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 (using the Cockroft-Gault equation for patients ≥ 18 years old and the Schwartz equation for patients < 18 years old). This protocol does NOT include neonates. 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, with the exception of vancomycin, amikacin, gentamicin, and tobramycin. A pharmacokinetic consult will be performed by the pharmacist for these drugs, and the ordering physician will be contacted for dosage changes unless ordered as "pharmacy to dose."

The most current version of the Renal Dosage Adjustment Guidelines for Antimicrobials can be found online at www.nebraskamed.com/asp.

Please note:

- If there are no clear recommendations available, do not attempt any automatic dosage adjustment. Consult with the physician.

Antimicrobial	Normal Dose	Renal Dosage Adjustment Based on CrCl Estimate (in ml/min)*
Abacavir	Adult 300 mg PO bid or 600 mg PO qday Pediatric 8 mg/kg PO bid	No adjustment necessary.
Acyclovir	Adult *PO* 200 mg PO 5x/day 400 mg PO 5x/day 800 mg PO 5x/day 400 mg PO bid *IV* 5-12.4 mg/kg IV q8h - Pediatric *PO*	 CrCl 0-10: same dose bid CrCl 11-25: same dose tid CrCl 0-10: same dose bid CrCl 11-25: same dose tid CrCl 0-10: same dose bid CrCl 0-10: 200 mg PO bid CrCl 25-50: same dose q12h CrCl 10-24: same dose q24h CrCl <10: 2.5-6.2 mg/kg IV q24h HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: dose as CrCl <10 -

	6.25-20 mg/kg PO qid *IV* 15-30 mg/kg IV q8h	CrCl 10-25: same dose tid CrCl <10: same dose bid CrCl 25-50: same dose q12h CrCl 10-24: same dose q24h CrCl <10: 50% IV q24h[Ŧ] HD/CAPD: No data.
Amantadine	<u>Adult</u> 100 mg PO bid or 200 mg daily - <u>Pediatric</u> 1-9 years: 5 mg/kg/day PO in 2 divided doses (maximum dose: 150 mg/day) ≥10 years and < 40 kg: 5 mg/kg/day PO in 2 divided doses (maximum dose: 150 mg/day) ≥10 years and ≥40 kg: 100 mg PO bid daily	CrCl 30-50: Administer 200 mg on day 1, then 100 mg/day CrCl 15-29: Administer 200 mg on day 1, then 100 mg on alternate days CrCl <15: Administer 200 mg every 7 days HD: Administer 200 mg every 7 days CAPD: No supplemental dose is needed. - No clear recommendations.
Amikacin	<u>Adult</u> 15 mg/kg/day IV divided q8h Monitoring of serum levels is recommended. Once daily dosing of aminoglycosides is adjusted based on the Hartford nomogram. - <u>Pediatric</u> 5 mg/kg IV q8h	CrCl 51-90: 60-90% IV q12h[Ŧ] CrCl 10-50: 30-70% IV q12-18h[Ŧ] CrCl <10: 20-30% IV q24-48h[Ŧ] HD/CAPD: Dose according to levels. - Adjustments made based on levels.
Amoxicillin	<u>Adult</u> 250-500 mg PO q8h <u>Pediatric</u> 12.5-45 mg/kg PO q8-12h (25-90 mg/kg/day)	*Same for Adult & Pediatric* CrCl 10-30: same dose q12h CrCl <10: same dose q24h HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: 250 mg PO q12h No clear recommendations for

		pediatrics.
Amoxicillin/clavulanate	<u>Adult</u> 500/125 mg PO tid 875/125 mg PO bid 1000/62.5 mg PO bid (XR formulation) - <u>Pediatric</u> 10-45 mg (amoxicillin component)/kg q8-12h [20-40 mg (amoxicillin component)/kg/day]	 CrCl 10-30: 250/125 mg PO bid CrCl <10: 250/125 mg PO qday CrCl 10-30: 500/125 mg PO bid CrCl <10: 500/125 mg PO qday XR formulation NOT recommended with CrCl < 30. HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: 250/62.5 mg PO q12h - CrCl 10-30: same dose q12h CrCl <10: same dose q24h HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: No clear recommendations.
Amphotericin B	<u>Adult & Pediatric</u> 1 mg/kg IV qday	 CrCl <10: same dose q48h HD: No adjustment necessary. CAPD: Dose as CrCl <10.
Amphotericin B Liposomal	<u>Adult & Pediatric</u> 3 mg/kg IV qday	 No adjustment necessary.
Ampicillin	<u>Adult</u> *PO* 250-1000 mg PO q6h *IV* 250-1000 mg IV q6h 2 g IV q4h - <u>Pediatric</u> *PO* 12.5-25 mg/kg PO qid *IV* 25-100 mg/kg IV q6h	 CrCl <10: same dose q12h CrCl <10: same dose q12h CrCl 10-50: same dose q6h CrCl <10: same dose q12h HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: 250 mg PO/IV q12h - CrCl <10: same dose q12h CrCl <10: same dose q12h HD: Dose as CrCl <10. Give

