartford nomogram</p>

	<p>10 mg/kg/day may be used for UTIs</p> <p>-----</p> <p>Traditional dosing 5 mg/kg IV q8h</p> <p>Monitoring of serum levels is recommended.</p> <p>*Refer to TNMC PK training packet on ASP website[§] for exclusions to extended-interval dosing</p> <p>-----</p> <p><u>Pediatric</u> Traditional dosing 5 mg/kg IV q8h</p>	<p>-----</p> <p>Traditional dosing (empiric, before levels): CrCl 51-90: 60-90% IV q12h[†] CrCl 10-50: 30-70% IV q12-18h[†] CrCl <10: 20-30% IV q24-48h[†]</p> <p>HD/CAPD: Dose according to levels. CVVH: See dosing at end of this document</p>
Amoxicillin	<p><u>Adult</u> 250-1000 mg PO q8h</p> <p><u>Pediatric</u> 12.5-25 mg/kg PO q8-12h (25-90 mg/kg/day) AOM: 90 mg/kg/day PO divided q8-12h</p>	<p><i>Same for Adult & Pediatric</i> CrCl 10-30: same dose q12h CrCl <10: same dose q24h</p> <p>HD: Dose daily as CrCl <10. Give after dialysis on dialysis days. CAPD: 250 mg PO q12h</p>
Amoxicillin/clavulanate	<p><u>Adult</u> 500/125 mg PO q8h</p> <p>875/125 mg PO q12h</p> <p>1000/62.5 mg PO q12h (XR formulation)</p> <p>-----</p> <p><u>Pediatric</u> 15-45 mg (amoxicillin component)/kg 12h AOM: 22.5-45 mg/kg q12h [30-90 mg (amoxicillin component)/kg/day]</p>	<p>CrCl 10-30: 250/125 mg PO q12h CrCl <10: 250/125 mg PO q24h</p> <p>CrCl 10-30: 500/125 mg PO q12h CrCl <10: 500/125 mg PO q24h</p> <p>XR formulation NOT recommended with CrCl < 30.</p> <p>HD: Dose as daily CrCl <10. Give after dialysis on dialysis days. CAPD: 250/62.5 mg PO q12h</p> <p>-----</p> <p>CrCl 10-30: same dose q12h CrCl <10: same dose q24h</p> <p>HD: Dose daily as CrCl <10. Give after dialysis on dialysis days. CAPD: No clear recommendations.</p>
Amphotericin B deoxycholate	<p><u>Adult & Pediatric</u> 0.7-1 mg/kg IV q24h</p>	<p>No adjustment necessary</p>
Amphotericin B Liposomal	<p><u>Adult & Pediatric</u> 3 mg/kg IV q24h</p> <p>(Automatic dose substitution to 3 mg/kg, refer to policy on ASP website[§])</p>	<p>No adjustment necessary</p>
Ampicillin	<p><u>Adult</u> <u>PO</u> 250-1000 mg PO q6h</p>	<p><u>PO</u> CrCl <10: same dose q12h</p>

	<p><i>IV</i> 1-2 g IV q4-6h</p> <p>-----</p> <p><u>Pediatric</u> <i>PO</i> 12.5-25 mg/kg PO q6h</p> <p><i>IV</i> 25-100 mg/kg IV q6h</p>	<p><i>IV</i> CrCl 30-50: same dose q8h CrCl <30: same dose q12h</p> <p>HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: 250 mg PO/IV q12h</p> <p>-----</p> <p><i>PO/IV</i> CrCl <10: same dose q12h</p> <p>HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: No clear recommendations.</p>
Ampicillin/sulbactam	<p><u>Adult</u> 1.5-3 g IV q6h</p> <p>-----</p> <p><u>Pediatric</u> 25-100 mg (ampicillin component)/kg IV q6h</p>	<p>CrCl 30-50: same dose q8h CrCl 15-29: same dose q12h CrCl <15: same dose q24h</p> <p>HD: Dose daily as CrCl <15. Give after dialysis on dialysis days. CAPD: Dose as CrCl <15.</p> <p>-----</p> <p>CrCl 15-29: same dose q12h CrCl <15: same dose q24h</p> <p>HD: Dose as daily CrCl <15. Give after dialysis on dialysis days. CAPD: Dose as CrCl <15.</p>
<p>Atazanavir (ATV)</p> <p>RTV=ritonavir PPI: proton pump inhibitor H2RA: histamine 2 receptor antagonist EFV: efavirenz TDF:tenofovir AUC: area under the curve</p>	<p><u>Naïve</u> <i>Adult</i> ATV + RTV 300/100mg daily w/food</p> <p>Unable to tolerate RTV and/or on H2RA: ATV 400mg daily w/food</p> <p>With TDF, H2RA or PPI: ATV + RTV 300/100mg daily w/food</p> <p>With EFV: ATV+RTV: 400/100mg daily w/food</p> <p><u>Pediatric</u> ≥6yr: 15-24kg; ATV+RTV 150/80mg daily; 25-31kg: 200/100mg daily; 32-38kg 250/100mg daily; ≥39kg 300/100mg daily w/food</p> <p>≥13yr, ≥39kg and unable to tolerate RTV: ATV 400mg daily w/food</p> <p><u>Experienced</u></p>	<p>No renal adjustment necessary.</p> <p>PPI contraindicated in treatment experienced patients (package labeling) due to decrease in AUC by 75%. In naïve patients PPI should not exceed 20 mg omeprazole/day or equivalent. PPI should be given 12 hours prior to ATV.</p> <p>H2RA dose should not exceed equivalent of famotidine 20 mg q12h. ATV/RTV should be administered simultaneously with or 10 hours after H2RA</p> <p>ATV 400 mg once daily should be administered at least 2 hours before and at least 10 hours after the H2RA</p>

	<p><u>Adult</u> On H2RA: ATV + RTV 300/100mg daily w/food</p> <p>With TFV and H2RA: ATV+RTV 400/100mg daily w/food NOTE: PPI and EFV are contraindicated in treatment-experienced patients receiving atazanavir</p> <p><u>Pediatric</u> ≥6yr: 25-31kg: ATV+RTV 200/100mg daily; 32-38Kg: 250/100mg daily; ≥39kg 300/100mg daily w/food</p>	
Atovaquone	<p><u>Adult & Pediatric (>13yo)</u> 1500 mg PO divided q12-24h</p> <p><u>Pediatric</u> 20 mg/kg PO q12h</p>	No data.
Azithromycin	<p><u>Adult</u> 250-500 mg PO/IV q24h</p> <p><u>Pediatric</u> 5-10 mg/kg PO q24h</p>	<p>No adjustment necessary.</p> <p>Caution advised if CrCl < 10 (AUC increased by 35%).</p>
Aztreonam	<p><u>Adult</u> 1 g IV q8h</p> <p>Anti-pseudomonal/moderate-severe infection: 2 gm IV q8hr</p> <p>-----</p> <p><u>Pediatric</u> 30-60 mg/kg IV q6-8h</p>	<p>CrCl 10-30: same dose IV q12h CrCl <10: same dose IV q24h</p> <p>HD: Dose daily as for CrCl <10 and administer after dialysis on dialysis days. CAPD: Dose as CrCl <10. CVVH: See dosing at end of this document</p> <p>-----</p> <p>CrCl 10-30: 50% IV at same interval[†] CrCl <10: 25% IV at same interval[†]</p> <p>HD: Dose as for CrCl <10 with an extra 3.25-7.5 mg/kg IV after dialysis. CAPD: Dose as CrCl <10.</p>
Cefazolin	<p><u>Adult</u> 2 g IV q8h (All Gram-negative infections, <i>S. aureus</i> bloodstream infections, moderate-severe infections, patients >80kg)</p> <p>1 g IV q8h (surgical prophylaxis for patients <80kg, simple urinary tract infections)</p> <p>-----</p> <p><u>Pediatric</u> 16.7-50mg/kg IV q8h</p>	<p>CrCl 10-30: same dose q12h CrCl <10: 1-2 g q24h</p> <p>HD: 1 gm IV q24hr, administered after HD -OR- 2 gm (~20 mg/kg) IV after each HD three times weekly CAPD: 500 mg IV q12h CVVH: See dosing at end of this document</p> <p>-----</p> <p>CrCl 10-30: same dose q12h CrCl <10: same dose q24h</p>