		after dialysis on dialysis days. CAPD: No clear recommendations.
Ampicillin/sulbactam	<u>Adult</u> 1.5-3 g IV q6h - <u>Pediatric</u> 25-100 mg (ampicillin component)/kg IV q6h	 CrCl 30-50: same dose q8h CrCl 15-29: same dose q12h CrCl <15: same dose q24h HD: Dose as CrCl <15. Give after dialysis on dialysis days. CAPD: Dose as CrCl <15. - CrCl 15-29: same dose q12h CrCl <15: same dose q24h HD: Dose as CrCl <15. Give after dialysis on dialysis days. CAPD: Dose as CrCl <15.
Atazanavir (AZV) RTV=ritonavir PPI: proton pump inhibitor H2RA: histamine 2 receptor antagonist EFV= efavirenz TFV=tenofovir	<u>Naïve</u> *Adult* AZV + RTV 300/100mg daily w/food Unable to tolerate RTV and/or on H2RA: AZV 400mg daily w/food With TFV, H2RA or PPI: AZV + RTV 300/100mg daily w/food With EFV: AZV+RTV: 400/100mg daily w/food *Pediatric* ≥6yr: 15-24kg; AZV+RTV 150/80mg daily; 25-31kg: 200/100mg daily; 32-38kg 250/100mg daily; ≥39kg 300/100mg daily w/food ≥13yr, ≥39kg and unable to tolerate RTV: AZV 400mg daily w/food <u>Experienced</u> *Adult* On H2RA: AZV + RTV 300/100mg daily w/food With TFV and H2RA: AZV+RTV 400/100mg daily w/food *Pediatric*	No adjustment necessary.

	≥6yr: 25-31kg: AZV+RTV 200/100mg daily; 32-38Kg: 250/100mg daily; ≥39kg 300/100mg daily w/food	
Atovaquone	Adult & Pediatric (>13yo) 1500 mg PO divided q12-24h Pediatric 20 mg/kg PO bid	No data.
Azithromycin	Adult 250-500 mg PO/IV qday Pediatric 5-10 mg/kg PO qday	No adjustment necessary. Caution advised if CrCl < 10 (AUC increased by 35%).
Aztreonam	Adult 1-2 g IV q8-12h - Pediatric 30-60 mg/kg IV q6-8h	CrCl 10-30: 1-2 g IV x1, then 50% IV at same interval[Ŧ] CrCl <10: 1-2 g IV x1, then 25% IV at same interval[Ŧ] HD: Dose as for CrCl <10 with an extra 125-250 mg IV after dialysis. CAPD: Dose as CrCl <10. - CrCl 10-30: 50% IV at same interval[Ŧ] CrCl <10: 25% IV at same interval[Ŧ] HD: Dose as for CrCl <10 with an extra 3.25-7.5 mg/kg IV after dialysis. CAPD: Dose as CrCl <10.
Caspofungin	Adult 70 mg IV x1, then 50 mg IV qday Pediatric 70 mg/m^2 IV x1, then 50 mg/m^2 IV qday	No adjustment necessary.
Cefazolin	Adult 1-2 g IV q8h - Pediatric 16.7-50mg/kg IV q8h	CrCl 10-50: same dose q12h CrCl <10: same dose q24h HD: 500 mg – 1 g IV given only after dialysis. CAPD: 500 mg IV q12h - CrCl 10-30: same dose q12h CrCl <10: same dose q24h

		HD: 2.5-7.5 mg/kg IV given only after dialysis. CAPD: No adjustment necessary.
Cefepime	<u>Adult</u> 1-2 g IV q8-12h 1 g IV q6h - <u>Pediatric</u> 50 mg/kg IV q8-12h	 CrCl 10-50: same dose q12 (for q8h dosing)-q24h (for q12h dosing) CrCl <10: same dose q24h (for q8h dosing) -q48h (for q12h dosing) CrCl 30-50: 1 g IV q8h CrCl 10-29: 1 g IV q12h CrCl <10: 1 g IV q24h HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: Dose for CrCl <10. - CrCl 10-50: same dose q12 (for q8h dosing)-q24h (for q12h dosing) CrCl <10: 50% q24h[Ŧ] HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: 50 mg/kg IV q48h
Cefotaxime	<u>Adult</u> 1-2 g IV q8h - <u>Pediatric</u> 25-100mg/kg IV q6-8h (100-200mg/kg/day)	 CrCl 10-50: same dose q12h CrCl <10: same dose q24h HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: 1 g IV q24h - CrCl <20: same dose q24h HD: Dose as CrCl <20. Give after dialysis on dialysis days. CAPD: 50-100 mg/kg IV q24h
Cefoxitin	<u>Adult</u> 1-2 g IV q8h - <u>Pediatric</u> 20-40mg/kg IV q6h	 CrCl 10-30: same dose q12h CrCl <10: same dose IV q24h HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: 1 g IV q24h - CrCl 51-90: same dose q8h CrCl 10-50: same dose q12h CrCl <10: same dose q24-48h

		HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: No clear recommendations.
Ceftazidime	<u>Adult</u> 1-2 g IV q8-12h - <u>Pediatric</u> 30-50 mg/kg IV q8h	CrCl 10-50: same dose q24h CrCl <10: same dose q48h HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: 1 g IV x1, then 500 mg IV q24h - 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[Ŧ]
Ceftriaxone	<u>Adult</u> 1-2 g IV q12-24h - <u>Pediatric</u> 25-100mg/kg IV q12-24h (50-100mg/kg/day)	No adjustment necessary. CAPD: 750 mg IV q12h - No adjustment necessary.
Cefuroxime	<u>Adult</u> *PO* 250-500 mg PO bid *IV* 750 mg – 1.5 g IV q8h - <u>Pediatric</u> *PO* Cefuroxime 10-15 mg/kg PO bid *IV* 25-50mg/kg IV q8h	No adjustment necessary. HD: Give after dialysis on dialysis days. CrCl 10-20: same dose q12h CrCl <10: same dose q24h HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: Dose as CrCl <10. - No adjustment necessary. HD: Give after dialysis on dialysis days. CrCl 10-20: same dose q12h CrCl <10: same dose q24h HD: Dose as CrCl <10. Give after dialysis on dialysis days.

		CAPD: Dose as CrCl <10.
Cephalexin	Adult 250 - 500 mg PO qid - Pediatric 6.25-37.5 mg/kg PO q6h	CrCl 50-90: same dose PO tid CrCl <50: same dose PO bid HD: Dose as CrCl <50. Give after dialysis on dialysis days. CAPD: Dose as CrCl <50. - CrCl 10-40: same dose q8h CrCl >10: same dose q12h HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: Dose as CrCl <10.
Chloramphenicol	Adult 12.5-25 mg/kg IV q6h Pediatric 6.25-25 mg/kg IV q6h	No adjustment necessary.
Ciprofloxacin	Adult *PO* 250-750 mg PO q12h *IV* 400 mg IV q8-12h - Pediatric *PO* 10-20 mg/kg PO q12h *IV* 10-15 mg/kg IV q8-12h	CrCl <30: same dose q24h HD/CAPD: Dose as CrCl <30 given after dialysis. CrCl <30: same dose q12 (for q8h regimen)-24h (for q12h regimen) HD/CAPD: Dose as CrCl <30 given after dialysis. - No clear recommendations.
Clarithromycin	Adult 0.5 – 1 g PO q12h Pediatric 7.5 mg/kg PO q12h	*Same for Adult & Pediatric* CrCl <30: 50% PO q12h[Ŧ] HD: Dose as CrCl <30. Give after dialysis on dialysis days. CAPD: No adjustment necessary.
Clindamycin	Adult *PO* 150-450 mg PO q6-8h *IV* 300-900 mg IV q6-8h Pediatric	No adjustment necessary.

	PO 2.5-10 mg/kg PO q6-8h (10-30 mg/kg/day) *IV* 6.25-10 mg/kg IV q6-8h (25-40 mg/kg/day)	
Colistimethate (colistin)	Adult & Pediatric 2.5-5 mg/kg/day IV in 2-4 doses	CrCl 20-50: 75% IV q12-24h[Ŧ] CrCl 10-19: 50% IV q24h[Ŧ] CrCl <10: 25% IV q 36h[Ŧ] HD: Dose as CrCl <10. CAPD: No clear recommendations.
Dapsone	Adult 50-100 mg PO qday Pediatric 1-2 mg/kg PO qday	No clear guidelines, but adjustment recommended.
Daptomycin	Adult 4-6 mg/kg IV q24h Safety and efficacy not established in pediatrics.	CrCl <30: same dose IV q48h HD: Dose as CrCl <30. Give after dialysis on dialysis days. CAPD: Dose as CrCl <30.
Darunavir	Naïve *Adult* DRV+RTV 800/100mg daily w/food *Pediatric* ≥6yrs; 20-29kg: DRV+RTV 375/50mg BID; 30-39Kg 450/60mg BID; ≥40kg 600/100mg BID Experienced *Adult* DRV+RTV 600/100mg BID w/food *Pediatric* No recommendations.	No adjustment necessary.
Dicloxacillin	Adult 250-500 mg PO q6h Pediatric 6.25-12.5 mg/kg PO q6h	No adjustment necessary.
Didanosine	Adult 125-200 mg PO bid (buffered tabs)	CrCl 10-29: same dose PO qday CrCl <10: 75-100 mg PO qday HD/CAPD: Dose as CrCl <10.

	250-400 mg PO qday (enteric coated tabs) - <u>Pediatric</u> 100-120 mg/m^2 PO bid	CrCl 10-29: 125 mg PO qday CrCl <10: EC tabs not recommended. HD/CAPD: Dose as CrCl 10-29. (Only recommended if >60kg) - No clear recommendations except for HD. HD: 25% of total dose PO qday[∓]
Doxycycline	<u>Adult</u> 100 mg PO/IV q12h <u>Pediatric</u> *not to be used in children < 8yo 1-4 mg/kg PO/IV q12-24h (2-4 mg/kg/day)	No adjustment necessary.
Efavirenz	<u>Adult</u> 600 mg PO qday <u>Pediatric</u> 200-600 mg PO qday	No adjustment necessary.
Emtricitabine	<u>Adult:</u> Capsule: 200 mg once daily Solution: 240 mg once daily - <u>Pediatric</u> 0-3 months: Solution: 3 mg/kg/day 3 months to 17 years: Capsule: Children >33 kg: 200 mg once daily Solution: 6 mg/kg once daily; maximum: 240 mg/day	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 HD: Dose as CrCl <15. Give after dialysis on dialysis days. - No clear recommendations
Ertapenem	<u>Adult</u> 1 g IV qday - <u>Pediatric</u> 15 mg/kg IV q12h	CrCl < 30: 50% IV qday HD/CAPD: Dose as CrCl < 30 given after dialysis on dialysis days. - No clear recommendations.
Erythromycin	<u>Adult</u>	*Same for Adult & Pediatric*

	PO 250-500 mg PO q6-12h *IV* 15-20 mg/kg/day IV divided q6-8h <u>Pediatric</u> *PO* 7.5-16.7 mg/kg PO q6-8h (30-50 mg/kg/day) *IV* 3.75-12.5 mg/kg IV q6h	CrCl <10: 50% PO/IV at same interval.[Ŧ] 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 qday <u>Pediatric</u> 15-25 mg/kg PO qday	*Same for Adult & Pediatric* 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.
Famciclovir	<u>Adult</u> 500 mg PO tid Safety and efficacy not established in pediatrics.	CrCl 40-59: same dose q12h CrCl 20-39: same dose q24h CrCl <20: 50% q24h[Ŧ] HD: 50% after each dialysis session.[Ŧ] CAPD: No clear recommendations.
Fluconazole	<u>Adult</u> 100-400 mg PO/IV q24h - <u>Pediatric</u> 3-12 mg/kg/day PO/IV q24h	CrCl <50: 50% PO/IV q24h[Ŧ] HD: Give dose only after dialysis. CAPD: 50% PO/IV q24h[Ŧ] - CrCl 20-50: 50% PO/IV q24h[Ŧ] CrCl <20: 25% PO/IV q24h[Ŧ] HD: Give dose only after dialysis. CAPD: 25% PO/IV q24h[Ŧ]
Flucytosine	<u>Adult</u> 50-150 mg/kg/day PO divided	CrCl 10-50: same dose q12-

	q6h - <u>Pediatric</u> 25-37.5 mg/kg PO q6h	24h CrCl <10: same dose q24h HD/CAPD: Give dose only after dialysis. - CrCl 20-40: same dose q12 CrCl 10-19: same dose q24h CrCl <10: same dose q48h HD/CAPD: Give dose only after dialysis.
Fosamprenavir (FPV) RTV = ritonavir EFV=efavirenz	<u>Naïve</u> *Adult* FPV 1400mg BID OR 1400mg + RTV 200mg daily OR 1400mg + RTV 100mg daily OR 700mg+ RTV 100mg BID With EFV: 1400mg+RTV 300mg daily *Pediatric* 2-5yr: 30mg/kg BID ≥6yr: 30mg/kg BID OR FPV 18mg/kg+ RTV 3mg/kg BID; (maximum dose: FPV 1400mg or RTV 200mg/day) <u>Experienced</u> *Adult* FPV 700mg + RTV 100mg BID *Pediatric* ≥6yr: FPV 18mg/kg + RTV 3mg/kg BID (maximum dose: 1400mg+RTV 200mg/day)	No adjustment necessary.
Foscarnet	<u>Adult</u> 40 mg/kg IV q8h 60 mg/kg IV q8h	**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 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. 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.
	90-120 mg/kg IV q24h . -	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. HD: 40-60 mg/kg IV after each dialysis session. -
	<u>Pediatric</u> 60 mg/kg IV q8h (induction) 90-120 mg/kg IV q24h (maintenance) 40-60 mg/kg IV q12h	**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 <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 HD/CAPD: No data.
Ganciclovir	<u>Adult</u>	