		<p>HD: 2.5-7.5 mg/kg IV given only after dialysis. CAPD: No adjustment necessary.</p>
<p>Cefepime</p> <p>Refer to dosing protocol on ASP website^s</p>	<p><u>Adult</u> 1 g IV q6h</p> <p>-----</p> <p>Febrile Neutropenia: 2 g IV q8hr</p> <p>-----</p> <p>Mild-moderate UTI or community-acquired pneumonia not caused by <i>P. aeruginosa</i>: 1 g IV q12hr</p> <p>-----</p> <p><u>Pediatric</u> Pediatric ≥ 40 kg: see adult dose</p> <p>Pediatric <40 kg: 50 mg/kg IV q8-12h</p>	<p>CrCl 30-50: 1 g IV q8h CrCl 10-29: 1 g IV q12h CrCl <10: 1 g IV q24h CVVH: See dosing at end of this document</p> <p>-----</p> <p>CrCl 30-50: 2 g IV q12h CrCl 10-29: 1 g IV q12h CrCl <10: 1 g IV q24h CVVH: See dosing at end of this document</p> <p>-----</p> <p>CrCl 10-50: 1 g IV q24h CrCl <10: 500 mg IV q24h</p> <p>-----</p> <p>HD: Dose daily as CrCl <10. Administer after dialysis on dialysis days. CAPD: Dose for CrCl <10.</p> <p>-----</p> <p>CrCl 10-50: same dose q12 (for q8h dosing)-q24h (for q12h dosing) CrCl <10: 50% q24h^f</p> <p>-----</p> <p>HD: Dose daily as CrCl <10. Give after dialysis on dialysis days. CAPD: 50 mg/kg IV q48h</p>
<p>Cefotaxime</p>	<p><u>Adult</u> 1-2 g IV q8h (Therapeutic interchange to ceftriaxone in adults, see cephalosporin therapeutic interchange policy)</p> <p>-----</p> <p><u>Pediatric</u> 25-100mg/kg IV q6-8h (100-200mg/kg/day)</p>	<p>CrCl 10-50: same dose q12h CrCl <10: same dose q24h</p> <p>-----</p> <p>HD: Dose daily as CrCl <10. Give after dialysis on dialysis days. CAPD: 1 g IV q24h</p> <p>-----</p> <p>CrCl <20: same dose q24h</p> <p>-----</p> <p>HD: Dose daily as CrCl <20. Give after dialysis on dialysis days. CAPD: 50-100 mg/kg IV q24h</p>
<p>Cefoxitin</p>	<p><u>Adult</u> 1-2 g IV q8h</p> <p>For coverage of <i>Enterobacteriaceae</i> (<i>E. coli</i>, <i>Klebsiella sp.</i> <i>Proteus sp.</i> etc.): 2 g IV q6h</p> <p>-----</p>	<p>CrCl 10-30: same dose q12h CrCl <10: same dose IV q24h</p> <p>-----</p> <p>HD: Dose daily as CrCl <10. Give after dialysis on dialysis days. CAPD: 1 g IV q24h</p> <p>-----</p>

	<u>Pediatric</u> 20-40mg/kg IV q6h	CrCl 51-90: same dose q8h CrCl 10-50: same dose q12h CrCl <10: same dose q24-48h HD: Dose daily as CrCl <10. Give after dialysis on dialysis days. CAPD: No clear recommendations.
Ceftazidime	<u>Adult</u> 1 g IV q8h Anti-pseudomonal dosing: 2 gm IV q8hr ----- <u>Pediatric</u> 30-50 mg/kg IV q8h	CrCl 10-30: same dose q12h CrCl <10: 1 gm q24h HD: Dose daily as CrCl <10. Give after dialysis on dialysis days. CAPD: 1 g IV x1, then 500 mg IV q24h CVVH: See dosing at end of this document ----- CrCl 30-50: same dose q12h CrCl 10-29: same dose q24h CrCl <10: same dose q48h HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: 30-75 mg/kg IV x1, then 50% q24h [†]
Ceftriaxone	<u>Adult</u> 1 g IV q24h Patients >80 kg: 2 g IV q24h Meningitis: 2 g IV q12h ----- <u>Pediatric</u> 25-100mg/kg IV q12-24h (50-100mg/kg/day)	No adjustment necessary. CAPD: 1 g IV q12h ----- No adjustment necessary.
Cefuroxime	<u>Adult</u> PO 250-500 mg PO q12h IV 1.5 g IV q8h	No adjustment necessary. CrCl 10-20: 1.5 gm IV q12h CrCl <10: 1.5 gm q24h HD: Dose daily as CrCl <10. Give after dialysis on dialysis days. CAPD: Dose as CrCl <10. -----

	<p>-----</p> <p><u>Pediatric</u> PO Cefuroxime 10-15 mg/kg PO q12h</p> <p>IV 25-50mg/kg IV q8h</p>	<p>No adjustment necessary.</p> <p>HD: Give after dialysis on dialysis days.</p> <p>CrCl 10-20: same dose q12h CrCl <10: same dose q24h</p> <p>HD: Dose daily as CrCl <10. Give after dialysis on dialysis days. CAPD: Dose as CrCl <10.</p>
Cephalexin	<p><u>Adult</u> 250 - 1000 mg PO q6h</p> <p>-----</p> <p><u>Pediatric</u> 6.25-37.5 mg/kg PO q6h</p>	<p>CrCl 50-90: same dose PO q8h CrCl <50: same dose PO q12h</p> <p>HD: Dose as CrCl <50. Give after dialysis on dialysis days. CAPD: Dose as CrCl <50.</p> <p>-----</p> <p>CrCl 10-40: same dose q8h CrCl <10: same dose q12h</p> <p>HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: Dose as CrCl <10.</p>
Chloramphenicol	<p><u>Adult</u> 12.5-25 mg/kg IV q6h</p> <p><u>Pediatric</u> 6.25-25 mg/kg IV q6h</p>	<p>No adjustment necessary.</p>
Ciprofloxacin	<p><u>Adult</u> PO 250-750 mg PO q12h (consider 750mg q8h for pneumonia/severe infection)</p> <p>IV 400 mg IV q8-12h (q8h for pneumonia/severe infection)</p> <p>-----</p> <p><u>Pediatric</u> PO 10-20 mg/kg PO q12h</p> <p>IV 10-15 mg/kg IV q8-12h</p>	<p>CrCl <30: same dose q24h</p> <p>HD/CAPD: Dose as CrCl <30 given after dialysis.</p> <p>CrCl <30: same dose q12 (for q8h regimen)-24h (for q12h regimen)</p> <p>HD/CAPD: Dose as CrCl <30 given after dialysis.</p> <p>-----</p> <p>No clear recommendations.</p>
Clarithromycin	<p><u>Adult</u> 0.5 – 1 g PO q12h</p> <p><u>Pediatric</u> 7.5 mg/kg PO q12h</p>	<p><i>Same for Adult & Pediatric</i> CrCl <30: 50% PO q12h[†]</p> <p>HD: Dose as CrCl <30. Give after dialysis on dialysis days.</p>

		CAPD: No adjustment necessary.
Clindamycin	<p><u>Adult</u> PO 150-450 mg PO q6-8h</p> <p>IV Standard dose: 600 mg IV q8h</p> <p>Necrotizing fasciitis: 900 mg IV q8h</p> <p><u>Pediatric</u> PO 2.5-10 mg/kg PO q6-8h (10-30 mg/kg/day)</p> <p>IV 6.25-10 mg/kg IV q6-8h (25-40 mg/kg/day)</p>	No adjustment necessary.
Colistin base IV Restricted to ID service or pulmonary service consultation	<p><u>Adult</u> 5 mg/kg/day (lesser of actual or ideal body weight) colistin base IV divided in 2-3 doses</p>	<p>Use loading dose in renal dysfunction: Loading dose: 2.5 mg/kg IV q12h x2 doses. Maintenance dosing begins 24 hours after first loading dose</p> <p>CrCl >40: no adjustment needed CrCl 20-40: 75% IV q12h[†] CrCl 10-19: 50% IV q12h[†] CrCl <10, HD/CAPD: 50 mg IV q12h (after HD on HD days) SLED: While on SLED dose as CrCl>40 While off SLED dose as CrCl<10</p> <p>See colistin dosing and restriction document available on ASP website[§]</p>
Colistin base Inhaled Restricted to ID service or pulmonary service consultation	<p><u>Adult</u> 75-150 mg inhaled q12h</p> <p><u>Pediatric</u> 30-75 mg inhaled q12h</p>	<p>No adjustment necessary</p> <p>See colistin dosing and restriction document available on ASP website[§]</p>
Dapsone	<p><u>Adult</u> 50-100 mg PO q24h</p> <p><u>Pediatric</u> 1-2 mg/kg PO q24h</p>	No clear guidelines, but adjustment recommended.
Daptomycin Restricted to ID Service review and approval for non FDA-approved indications	<p><u>Adult</u> 6 mg/kg IV q24h</p> <p>UTI or skin/skin structure infection: 4 mg/kg IV q24h</p> <p>Safety and efficacy not established in pediatrics.</p>	<p>CrCl <30: same dose IV q48h</p> <p>HD: Dose as CrCl <30. Give after dialysis on dialysis days. CAPD: Dose as CrCl <30.</p>
Darunavir (DRV)	<p><u>Naïve</u> <u>Adult</u> DRV+RTV 800/100mg daily w/food</p>	

	<p><u>Pediatric</u> ≥6yrs; 20-29kg: DRV+RTV 375/50mg Q12H; 30-39Kg 450/60mg Q12H; ≥40kg 600/100mg Q12H</p> <p><u>Experienced Adult</u> DRV+RTV 600/100mg Q12H w/food</p> <p><u>Pediatric</u> No recommendations.</p>	No adjustment necessary.
Dicloxacillin	<p><u>Adult</u> 250-500 mg PO q6h</p> <p><u>Pediatric</u> 6.25-12.5 mg/kg PO q6h</p>	No adjustment necessary.
Didanosine (enteric coated, DDI EC)	<p><u>Adult</u></p> <p>≥60kg 400 mg EC PO q24h <i>if given with TDF: 250 mg PO q24h</i></p> <p><60 kg: 250 mg EC PO q24h <i>if given with TDF: 200 mg PO q24h</i></p> <p>-----</p> <p><u>Pediatric</u> 100-120 mg/m² PO q12h</p>	<p>CrCl 30-59 & ≥60kg: 200 mg EC q24h CrCl 30-59 & <60kg: 125 mg EC q24h CrCl 10-29: 125 mg PO EC q24h CrCl <10, HD/CAPD: Dose as CrCl 10-29 and if patient is <60kg use oral solution instead of EC formulation</p> <p>-----</p> <p>No clear recommendations except for HD. HD: 25% of total dose PO q24h[†]</p>
Doxycycline	<p><u>Adult</u> 100 mg PO/IV q12h</p> <p><u>Pediatric</u> *not to be used in children < 8yo 1-4 mg/kg PO/IV q12-24h (2-4 mg/kg/day)</p>	No adjustment necessary.
Efavirenz (EFV)	<p><u>Adult</u> 600 mg PO QHS (avoid food)</p> <p><u>Pediatric</u> 200-600 mg PO q24h</p>	No adjustment necessary.
Emtricitabine (FTC)	<p><u>Adult:</u> Capsule: 200 mg once daily Solution: 240 mg once daily</p> <p>-----</p> <p><u>Pediatric</u> 0-3 months: Solution: 3 mg/kg/day 3 months to 17 years: Capsule: Children >33 kg: 200 mg once</p>	<p>CrCl 30-49: Capsule: 200mg q48h; Solution: 120 mg q24h CrCl 15-29: Capsule: 200 mg q72h; Solution: 80 mg q24h CrCl <15: Capsule: 200 mg q96h; Solution: 60 mg q24h</p> <p>HD: Dose as CrCl <15. Give after dialysis on dialysis days.</p> <p>-----</p> <p>No clear recommendations</p>

	daily Solution: 6 mg/kg once daily; maximum: 240 mg/day	
Ertapenem	<u>Adult</u> 1 g IV q24h ----- <u>Pediatric</u> 15 mg/kg IV q12h	CrCl < 30: 500 mg IV q24h HD/CAPD: Dose as CrCl < 30 given after dialysis on dialysis days. ----- No clear recommendations.
Erythromycin	<u>Adult</u> <i>PO</i> 250-500 mg PO q6-12h <i>IV</i> 15-20 mg/kg/day IV divided q6-8h <u>Pediatric</u> <i>PO</i> 7.5-16.7 mg/kg PO q6-8h (30-50 mg/kg/day) <i>IV</i> 3.75-12.5 mg/kg IV q6h	<i>Same for Adult & Pediatric</i> CrCl <10: 50% PO/IV at same interval. [†] HD/CAPD: Dose as CrCl <10.
Erythromycin/sulfisoxazole	<u>Adult</u> 400 mg (erythromycin component) PO q6h <u>Pediatric</u> 10-16.7 mg (erythromycin component)/kg PO q6-8h [40-50 mg (erythromycin component)/kg/day]	No clear recommendations.
Ethambutol	<u>Adult</u> 15-25 mg/kg PO q24h (max. dose 2.5 grams) <u>Pediatric</u> 15-25 mg/kg PO q24h (max. dose 2.5 grams)	<i>Same for Adult & Pediatric</i> CrCl 10-50: same dose PO q24-36h CrCl <10: same dose PO q48h HD: Give dose only after dialysis. CAPD: Dose as CrCl <10.
Etravirine (ETV)	200 mg PO q12h with food	No adjustment necessary
Famciclovir	<u>Adult</u> 500 mg PO q8h (varicella zoster virus) Safety and efficacy not established in pediatrics.	CrCl 40-59: same dose q12h CrCl 20-39: same dose q24h CrCl <20: 50% q24h [†] HD: 50% after each dialysis session. [†] CAPD: No clear recommendations.
Fluconazole	<u>Adult</u> <u>Invasive candidiasis</u> (susceptible <i>C. albicans</i> , <i>C. tropicalis</i> , <i>C. parapsilosis</i>): 800 mg (12 mg/kg) load x1dose then 400 mg (6 mg/kg) PO/IV q24h	<u>Invasive candidiasis</u> : CrCl <30: 800 mg (12mg/kg) load x1dose then 50% (3 mg/kg) PO/IV q24h [†] HD: 800 mg (12mg/kg) load x1dose

	<p><u>Esophageal candidiasis:</u> 200 mg PO/IV q24h</p> <p><u>Oropharyngeal candidiasis:</u> 100 mg q24h</p> <p>-----</p> <p><u>Pediatric</u> 3-12 mg/kg/day PO/IV q24h</p>	<p>then 400 mg (6 mg/kg) PO/IV after HD three times weekly CAPD: 800 mg (12mg/kg) load x1dose then 50% (3 mg/kg) PO/IV q24h[†] CVVH: See dosing at end of this document</p> <p><u>Esophageal/Oropharyngeal candidiasis:</u> CrCl <30: 50% PO/IV q24h[†]</p> <p>HD: 100% PO/IV after each dialysis[†] CAPD: 50% PO/IV q24h[†]</p> <p>-----</p> <p>CrCl 20-50: 50% PO/IV q24h[†] CrCl <20: 25% PO/IV q24h[†] HD: Give dose only after dialysis. CAPD: 25% PO/IV q24h[†]</p>
Flucytosine	<p><u>Adult</u> 50-150 mg/kg/day PO divided q6h</p> <p>-----</p> <p><u>Pediatric</u> 25-37.5 mg/kg PO q6h</p>	<p>CrCl 10-50: same dose q12-24h CrCl <10: same dose q24h HD/CAPD: Give dose only after dialysis.</p> <p>-----</p> <p>CrCl 20-40: same dose q12 CrCl 10-19: same dose q24h CrCl <10: same dose q48h HD/CAPD: Give dose only after dialysis.</p>
Fosamprenavir (FPV) RTV = ritonavir EFV=efavirenz	<p><u>ARV Naïve</u> <i>Adult</i> FPV 1400mg q12h OR 1400mg + RTV 200mg daily OR 1400mg + RTV 100mg daily OR 700mg+ RTV 100mg q12h</p> <p>With EFV or NVP: 1400mg + RTV 300mg daily</p> <p><i>Pediatric</i> 2-5yr: 30mg/kg q12h ≥6yr: 30mg/kg q12h OR FPV 18mg/kg+ RTV 3mg/kg q12h; (maximum dose: FPV 1400mg or RTV 200mg/day)</p> <p><u>ARV Experienced</u> <i>Adult</i> FPV 700mg + RTV 100mg q12h</p> <p><i>Pediatric</i> ≥6yr: FPV 18mg/kg + RTV 3mg/kg q12h (maximum dose: 1400mg+RTV 200mg/day)</p>	<p>No adjustment necessary.</p>
Foscarnet	<p><u>Adult</u> <u>Mucocutaneous HSV:</u> 40 mg/kg IV q8h</p>	<p>CrCl as ml/min/kg body weight CrCl >1.0-1.4: 30 mg/kg IV q8h CrCl >0.8-1.0: 35 mg/kg IV q12h CrCl >0.6-0.8: 25 mg/kg IV q12h</p>