	PO 1 g PO tid *IV* 5 mg/kg IV q12h 5 mg/kg IV q24h - <u>Pediatric</u> *PO* 30 mg/kg PO tid *IV* 5 mg/kg IV q12h 5 mg/kg IV q24h 	CrCl 50-69: 1.5 g PO q24h or 500 mg PO tid CrCl 25-49: 1 g PO q24h CrCl 10-24: 500 mg PO q24h CrCl <10: 500 mg PO 3x/week 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 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 HD (PO/IV): Dose as CrCl <10 given after dialysis sessions. - No clear recommendations. 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 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 HD (PO/IV): Dose as CrCl <10 given after dialysis sessions.
Gentamicin	<u>Adult & Pediatric</u> 1.5-2.5 mg/kg IV q8h Monitoring of serum levels is recommended. Once daily dosing of aminoglycosides is adjusted based on the Hartford nomogram.	CrCl 51-90: 60-90% IV q8-12h$^{\text{Ŧ}}$ CrCl 10-50: 30-70% IV q12h$^{\text{Ŧ}}$ CrCl <10: 20-30% IV q24-48h$^{\text{Ŧ}}$ HD/CAPD: Dose according to levels.

Imipenem	Adult 500 mg IV q6h	Weight ≥ 70kg CrCl 71-90: no adjustment CrCl 41-70: 500 mg IV q8h CrCl 21-40: 250 mg IV q6h CrCl 6-20: 250 mg IV q12h Weight 60-69kg CrCl 71-90: 500 mg IV q8h CrCl 41-70: 250 mg IV q6h CrCl 21-40: 250 mg IV q8h CrCl 6-20: 250 mg IV q12h Weight 50-59kg CrCl 71-90: 250 mg IV q6h CrCl 41-70: 250 mg IV q6h CrCl 21-40: 250 mg IV q8h CrCl 6-20: 250 mg IV q12h Weight 40-49kg CrCl 71-90: 250 mg IV q6h CrCl 41-70: 250 mg IV q8h CrCl 21-40: 250 mg IV q12h CrCl 6-20: 250 mg IV q12h Weight 30-39kg CrCl 71-90: 250 mg IV q8h CrCl 41-70: 125 mg IV q6h CrCl 21-40: 125 mg IV q8h CrCl 6-20: 125 mg IV q12h
	1 g IV q8h For any other adult doses, use adjustment tables provided by Micromedex. -	Weight ≥ 70kg CrCl 71-90: no adjustment CrCl 41-70: 500 mg IV q6h CrCl 21-40: 500 mg IV q8h CrCl 6-20: 500 mg IV q12h Weight 60-69kg CrCl 71-90: 750 mg IV q8h CrCl 41-70: 500 mg IV q8h CrCl 21-40: 500 mg IV q8h CrCl 6-20: 500 mg IV q12h Weight 50-59kg CrCl 71-90: 500 mg IV q6h CrCl 41-70: 500 mg IV q8h CrCl 21-40: 250 mg IV q6h CrCl 6-20: 250 mg IV q12h Weight 40-49kg CrCl 71-90: 500 mg IV q8h CrCl 41-70: 250 mg IV q6h CrCl 21-40: 250 mg IV q8h CrCl 6-20: 250 mg IV q12h Weight 30-39kg CrCl 71-90: 250 mg IV q6h CrCl 41-70: 250 mg IV q8h CrCl 21-40: 250 mg IV q8h CrCl 6-20: 250 mg IV q12h HD: Dose as CrCl <20. Dose after dialysis on dialysis days. CAPD: Dose as CrCl <10. -

	Pediatric 15-25 mg/kg IV q6h	CrCl 41-70: 50% IV q6h‡ CrCl 21-40: 35% IV q8h‡ CrCl 6-20: 25% IV q12h‡ HD: Same dose q12h, given after dialysis on dialysis days. CAPD: Dose as CrCl 6-20.
Indinavir	Adult 800 mg PO tid - Pediatric 500 mg/m^2 PO tid	No adjustment necessary. - No clear recommendations (<20% renal elimination).
Isoniazid	Adult 5 mg/kg PO qday Pediatric 10-15 mg/kg PO qday	No adjustment necessary. HD/CAPD: Give dose after dialysis on dialysis days.
Itraconazole	Adult *PO* 100-200 mg PO bid *IV* 200 mg IV q12h Pediatric 3-5 mg/kg PO/IV q24h	 No adjustment necessary. IV formulation should not be used if CrCl <30 due to accumulation of cyclodextrin vehicle.
Lamivudine	Adult 300 mg PO qday - Pediatric 2-4 mg/kg PO bid	 CrCl 30-49: 150 mg PO qday CrCl 15-29: 150 mg PO x1, then 100 mg PO qday CrCl 5-14: 150 mg PO x1, then 50 mg PO qday CrCl <5: 50 mg PO x1, then 25 mg PO qday HD/CAPD: Dose as CrCl <5. - No clear recommendations (70% renal elimination).
Linezolid	Adult 600 mg PO/IV q12h Pediatric 10 mg/kg PO/IV q8-12h	 No adjustment necessary.
Lopinavir/ritonavir	Adult 400/100 mg PO bid Pediatric 10-13 mg (lopinavir component)/kg PO bid	 No clear recommendations, but adjustment probably not necessary (<3% renal elimination).
Meropenem	Adult 500 mg IV q6h	 CrCl 25-49: 500 mg IV q8h CrCl 10-24: 500 mg IV q12h