	<p><u>Disseminated CMV, induction:</u> 60 mg/kg IV q8h</p> <p><u>Disseminated CMV, maintenance:</u> 90-120 mg/kg IV q24h</p> <p>.</p> <p>-----</p> <p><u>Pediatric</u> <u>Induction</u> 60 mg/kg IV q8h</p> <p><u>Maintenance</u> 90-120 mg/kg IV q24h</p> <p>40-60 mg/kg IV q12h</p>	<p>CrCl >0.5-0.6: 40 mg/kg IV q24h CrCl 0.4-0.5: 35 mg/kg IV q24h CrCl <0.4: Not recommended.</p> <p>CrCl >1.0-1.4: 45 mg/kg IV q8h CrCl >0.8-1.0: 50 mg/kg IV q12h CrCl >0.6-0.8: 40 mg/kg IV q12h CrCl >0.5-0.6: 60 mg/kg IV q24h CrCl 0.4-0.5: 50 mg/kg IV q24h CrCl <0.4: Not recommended.</p> <p>CrCl >1.0-1.4: 70-90 mg/kg IV q24h CrCl >0.8-1.0: 50-65 mg/kg IV q24h CrCl >0.6-0.8: 80-105 mg/kg IV q48h CrCl >0.5-0.6: 60-80 mg/kg IV q48h CrCl 0.4-0.5: 50-65 mg/kg IV q48h CrCl <0.4: Not recommended.</p> <p>HD: 40-60 mg/kg IV after each dialysis session.</p> <p>-----</p> <p>CrCl as ml/min/kg body weight <u>Induction</u> CrCl ≥ 1.6: 60 mg/kg/8h CrCl 1.5: 56.5 mg/kg/8h CrCl 1.4: 53 mg/kg/8h CrCl 1.3: 49.4 mg/kg/8h CrCl 1.2: 45.9 mg/kg/8h CrCl 1.1: 42.4 mg/kg/8h CrCl 1: 38.9 mg/kg/8h CrCl 0.9: 35.3 mg/kg/8h CrCl 0.8: 31.8 mg/kg/8h CrCl 0.7: 28.3 mg/kg/8h CrCl 0.6: 24.8 mg/kg/8h CrCl 0.5: 21.2 mg/kg/8h CrCl 0.4: 17.7 mg/kg/8h</p> <p><u>Maintenance</u> CrCl 1-1.4: 70-90 mg/kg IV q24h CrCl 0.8-<1: 50-65 mg/kg IV q24h CrCl 0.6-<0.8: 80-105 mg/kg IV q48h CrCl 0.5-<0.6: 60-80 mg/kg IV q48h CrCl 0.4-<0.5: 50-65 IV q48h CrCl < 0.4: not recommended</p> <p>HD/CAPD: No data.</p>
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<p>Fosfomycin sachet</p> <p>Susceptibility testing required for use other than a one time dose for uncomplicated cystitis</p> <p>ID Service consultation strongly recommended for use other than uncomplicated cystitis</p> <p>Refer to fosfomycin information on ASP website[§]</p>	<p><u>Adult</u> Uncomplicated cystitis: 3g oral x 1 dose</p> <p>Complicated cystitis: 3 g oral q48h</p> <p>-----</p> <p><u>Pediatric</u> Pediatric ≥15 yrs: SEE ADULT DOSE</p> <p>Pediatric ≤14 yrs: Uncomplicated cystitis: 2g oral x 1 dose Complicated cystitis: 2g oral every 2 days</p> <p>Pediatric ≤1 yr: Uncomplicated cystitis: 1g oral x 1 dose Complicated cystitis: 1g oral every 2 days</p>	<p>CrCl <50: same dose</p> <p>CrCl <50: 3g oral q72h</p> <p>-----</p> <p>SEE ADULT DOSAGE</p> <p>If uncomplicated and CrCl<50: give same dose</p> <p>If complicated and CrCl<50: Age ≤14 yrs: 2g oral every 3 days Age ≤1 yr: 1g oral every 3 days</p>
<p>Ganciclovir</p>	<p><u>Adult</u> <i>PO</i> 1 g PO q8h</p> <p><i>IV</i> Induction: 5 mg/kg IV q12h</p> <p>Maintenance 5 mg/kg IV q24h</p> <p>-----</p> <p><u>Pediatric</u> <i>PO</i> 30 mg/kg PO q8h</p> <p><i>IV</i> Induction: 5 mg/kg IV q12h</p> <p>Maintenance: 5 mg/kg IV q24h</p>	<p>CrCl 50-69: 1.5 g PO q24h or 500 mg PO q8h CrCl 25-49: 1 g PO q24h CrCl 10-24: 500 mg PO q24h CrCl <10: 500 mg PO 3x/week</p> <p>CrCl 50-69: 2.5 mg/kg IV q12h CrCl 25-49: 2.5 mg/kg IV q24h CrCl 10-24: 1.25 mg/kg IV q24h CrCl <10:1.25 mg/kg IV 3x/week</p> <p>CrCl 50-69: 2.5 mg/kg IV q24h CrCl 25-49: 1.25 mg/kg IV q24h CrCl 10-24: 0.625 mg/kg IV q24h CrCl <10: 0.625 mg/kg IV 3x/week</p> <p>HD (PO/IV): Dose as CrCl <10 given after dialysis sessions.</p> <p>-----</p> <p>No clear recommendations.</p> <p>CrCl 50-69: 2.5 mg/kg IV q12h CrCl 25-49: 2.5 mg/kg IV q24h CrCl 10-24: 1.25 mg/kg IV q24h CrCl <10:1.25 mg/kg IV 3x/week</p> <p>CrCl 50-69: 2.5 mg/kg IV q24h CrCl 25-49: 1.25 mg/kg IV q24h CrCl 10-24: 0.625 mg/kg IV q24h CrCl <10: 0.625 mg/kg IV 3x/week</p> <p>HD (PO/IV): Dose as CrCl <10 given after dialysis sessions.</p>

Gentamicin	<p><u>Adult</u> Extended interval dosing (most indications*): 7 mg/kg once daily</p> <ul style="list-style-type: none"> adjusted by serum level 6-14 hrs after start of infusion and Hartford nomogram (see PK training packet on ASP website[§]) <p>5 mg/kg/day may be used for UTIs</p> <p>-----</p> <p>Traditional dosing 1.5-2.5 mg/kg IV q8h</p> <p>Monitoring of serum levels is recommended.</p> <p>*Refer to TNMC PK training packet on ASP website[§] for exclusions to extended-interval dosing</p> <p>-----</p> <p><u>Pediatric</u> Traditional dosing 1.5-2.5 mg/kg IV q8h</p>	<p>Extended interval dosing frequency determined by levels/Hartford nomogram</p> <p>-----</p> <p>Traditional dosing (empiric, before levels): CrCl 51-90: 60-90% IV q8-12h[†] CrCl 10-50: 30-70% IV q12h[†] CrCl <10: 20-30% IV q24-48h[†] HD/CAPD: Dose according to levels. CVVH: See dosing at end of this document</p>
Imipenem	<p><u>Adult</u> 500 mg IV q6h</p> <p>For any other adult doses, use adjustment tables provided by Micromedex.</p> <p>-----</p> <p><u>Pediatric</u> 15-25 mg/kg IV q6h</p>	<p><u>Adjusted by weight and CrCl. See Micromedex for adjustment.</u></p> <p>HD: Dose as CrCl <20. Dose after dialysis on dialysis days. CAPD: Dose as CrCl <10</p> <p>-----</p> <p>CrCl 41-70: 50% IV q6h[†] CrCl 21-40: 35% IV q8h[†] CrCl 6-20: 25% IV q12h[†]</p> <p>HD: Same dose q12h, given after dialysis on dialysis days. CAPD: Dose as CrCl 6-20</p>
Indinavir	<p><u>Adult</u> 800 mg PO q8h</p> <p>-----</p> <p><u>Pediatric</u>: 500 mg/m² PO q8h</p>	<p>No adjustment necessary.</p> <p>-----</p> <p>No clear recommendations (<20% renal elimination).</p>
Isoniazid	<p><u>Adult</u> 5 mg/kg PO q24h (max dose 300 mg daily)</p> <p><u>Pediatric</u> 10-15 mg/kg PO q24h (max dose 300 mg daily)</p>	<p>No adjustment necessary.</p> <p>HD/CAPD: Give dose after dialysis on dialysis days.</p>
Itraconazole	<p><u>Adult</u> 100-200 mg PO q12h</p> <p>Endemic fungi (<i>Histoplasma sp.</i>, <i>Coccidioides sp.</i>, <i>Blastomyces sp.</i>): 200 mg PO q8h x2days load then 200 mg PO q12h</p> <p><u>Pediatric</u></p>	<p>No renal adjustment necessary.</p> <p>Avoid concomitant proton pump inhibitors or histamine receptor antagonists</p> <p>Suspension should be administered on an empty stomach</p>

	3-5 mg/kg PO q24h	<p>Capsules should be administered with meal or acidic beverage</p> <p>Therapeutic drug monitoring should be considered. Goal steady-state trough obtained after 5-7 days of therapy for active disease >1mg/dL (sum of hydroxy-itraconazole and itraconazole)</p>
Lamivudine (3TC)	<p><u>Adult</u> 150 mg q12h OR 300 mg PO q24h</p> <p>-----</p> <p><u>Pediatric</u> 2-4 mg/kg PO q12h</p>	<p>CrCl 30-49: 150 mg PO q24h CrCl 15-29: 150 mg PO x1, then 100 mg PO q24h CrCl 5-14: 150 mg PO x1, then 50 mg PO q24h CrCl <5: 50 mg PO x1, then 25 mg PO q24h (Note: because lamivudine is well-tolerated and available in 100 mg tablets, some practitioners will prescribe 50 mg PO daily (half of a 100 mg tablet))</p> <p>HD/CAPD: Dose as CrCl <5.</p> <p>-----</p> <p>No clear recommendations (70% renal elimination).</p>
Levofloxacin	<p><u>Adult</u> 750 mg q24h</p> <p>500 mg q24h</p> <p>Urinary tract infection: 250 mg q24h</p> <p>-----</p> <p><u>Pediatric</u> < 6 months: use not recommended ≥ 6 months to <5 years: 10 mg/kg/dose PO/IV q12hrs ≥5 years: 10 mg/kg/dose PO/IV q24hrs Maximum daily dose: 750 mg</p>	<p>CrCl 20-49: 750 mg q48h CrCl <20 or HD/PD: 750 mg x1 dose then 500 mg q48h</p> <p>CrCl 20-49 ml/min: 500 mg x 1, then 250mg Q24h CrCl <20 ml/min, HD/PD: 500mg X 1, then 250mg Q48h</p> <p>CrCl ≤20: 250 mg q48h (except when ordered duration ≤3 days, then no dose adjustment needed), HD/PD: no information available</p> <p>-----</p> <p>ALL AGES: CrCl 10-29 ml/min: 10mg/kg q24hrs CrCl <10 ml/min, HD/PD: 10mg/kg q48hrs</p>
Linezolid	<p><u>Adult</u> 600 mg PO/IV q12h</p> <p><u>Pediatric</u> 10 mg/kg PO/IV q8-12h</p>	<p>No adjustment necessary. Consider dose adjustment in CVVH (See dosing at end of this document)</p>
Lopinavir/ritonavir (LPV/r)	<p><u>Adult</u> 400/100 mg PO q12h</p>	<p>No clear recommendations, but</p>

	<p>or</p> <p>800/200 mg PO q24h (do not use once daily dosing in pts with >2 lopinavir resistance-associated substitutions, pregnancy, or patients receiving EFV, NVP, NFV, carbamazepine, phenobarbital, or phenytoin)</p> <p><u>Pediatric</u> 10-13 mg (lopinavir component)/kg PO q12h</p>	<p>adjustment probably not necessary (<3% renal elimination). Avoid once daily dosing in patients receiving HD</p>
Maraviroc	<p><u>150 mg PO q12h</u>: when used concomitantly with a potent CYP3A inhibitor (with or without a CYP3A inducer) including protease inhibitors (except tipranavir/ritonavir), delavirdine, ketoconazole, itraconazole, clarithromycin, nefazadone, and telithromycin</p> <p><u>600 mg PO q12h</u>: when used concomitantly with a potent CYP3A inducer (without a strong CYP3A inhibitor) including efavirenz, etravirine, rifampin, carbamazepine, phenobarbital, and phenytoin.</p> <p><u>300 mg PO q12h</u>: when used concomitantly with tipranavir/ritonavir, nevirapine, raltegravir, all nucleoside reverse transcriptase inhibitors, and enfuvirtide</p>	<p>Caution in patients with hepatic impairment</p> <p>Caution in patients with CrCl<50</p>
<p>Meropenem</p> <p>Refer to dosing protocol on ASP website^s</p>	<p><u>Adult</u> Standard dose: 500 mg IV q6h</p> <p>Simple urinary tract infection: 500 mg IV q8h</p> <p>see next page Meningitis, cystic fibrosis, meropenem MIC of 4 mcg/mL 2 g IV q8h</p> <p>-----</p> <p><u>Pediatric</u> 20-40 mg/kg IV q8h (q12h for neonates 7 days old and under)</p>	<p>CrCl 25-49: 500 mg IV q8h CrCl 10-24: 500 mg IV q12h CrCl < 10: 500 mg IV q24h</p> <p>CrCl 25-49: 500 mg IV q12h CrCl 10-24: 250 mg IV q12h CrCl < 10: 500 mg IV q24h</p> <p>CrCl 25-49: 2 g IV q12h CrCl 10-24: 1 g IV q12h CrCl < 10: 1 g IV q24h</p> <p>HD/CAPD: Dose as CrCl < 10 given after dialysis on dialysis days. CVVH: See dosing at end of this document</p> <p>-----</p> <p>No clear recommendations for neonates 7 days old under. For those over 7 days old: CrCl 10-24: Same dose IV q12h CrCl < 10: Same dose IV q24h</p> <p>HD/CAPD: Dose as CrCl < 10 given after dialysis on dialysis days.</p>
Metronidazole	<u>Adult</u>	<i>Same for Adult & Pediatric</i>

	500 mg PO/IV q8h <u>Pediatric</u> 3.75-16.7 mg/kg PO/IV q6-8h (15-50 mg/kg/day)	CrCl <10, HD, or severe hepatic dysfunction: consider 50% at same interval if >14 day duration [†]
Micafungin	<u>Adult</u> 50-150 mg IV q24h ----- <u>Pediatric</u> 1-4.5 mg/kg IV q24h	No adjustment necessary. ----- No clear recommendations.
Minocycline	<u>Adult</u> 100 mg PO q12h (200 mg PO qhs) <u>Pediatric</u> *not to be used in children < 8yo 2 mg/kg PO q12h (4 mg/kg PO qhs)	No adjustment necessary.
Moxifloxacin	<u>Adult</u> 400 mg PO/IV q24h Safety and efficacy not established in pediatrics.	No adjustment necessary.
Nelfinavir (NFV)	<u>Adult</u> 1250 mg PO q12h <u>Pediatric</u> 45-55 mg/kg PO q12h	No clear recommendations, but adjustment probably not necessary (<2% renal elimination).
Nevirapine (NVP)	<u>Adult</u> 200 mg PO q24h x14 days then increase to 200 mg PO q12h (immediate release tab) or 400 mg PO q24h (extended-release tab) <u>Pediatric</u> 4-7 mg/kg PO q12h	No adjustment necessary. Give dose after dialysis on dialysis days. Avoid if naïve and CD4 count > 250 cells/mm ³ in women and 400 cells/mm ³ in men
Nitrofurantoin	<u>Adult</u> 50-100 mg PO q12h <u>Pediatric</u> 1.25-1.75 mg/kg PO q6h	CrCl <50, HD/CAPD: Use is not recommended – will not reliably reach useful concentrations in urine and will have increased risk of toxicity
Oseltamivir	<u>Adult</u> 75 mg PO q12h <u>Pediatric</u> 30-75 mg PO q12h	<u>Adult</u> CrCl 30-60: 30 mg twice daily CrCl 10-30: 30 mg once daily ESRD on HD: 30 mg after HD session, treatment duration not to exceed 5 days ESRD on CAPD: single 30 mg dose administered immediately after a dialysis exchange
Oxacillin	<u>Adult</u> Methicillin-susceptible <i>S. aureus</i> bloodstream infections: 2g IV q4h Non-bloodstream infections 1-2g IV q4-6h	No adjustment necessary.