	500 mg IV q8h 2 g IV q8h - Pediatric 20-40 mg/kg IV q8h (q12h for neonates 7 days old and under)	CrCl < 10: 500 mg IV q24h CrCl 25-49: 500 mg IV q12h CrCl 10-24: 250 mg IV q12h CrCl < 10: 500 mg IV q24h CrCl 25-49: 2 g IV q12h CrCl 10-24: 1 g IV q12h CrCl < 10: 1 g IV q24h HD/CAPD: Dose as CrCl < 10 given after dialysis on dialysis days. - 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 HD/CAPD: Dose as CrCl < 10 given after dialysis on dialysis days.
Metronidazole	Adult 500 mg PO/IV q8h Pediatric 3.75-16.7 mg/kg PO/IV q6-8h (15-50 mg/kg/day)	*Same for Adult & Pediatric* CrCl <10: 50% at same interval[Ŧ] HD/CAPD: Dose as CrCl <10 given after dialysis on dialysis days.
Micafungin	Adult 50-150 mg IV qday - Pediatric 1-4.5 mg/kg IV qday	No adjustment necessary. - No clear recommendations.
Minocycline	Adult 100 mg PO bid (200 mg PO qhs) Pediatric *not to be used in children < 8yo 2 mg/kg PO bid (4 mg/kg PO qhs)	No adjustment necessary.
Moxifloxacin	Adult 400 mg PO/IV qday Safety and efficacy not established in pediatrics.	No adjustment necessary.
Nelfinavir	Adult 1250 mg PO bid Pediatric 45-55 mg/kg PO bid	No clear recommendations, but adjustment probably not necessary (<2% renal elimination).

Nevirapine	Adult 200 mg PO bid Pediatric 4-7 mg/kg PO bid	No adjustment necessary. Give dose after dialysis on dialysis days.
Nitrofurantoin	Adult 50-100 mg PO bid Pediatric 1.25-1.75 mg/kg PO qid	CrCl <50, HD/CAPD: Use is not recommended.
Oseltamivir	Adult 75 mg PO bid Pediatric 30-75 mg PO bid	*Same for Adult & Pediatric* CrCl 10-30: same dose PO qday CrCl <10, HD/CAPD: No data.
Oxacillin	Adult 0.5 – 1 g IV q4-6h Pediatric 16.7-50 mg/kg IV q4-6h (50-100 mg/kg/day)	No adjustment necessary.
Penicillin G	Adult 0.5 – 4 million units IV q4h - Pediatric 25,000-100,000 units/kg IV q4-6h (100,000-400,000 units/kg/day)	CrCl 10-50: 75% IV at same interval[Ŧ] CrCl <10: 50% IV at same interval[Ŧ] 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	Adult 250-500 mg PO q6-8h Pediatric 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	Adult 4 mg/kg IV q24h - Pediatric 4 mg/kg IV q24h	No adjustment necessary. - CrCl 10-30: same dose q36h CrCl <10: same dose q48h
Piperacillin	Adult 3-4 g IV q4-6h	CrCl 10-50: same dose IV q6-8h

	      - <u>Pediatric</u> 33.3-75 mg/kg IV q4-6h (200-300 mg/kg/day)	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	<u>Adult</u> 3.375 g IV q6h or 4.5 g IV q8h 4.5 g IV q6h Extended infusion: 3.375 g IV q8h, infused over 4h - <u>Pediatric</u> 50-133.3 mg/kg (piperacillin) IV q8h [150-400mg/kg/day (piperacillin)]	 CrCl 20-40: 2.25 g IV q6h CrCl <20: 2.25 g IV q8h CrCl 20-40: 3.375 g IV q6h CrCl <20: 2.25 g IV q6h HD: Dose as CrCl <20 + 0.75 g IV after dialysis. CAPD: Dose as CrCl <20. CrCl <20: 3.375 g IV q12h, infused over 4h HD/CAPD: Dose as CrCl <20. - CrCl 20-40: 70% IV q6h[ǂ] CrCl <20: 70% IV q8h[ǂ] HD/CAPD: No recommendations.
Posaconazole	<u>Adult & Pediatric (≥13 y.o.)</u> 200-800 mg PO q6-24h (Maximum 800 mg qday)	 No adjustment necessary.
Primaquine	<u>Adult</u> 15-30 mg PO qday <u>Pediatric</u> 0.3 mg/kg PO qday	 No clear recommendations, but adjustment probably not necessary (<1% renal elimination).
Pyrazinamide	<u>Adult</u> 25 mg/kg PO qday - <u>Pediatric</u> 10-40 mg/kg PO q12-24h (20-40 mg/kg/day)	 CrCl <10: 15 mg/kg PO qday HD: 25 mg/kg PO after each dialysis session. CAPD: No data. - CrCl <10, HD: 40 mg/kg PO 3x/week CAPD: No data.
Pyrimethamine	<u>Adult</u>	