	<u>Pediatric</u> 16.7-50 mg/kg IV q4-6h (50-100 mg/kg/day)	
Penicillin G	<u>Adult</u> 2 – 4 million units IV q4h ----- <u>Pediatric</u> 25,000-100,000 units/kg IV q4-6h (100,000-400,000 units/kg/day)	CrCl 10-50: 75% IV at same interval [†] CrCl <10: 2-4 million units q8h HD: Dose as CrCl <10. Give dose after dialysis on dialysis days. CAPD: Dose as CrCl <10. ----- CrCl 10-30: same dose q8h CrCl <10: same dose q12h HD: Dose as CrCl <10. Give dose after dialysis on dialysis days. CAPD: Dose as CrCl <10.
Penicillin VK	<u>Adult</u> 250-500 mg PO q6-8h <u>Pediatric</u> 6.25-16.7 mg/kg PO q6-8h (25-50 mg/kg/day)	No adjustment necessary. HD: Give dose after dialysis on dialysis days.
Pentamidine	<u>Adult</u> 4 mg/kg IV q24h ----- <u>Pediatric</u> 4 mg/kg IV q24h	No adjustment necessary. ----- CrCl 10-30: same dose q36h CrCl <10: same dose q48h
Piperacillin	<u>Adult</u> 3-4 g IV q4-6h ----- <u>Pediatric</u> 33.3-75 mg/kg IV q4-6h (200-300 mg/kg/day)	CrCl 10-50: same dose IV q6-8h CrCl <10: same dose IV q8h HD: Dose as CrCl <10. Give dose after dialysis on dialysis days. CAPD: Dose as CrCl <10. ----- CrCl 20-40: same dose q8h CrCl <20: same dose q12h HD: Dose as CrCl <20. Give dose after dialysis on dialysis days. CAPD: Dose as CrCl <20.
Piperacillin/tazobactam See dosing protocol on ASP website ^s	<u>Adult</u> Extended 4hr infusion (standard at TNMC): 4.5 g IV q8h, infused over 4h Traditional, 30 minute infusion 3.375 g IV q6h or 4.5 g IV q8h	Extended 4hr infusion (standard at TNMC): CrCl <20, HD/CAPD: 4.5 g IV q12h, infused over 4h CVVH: See dosing at end of this document Traditional, 30 minute infusion CrCl 20-40: 2.25 g IV q6h CrCl <20: 2.25 g IV q8h

	<p>Anti-pseudomonal dosing: 4.5 g IV q6h</p> <p>-----</p> <p><u>Pediatric</u> Extended infusion: >2kg and ≤40kg, over 40kg per adult dosing (all doses based on piperacillin component) 0-7 days: 100 mg/kg q12h, infused over 4h 8-28 days: 100 mg/kg q8h, infused over 4h >28 days: 100 mg/kg q6h, infused over 4h NOTE: all doses must be infused over 4 hours, except in NICU patients</p> <p>Traditional, 30 minute infusion 50-133.3 mg/kg (piperacillin) IV q6-8h [150-400mg/kg/day (piperacillin)]</p>	<p>CrCl 20-40: 3.375 g IV q6h CrCl <20: 2.25 g IV q6h</p> <p>HD: Dose as CrCl <20 + 0.75 g IV after dialysis. CAPD: Dose as CrCl <20.</p> <p>-----</p> <p>CrCl 20-40: 70%, same interval[†] CrCl <20, HD/CAPD: 70%, infuse q12h over 4 hours[†]</p> <p>CrCl 20-40: 70% IV q6h[†] CrCl <20: 70% IV q8h[†] HD/CAPD: No recommendations</p>
<p>Posaconazole</p> <p>Restricted to review and approval by the ID Service or the Hematology/Oncology Service</p>	<p><u>Adult & Pediatric (≥13 y.o.)</u> 200-800 mg PO q6-24h (q6h dosing preferred for active disease due to saturable absorption) (Maximum 800 mg q24h)</p> <p>Take with high fat meal/nutritional supplement. Avoid concomitant use of proton-pump inhibitors & histamine receptor antagonists</p>	<p>No adjustment necessary.</p> <p>Therapeutic drug monitoring suggested. Obtain steady state trough (7 days). Goal for active disease is >1.25 mg/L</p>
Primaquine	<p><u>Adult</u> 15-30 mg (primaquine base) PO q24h</p> <p><u>Pediatric</u> 0.3 mg/kg (primaquine base) PO q24h</p>	<p>No clear recommendations, but adjustment probably not necessary (<1% renal elimination).</p>
Pyrazinamide	<p><u>Adult</u> 25 mg/kg PO q24h (max dose 2gm PO for daily therapy)</p> <p>-----</p> <p><u>Pediatric</u> 10-40 mg/kg PO q12-24h (max dose 2gm PO for daily therapy) (20-40 mg/kg/day)</p>	<p>CrCl <10: 15 mg/kg PO q24h</p> <p>HD: 25 mg/kg PO after each dialysis session. CAPD: No data.</p> <p>-----</p> <p>CrCl <10, HD: 40 mg/kg PO 3x/week CAPD: No data.</p>
Pyrimethamine	<p><u>Adult</u> 50-100 mg PO q24h</p> <p><u>Pediatric</u> 1 mg/kg PO q12h</p>	<p>No adjustment necessary.</p>
Quinupristin/dalfopristin	<p><u>Adult & Pediatrics</u> 7.5 mg/kg IV q8h</p>	<p>No adjustment necessary. No data for pediatrics.</p>
Raltegravir (RAL)	<p><u>Adult and adolescent ≥16yrs</u> 400mg PO q12H</p>	<p>No adjustment necessary.</p>

	With rifampin: 800 mg PO q12h <u>Pediatric</u> Not established in <16yrs	
Ribavirin	<u>Adult</u> 400-600 mg PO q12h <u>Pediatric</u> 200-400 mg PO q12h	Same for Adult & Pediatric CrCl <50: Contraindicated.
Rifabutin	<u>Adult</u> 300 mg PO q24h <u>Pediatric</u> 5 mg/kg PO q24h	No adjustment necessary.
Rifampin	<u>Adult</u> Mycobacterial disease: 10 mg/kg (600 mg) PO daily Prosthetic valve infective endocarditis: 300 mg PO/IV q8h <u>Pediatric</u> 10-20 mg/kg PO/IV q24h	No adjustment necessary.
Rilpivirine (RVP)	Adult: 25 mg daily Do not coadminister with H2RA, PPI, or antacids	No dose adjustment necessary
Rimantidine	<u>Adult</u> 100 mg PO q12h ----- <u>Pediatric</u> 5 mg/kg PO q24h	CrCl <10: 100 mg PO q24h HD/CAPD: No data. ----- No clear recommendations.
Ritonavir (RTV)	<u>Adult</u> 100 mg PO q12h (in combination with another protease inhibitor) 100 mg PO q24h when coadministered with atazanavir or daily darunavir <u>Pediatric</u> 400 mg/m ² PO q12h	No adjustment necessary.
Saquinavir (SQV)	<u>Adult</u> 1000 mg PO q12h (w ritonavir 100 mg PO q12h) Not approved for use in pediatrics.	No data, but negligible renal clearance.
Stavudine (D4T)	<u>Adult</u> <60 kg: 30 mg PO q12h ≥60 kg: 40 mg PO q12h -----	CrCl 26-50: 50% PO q12h [†] CrCl 10-25 and HD: 50% PO q24h [†] Give after dialysis on dialysis days. CAPD: No data. -----

	<u>Pediatric</u> 1 mg/kg PO q12h	CrCl 25-50: 50% PO q12h [†] CrCl <25: 50% PO q24h [†] HD: Dose as CrCl <25. Give after dialysis on dialysis days. CAPD: No data.
Sulfadiazine	<u>Adult</u> 2-4 g PO in 3-6 divided doses <u>Pediatric</u> 37.5 mg/kg PO q6h	No data.
Tenofovir (TDF)	<u>Adult</u> 300 mg PO q24h <u>Pediatric</u> 8 mg/kg PO q24h	<i>Same for Adult & Pediatric</i> CrCl 30-49: 300 mg q48h CrCl 10-29: 300 mg twice weekly CrCl <10: No data HD: 300 mg once weekly, given after dialysis if on a dialysis day. CAPD: No data.
Tetracycline	<u>Adult</u> 250-500 mg PO q6h ----- <u>Pediatric</u> *not to be used in children < 8yo 6.25-12.5 mg/kg PO q6h	CrCl >50-90: same dose PO q8-12h CrCl 10-50: same dose PO q12-24h CrCl <10: same dose PO q24h HD/CAPD: No data. ----- CrCl 50-80: same dose q8h CrCl 10-49: same dose q12h CrCl <10: same dose q24h HD/CAPD: No data.
Ticarcillin	<u>Adult</u> 3 g IV q4h ----- <u>Pediatric</u> 25-75 mg/kg IV q4-6h (150-300 mg/kg/day)	CrCl 30-60: 2 g IV q4h CrCl 10-30: 2 g IV q8h CrCl <10: 2 g IV q12h HD: 2 g IV q12h with a 3 g IV supplement after each dialysis. CAPD: Dose as CrCl <10. ----- CrCl 10-30: same dose q8h CrCl <10: same dose q12h HD: Same dose 12h with dosing after dialysis. CAPD: Dose as CrCl <10.
Tigecycline (Restricted to ID Service review and approval)	<u>Adult</u> 100 mg IV load, then 50 mg IV q12h <u>Pediatric</u> Safety and efficacy not established in pediatrics.	<u>Adults & Peds:</u> Renal dysfunction: no adjustment necessary. Hepatic dysfunction, Child Pugh C: 100 mg IV load followed by 25 mg IV q12h
Tipranavir (TPV)	<u>Adult</u> 500 mg PO q12h (coadministered with ritonavir 200 mg PO q12h) <u>Pediatric</u> Safety and efficacy not established in	No data, but negligible renal clearance.

<p>Tobramycin</p>	<p>pediatrics.</p> <p><u>Adult & Pediatric</u> Extended interval dosing (most indications*): 7 mg/kg once daily</p> <ul style="list-style-type: none"> adjusted by serum level 6-14 hrs after start of infusion and Hartford nomogram (see PK training packet on ASP website[§]) <p>5 mg/kg/day may be used for UTIs</p> <p>-----</p> <p>Traditional dosing 1.5-2.5 mg/kg IV q8h</p> <p>Monitoring of serum levels is recommended.</p> <p>*Refer to TNMC PK training packet on ASP website[§] for exclusions to extended-interval dosing.</p> <p>-----</p> <p><u>Pediatric</u> Traditional dosing 1.5-2.5 mg/kg IV q8h</p>	<p>Extended interval dosing frequency determined by levels/Hartford nomogram</p> <p>-----</p> <p>Traditional dosing (empiric, before levels): CrCl 51-90: 60-90% IV q8-12h[†] CrCl 10-50: 30-70% IV q12h[†] CrCl <10: 20-30% IV q24-48h[†]</p> <p>HD/CAPD: Dose according to levels. CVVH: See dosing at end of this document</p>
<p>Trimethoprim/sulfamethoxazole (TMP/SMX)</p> <p>1 Bactrim DS tablet = 160mg(TMP)/800mg(SMX)</p> <p>Bactrim oral suspension = 40mg/5 mL (TMP)/ 200mg/5 mL (SMX)</p>	<p><u>Adult</u> PO</p> <p>Simple urinary tract infection: 1 Bactrim DS tablet PO q12h</p> <p>Skin/skin structure infection/other infections: 1-2 Bactrim DS tablets PO q12h</p> <p>PCP treatment:15-20 mg/kg/day* (trimethoprim component) PO divided q6-8h</p> <p>IV</p> <p>Skin/skin structure infection: 10 mg/kg/day (ideal body weight) trimethoprim component divided q12h</p> <p>Severe Infections/PCP 15-20 mg/kg/day* (trimethoprim component) IV divided q6-8h</p> <p><i>*Ideal body weight, consider an adjusted body weight in severely ill obese patients. See equation for adjusted body weight at end of document</i></p> <p>-----</p> <p><u>Pediatric</u> PO/IV</p> <p>Simple urinary tract infection” 5 mg/kg (TMP) PO q12h</p> <p>Skin/skin structure infection/other infections: 10 mg/kg/day (TMP) IV divided q12h</p>	<p><u>Adults and Pediatrics, PO/IV</u></p> <p><u>Simple UTI, skin/skin structure, other infections</u> CrCl <30: 50% of usual daily dose divided q12-24h</p> <p>HD: Dose as CrCl<30, administer after HD on HD days</p> <p>PCP treatment: CrCl 15-30: 15-20 mg/kg/day (trimethoprim component) q6-8h for 48 hours followed by 50% of usual daily dose divided q12h</p> <p>CrCl <15: 50% of usual daily dose divided q12h HD: Dose as CrCl<15, administer after HD on HD days</p>

	PCP treatment: 15-20 mg/kg/day (TMP) IV divided q6-8h	
Valacyclovir	<p><u>Adult</u> 2 g PO q12h</p> <p>1 g PO q8h</p> <p>1 g PO q12h</p> <p>1 g PO q24h</p> <p>500 mg PO q12h</p> <p>500 mg PO q24h</p> <p>Safety and efficacy not established in pediatrics.</p>	<p>CrCl 30-49: 1 g PO q12h CrCl 10-29: 500 mg PO q12h CrCl <10: 500 mg PO q24h</p> <p>CrCl 30-49: 1 g PO q12h CrCl 10-29: 1 g PO q24h CrCl <10: 500 mg PO q24h</p> <p>CrCl 30-49: no adjustment CrCl 10-29: 1 g PO q24h CrCl <10: 500 mg PO q24h</p> <p>CrCl 30-49: no adjustment CrCl 10-29: 500 mg PO q24h CrCl <10: 500 mg PO q24h</p> <p>CrCl 30-49: no adjustment CrCl 10-29: 500 mg PO q24h CrCl <10: 500 mg PO q24h</p> <p>CrCl 30-49: no adjustment CrCl 10-29: 500 mg PO q48h CrCl <10: 500 mg PO 48h</p> <p>HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: 500 mg PO q48h</p>
Valganciclovir	<p><u>Adult</u> Treatment, induction 900 mg PO q12h</p> <p>Treatment, maintenance 900 mg PO q24h</p> <p>Prophylaxis (dosing at TNMC) 450 mg PO q24h</p> <p>----- <u>Pediatric (Usual dosing at TNMC)</u> Treatment 14 mg/kg PO q12h</p>	<p><u>Adult</u> Treatment, induction CrCl 40-59: 50% PO same interval[†] CrCl 25-39: 50% PO q24h[†] CrCl 10-24: 50% PO q48h[†] CrCl <10, HD/CAPD: Use is not recommended.</p> <p>Treatment, maintenance CrCl 40-59: 50% PO same interval[†] CrCl 25-39: 50% PO q48h[†] CrCl 10-24: 50% PO twice weekly[†] CrCl <10, HD/CAPD: Use is not recommended.</p> <p>Prophylaxis CrCl 25-39: same dose PO q48h[†] CrCl 10-24: 450 mg PO twice weekly[†] CrCl <10, HD/CAPD: Use is not recommended.</p> <p>----- <u>Pediatric</u> Treatment CrCl 40-59: 50% PO same interval[†] CrCl 25-39: 50% PO q24h[†] CrCl 10-24: 50% PO q48h[†]</p>

	Maintenance or Prophylaxis 14 mg/kg PO daily	CrCl <10, HD/CAPD: Use is not recommended. Maintenance or Prophylaxis CrCl 40-59: 50% PO same interval [†] CrCl 25-39: 50% PO q48h [†] CrCl 10-24: 50% PO twice weekly [†] CrCl <10, HD/CAPD: Use is not recommended.
Vancomycin IV	<u>Adult</u> Standard*: 15-20 mg/kg IV q12h Consider 25 mg/kg x1 loading dose in critically ill patients ----- <u>Pediatric</u> 15-20 mg/kg IV q6h*	*Dosing, therapeutic goals, and monitoring should be individualized for each patient; consult pharmacy. Refer to PK training packet on ASP website[§] Troughs of 15-20 mcg/mL are recommended for patients with MRSA bloodstream infections, endocarditis, meningitis, pneumonia, osteomyelitis, and septic arthritis. CVVH: See dosing at end of this document ----- CrCl 70-89: same dose q8h CrCl 46-69: same dose q12h CrCl 30-45: same dose q18h CrCl 15-29: same dose q24h CrCl <15, HD/CAPD: Measure trough levels to determine when to dose.
Vancomycin PO	125 mg PO q6h	No renal adjustment necessary
Voriconazole	<u>Adult & Pediatric (>12 yo)*</u> <u>PO/IV</u> Active disease: Loading dose of 6mg/kg PO/IV q12h x2doses, then 4 mg/kg PO/IV q12h Prophylaxis: 200 mg PO q12h (100 mg q12h if <40kg) Therapeutic drug monitoring is suggested. Voriconazole target trough at steady-state is 2 - 5.5 mg/L.	Hepatic dysfunction (Child Pugh A or B): 6mg/kg q12h x2doses then 50% of normal daily dose. Renal dysfunction: PO No adjustment necessary. IV CrCl <50, HD/CAPD: Caution with IV formulation due to accumulation of cyclodextrin vehicle.
Zanamivir IH	<u>Adult and Pediatric ≥7 years</u> Treatment: Two inhalations (10 mg total) twice daily for 5 days <u>Adult and Pediatric ≥5 years</u> Prophylaxis: Two inhalations (10 mg total) once daily for daily for 10 days	No adjustment necessary.
Zidovudine (AZT)	<u>Adult</u> PO: 300 mg PO q12h <u>IV for intrapartum administration:</u>	CrCl <15, HD/CAPD: 100 mg PO q6-8h. Give after dialysis on dialysis days.