	50-100 mg PO qday Pediatric 1 mg/kg PO bid	No adjustment necessary.
Quinupristin/dalfopristin	Adult & Pediatrics 7.5 mg/kg IV q8h	No adjustment necessary. No data for pediatrics.
Raltegravir	Adult and adolescent ≥16yrs 400mg PO BID With rifampin: 800 mg PO bid Pediatric Not established in <16yrs	No adjustment necessary.
Ribavirin	Adult 400-600 mg PO bid Pediatric 200-400 mg PO bid	*Same for Adult & Pediatric* CrCl <50: Contraindicated.
Rifabutin	Adult 150-300 mg PO qday Pediatric 5 mg/kg PO qday	*Same for Adult & Pediatric* CrCl <30, HD: 50% PO qday‡
Rifampin	Adult 300 mg PO/IV q8h Pediatric 10-20 mg/kg PO/IV qday	*Same for Adult & Pediatric* CrCl <10: 50% PO/IV same interval‡ HD: No adjustment necessary. CAPD: 50% PO/IV q24h‡
Rimantidine	Adult 100 mg PO bid - Pediatric 5 mg/kg PO qday	 CrCl <10: 100 mg PO qday HD/CAPD: No data. - No clear recommendations.
Ritonavir	Adult 100 mg PO bid (in combination with another protease inhibitor) Pediatric 400 mg/m^2 PO bid	No adjustment necessary.
Saquinavir	Adult 1000 mg PO bid (w/low dose ritonavir) Not approved for use in pediatrics.	No data, but negligible renal clearance.
Stavudine	Adult 30-40 mg PO bid	 CrCl 26-50: 50% PO bid‡ CrCl 10-25: 50% PO qday‡ CrCl <10: 15 mg PO qday (<60 kg); 20 mg PO qday (>60 kg) HD: Dose as CrCl <10. Give

	- <u>Pediatric</u> 1 mg/kg PO bid	after dialysis on dialysis days. CAPD: No data. - CrCl 25-50: 50% PO bid[Ŧ] CrCl <25: 50% PO qday[Ŧ] 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	<u>Adult</u> 300 mg PO qday <u>Pediatric</u> 8 mg/kg PO qday	*Same for Adult & Pediatric* CrCl 30-49: same dose q48h CrCl 10-29: same dose 2x/week CrCl <10: No data HD: same dose qweek, given after dialysis if on a dialysis day. CAPD: No data.
Tetracycline	<u>Adult</u> 250-500 mg PO qid - <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: 3 g IV only after dialysis. CAPD: Dose as CrCl <10. - CrCl 10-30: same dose q8h CrCl <10: same dose q12h HD: Give dose only after dialysis. CAPD: Dose as CrCl <10.
Tigecycline	<u>Adult</u> 100 mg IV load, then 50 mg IV q12h	No adjustment necessary.

	Pediatric Safety and efficacy not established in pediatrics.	
Tipranavir	Adult 500 mg PO bid Pediatric Safety and efficacy not established in pediatrics.	No data, but negligible renal clearance.
Tobramycin	Adult & Pediatric 1.5-2.5 mg/kg IV q8h Monitoring of serum levels is recommended. Once daily dosing of aminoglycosides is adjusted based on the Hartford nomogram.	*Same for Adult & Pediatric* CrCl 51-90: 60-90% IV q8-12h[Ŧ] CrCl 10-50: 30-70% IV q12h[Ŧ] CrCl <10: 20-30% IV q24-48h[Ŧ] HD/CAPD: Dose according to levels.
Trimethoprim	Adult 100 mg PO bid - Pediatric 2-5 mg/kg PO q12h	CrCl 10-50: same dose PO q18h CrCl <10: same dose PO q24h HD: Give dose only after dialysis. CAPD: Dose as CrCl <10. - CrCl 15-30: 50% at same interval[Ŧ] CrCl <15: avoid use
Trimethoprim/sulfamethoxazole (TMP/SMX)	Adult *PO* 160(TMP)/800(SMX) mg PO bid *IV* 8-12 mg/kg/day (TMP) IV divided q8h 15-20 mg/kg/day (TMP) IV divided q8h - Pediatric	CrCl 15-30: 160/800 mg PO qday CrCl <15, HD: 160/800 mg PO q48h (after dialysis on dialysis days) CrCl 15-30: 8-12 mg/kg/day IV divided q12h for 48h, then 4-6 mg/kg IV q24h CrCl <15: 8-12 mg/kg IV q48h HD: 8-12 mg/kg IV after each dialysis session. CrCl 15-30: standard dose for 48h, then 7-10 mg/kg/day IV divided q12h CrCl <15: 15-20 mg/kg/dose IV q48h HD: 15-20 mg/kg IV after each dialysis session -