	<p>2 mg per kg body weight intravenously over 1 hour, followed by continuous infusion of 1 mg per kg body weight per hour. Refer to DHHS guidelines for dosage and duration for continuation post-partum</p> <p>-----</p> <p><u>Pediatric</u> PO: 160 mg/m² PO q8h IV: 120 mg/m² IV q6h</p>	<p>CrCl <15, HD/CAPD: 1 mg/kg IV q6-8h. Give after dialysis on dialysis days.</p> <p>-----</p> <p>No data.</p>
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*use Cockcroft-Gault equation for patients ≥ 18 years old; use Schwartz method for patients < 18 years old

†When the recommended renal dosage adjustment is listed as a percentage change, this indicates that X% of the originally ordered dose should be given, NOT that the dose should be decreased by X%. For example, an adult with a CrCl between 10-50 ml/min would receive 30-70% of the originally ordered amikacin dose

§Antimicrobial stewardship program (ASP) website: www.nebraskamed.com/asp

Adults: Estimate of Creatinine Clearance using Cockcroft-Gault equation

$$\text{CrCl (ml/min)} = \frac{(140 - \text{age}) * \text{IBW}}{72 * \text{Scr}} \times 0.85(\text{for females only})$$

Scr = serum creatinine concentration in mg/dL; if patient is > 65 years old and Scr < 1 mg/dL, round up to 1.0

IBW = ideal body weight

$$\text{IBW (males)} = 50 + (2.3 \times \text{inches} > 5 \text{ feet})$$

$$\text{IBW (females)} = 45.5 + (2.3 \times \text{inches} > 5 \text{ feet})$$

NOTE: use actual body weight if less than ideal body weight

Adjusted body weight: ideal body weight + 0.4(actual body weight – ideal body weight)

Pediatrics: Estimate of Creatinine Clearance using Schwartz's equation

$$\text{CrCl (ml/min)} = K \times L / \text{Scr}$$

K = Constant of proportionality that is age specific

Age	K
Preterm infants up to 1 year	0.33
Full-term infants up to 1 year	0.45
1-12 years	0.55
13-17 years female	0.55
13-17 years male	0.7

L = length or height in cm

Scr = serum creatinine concentration in mg/dL

Selected References, General Renal Dose Adjustments

1. Gilbert DN, et al. *The Sanford Guide to Antimicrobial Therapy*, 38th Edition, 2008.
2. MICROMEDEX® Healthcare Series, 2012.
3. Livornese LL, et al. Use of antibacterial agents in renal failure. *Infectious Disease Clinics of North America*. 2004;18:551-79.
4. Taketomo CK, et al. *Pediatric Dosage Handbook*, 12th Edition, 2005.
5. Aronoff GR, et al. *Drug Prescribing in Renal Failure*, 4th Edition, 1999.

Anti-infective dosing recommendations in continuous venovenous hemofiltration (CVVH) at The Nebraska Medical Center

Please note:

-In patients with renal failure, the time to achievement of steady-state is increased for renally-eliminated agents. In addition, patients on CRRT frequently have an increased volume of distribution for many agents. Therefore, **a loading dose should be utilized if not initiating therapy at the full dose.**

-Patients undergoing CVVH are at a high risk of being underdosed. For agents with relatively large therapeutic windows (e.g. beta-lactams) being used in critically ill patients, erring on the side of aggressive dosing may be prudent.

-Monitor patients for interruption of CVVH (e.g. clotting) or changing filtration rates. When CVVH is off, dose as hemodialysis patients or based on any residual renal function.

Drug	Loading dose for CRRT	Standard anephric dose	Dose by CVVH flow rate			
			1 L/h	2 L/h	3 L/h	4 L/h
Aminoglycosides ¹	3 mg/kg gent/tobra; 10 mg/kg amikacin	Provide loading dose then dose per therapeutic drug monitoring	Provide loading dose then dose per therapeutic drug monitoring; patients may require repeat dosing q24h at flow rates >1 L/h			
Acyclovir# ¹	NA	2.5-5 mg/kg q24h	5-7.5 mg/kg q24h	5-10 mg/kg q24h	5-10 mg/kg q24h	5-10 mg/kg q24h
Aztreonam ²	2 g	1-2 g q24h	1 g q8h	2g q12h	2 g q8h	2 g q6h
Cefazolin ²	2 g	1 g q24h	1 g q12h	1 g q12h	1 g q8h	1 g q8h
Cefepime ¹	2 g	1 g q24h	1 g q12-24h	1 g q12h	1 g q8h	1 g q6h
Ceftazidime ²	2 g	1 g q24h	1 g q12h	2g q12h	2 g q8h	2 g q8h
Ceftriaxone ^{3,4}	NA	1-2 g q12-24h	No adjustment necessary; dose as anephric			
Ciprofloxacin ¹	NA	400 mg (IV) or 500 mg (PO) q24h	No adjustment necessary; dose as anephric			
Daptomycin ¹	NA	6 mg/kg q48h	No adjustment necessary; dose as anephric			
Fluconazole* ^{1,5}	800 mg (12mg/kg)	400 mg (6 mg/kg) post dialysis sessions*	200 mg q24h	400 mg q24h	400 mg q12h	400 mg q12h
Levofloxacin ^{3,7}	500-750 mg	250 mg q24h	250 mg q24h or 500 mg q48h	250 mg q24h or 500 mg q48h	250 mg q24h or 500 mg q48h	500 mg q24h
Linezolid ^{1,6}	NA	600 mg q12h	600 mg q12h	600 mg q12h	600 mg q8-12h	600 mg q8-12h
Meropenem ^{1,3}	1-2 g	500 mg q24h	500 mg q12h	500 mg q8h	500 mg q6h	500 mg q6h
Moxifloxacin	NA	400 mg q24h	No adjustment necessary			
Oxacillin	NA	2 g q4h	No adjustment necessary			
Piperacillin/ tazobactam EI	NA	4.5 g (administered over 4h) q12h	4.5 g EI q12h	4.5 g EI q8h	4.5 g EI q8h	4.5 g EI q8h
Vancomycin ³	20-25 mg/kg	Provide loading dose then dose per therapeutic drug monitoring;	Provide loading dose then per therapeutic drug monitoring; patients may require approximately 500 mg q12h at flow rates >1 L/h			

#Use lower dose for mucocutaneous HSV and higher dose for HSV encephalitis or VZV; *Dose assuming invasive candidiasis; EI, 4-hour extended-infusion; NA, Not applicable

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1. Heintz BH, Matzke GR, Dager WE. Antimicrobial dosing concepts and recommendations for critically ill adult patients receiving continuous renal replacement therapy or intermittent hemodialysis. *Pharmacotherapy*. 2009 May;29(5):562-77.
2. Scheetz MH, Scarsi KK, Ghossein C, Hurt KM, Zembower TR, Postelnick MJ. Adjustment of antimicrobial dosages for continuous venovenous hemofiltration based on patient-specific information. *Clin Infect Dis*. 2006 Feb 1;42(3):436-7
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4. Matzke GR, Frye RF, Joy MS, Palevsky PM. Determinants of ceftriaxone clearance by continuous venovenous hemofiltration and hemodialysis. *Pharmacotherapy*. 2000 Jun;20(6):635-43.
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6. Meyer B, Kornek GV, Nikfardjam M, Karth GD, Heinz G, Locker GJ, Jaeger W, Thalhammer F. Multiple-dose pharmacokinetics of linezolid during continuous venovenous haemofiltration. *J Antimicrob Chemother*. 2005 Jul;56(1):172-9. Epub 2005 May 19.
7. Trotman RL, Williamson JC, Shoemaker, DM, et al. Antibiotic dosing in critically ill adult patients receiving continuous renal replacement therapy. *Clin Infect Dis*. 2005; 41:1159-66.

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