	PO 4 mg/kg (TMP) PO bid *IV* 8-12 mg/kg/day (TMP) IV divided q12h 15-20 mg/kg/day (TMP) IV divided q8h	 CrCl 15-30: 4 mg/kg mg PO qday CrCl <15, HD: 4 mg/kg PO q48h (after dialysis on dialysis days) CrCl 15-30: 8-12 mg/kg/day IV divided q12h for 48h, then 4-6 mg/kg IV q24h CrCl <15: 8-12 mg/kg IV q48h HD: 8-12 mg/kg IV after each dialysis session. CrCl 15-30: standard dose for 48h, then 7-10 mg/kg/day IV divided q12h CrCl <15: 15-20 mg/kg/dose IV q48h HD: 15-20 mg/kg IV alter each dialysis session
Valacyclovir	<u>Adult</u> 2 g PO bid 1 g PO q8h 1 g PO bid 1 g PO qday 500 mg PO bid 500 mg PO qday Safety and efficacy not established in pediatrics.	 CrCl 30-49: 1 g PO q12h CrCl 10-29: 500 mg PO q12h CrCl <10: 500 mg PO q24h CrCl 30-49: 1 g PO q12h CrCl 10-29: 1 g PO q24h CrCl <10: 500 mg PO q24h CrCl 30-49: no adjustment CrCl 10-29: 1 g PO q24h CrCl <10: 500 mg PO q24h CrCl 30-49: no adjustment CrCl 10-29: 500 mg PO q24h CrCl <10: 500 mg PO q24h CrCl 30-49: no adjustment CrCl 10-29: 500 mg PO q24h CrCl <10: 500 mg PO q24h CrCl 30-49: no adjustment CrCl 10-29: 500 mg PO q48h CrCl <10: 500 mg PO 48h HD: Dose as CrCl <10. Give after dialysis on dialysis days. CAPD: 500 mg PO q48h
Valganciclovir	<u>Adult</u> 900 mg PO bid Safety and efficacy not established in pediatrics.	 CrCl 40-59: 50% PO same interval[Ŧ] CrCl 25-39: 50% PO qday[Ŧ] CrCl 10-24: 50% PO q48h[Ŧ] CrCl <10, HD/CAPD: Use is not recommended.

Vancomycin	Adult 15 mg/kg IV q12h - Pediatric 15 mg/kg IV q6h	CrCl 10-50: 7.5 mg/kg IV q24-48h CrCl <10: 7.5 mg/kg IV q48-96h. Monitor trough levels. HD/CAPD: Dose as CrCl <10. Monitor trough levels. - 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.
Voriconazole	Adult & Pediatric (>12 yo) *PO* 200 mg PO q12h (100 mg q12h if <40kg) *IV* 6 mg/kg IV q12h x2, then 4 mg/kg IV q12h	No adjustment necessary. CrCl <50, HD/CAPD: Use is not recommended due to accumulation of cyclodextrin vehicle.
Zalcitabine	Adult 0.75 mg PO q8h - Pediatric 0.01 mg/kg PO q8h	CrCl 10-40: 0.75 mg PO q12h CrCl <10: 0.75 mg PO q24h HD/CAPD: No data. - No data.
Zanamivir IH	Adult and Pediatric ≥7 years Treatment: Two inhalations (10 mg total) twice daily for 5 days Adult and Pediatric ≥5 years Prophylaxis: Two inhalations (10 mg total) once daily for daily for 10 days	No adjustment necessary.
Zidovudine	Adult *PO* 300 mg PO bid *IV* 1 mg/kg IV q4h - Pediatric *PO* 160 mg/m^2 PO q8h	CrCl <15, HD/CAPD: 100 mg PO q8h. Give after dialysis on dialysis days. CrCl <15, HD/CAPD: 1 mg/kg IV q6-8h. Give after dialysis on dialysis days. - No data.

	IV 120 mg/m^2 IV q6h	

*use Cockroft-Gault equation for patients ≥ 18 years old; use Schwartz method for patients < 18 years old

[Ŧ]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.

Adults: Estimate of Creatinine Clearance using Cockroft-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

IBW (males) = 50 + (2.3 x inches > 5 feet)

IBW (females) = 45.5 + (2.3 x inches > 5 feet)

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

Pediatrics: Estimate of Creatinine Clearance using Schwartz's equation

CrCl (ml/min) = K x L/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

References

1. Gilbert DN, et al. *The Sanford Guide to Antimicrobial Therapy*, 38th Edition, 2008.
2. MICROMEDEX® Healthcare Series, 2008.
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.

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