Renal Dose Adjustments

The following medications may be adjusted automatically by pharmacy based on the patient's renal function.

Ampicillin

Ampicillin/sulbactam (Unasyn®)

Aztrenoam (Azactam®)

Baricitinib (Olumiant®)

Cefazolin (Ancef®)

Cefepime (Maxipime®)

Cefoxitin (Mefoxin)

Ceftaroline (Teflaro®)

Ceftazidime/avibactam (Avycaz®)

Ceftolozane/tazobactam (Zerbaxa®)

Ciprofloxacin (Cipro®)

Clindamycin (Cleocin®)

Enoxaparin (Lovenox®)

Famotidine (Pepcid®)

Fluconazole (Diflucan®) – IV only

Fondaparinux (Arixtra®)

Levofloxacin (Levaquin®)

Meropenem (Merrem®)

Meropenem/vaborbactam (Vabomere®)

Nirmatrelvir/ritonavir (Paxlovid)

Oseltamivir (Tamiflu®)

Piperacillin/tazobactam (Zosyn®)

CRRT Antibiotic Dosing Guidelines

The following medications are not adjusted automatically by pharmacy, but renal guidelines are included here for reference.

Acyclovir (Zovirax®)

Apixaban (Eliquis®)

Dabigatran (Pradaxa®)

Edoxaban (Savaysa®)

Rivaroxaban (Xarelto®)

Sulbactam/durlobactam (Xacduro®)

Ampicillin		
CrCl (ml/min)	**Uncomplicated Infection**	**Meningitis or Endovascular infection**
> 50	2 gm IV Q 6 hrs	2 gm IV Q 4 hrs
30-50	2 gm IV Q 8 hrs	2 gm IV Q 6 hrs
10-29	2 gm IV Q 12 hrs	2 gm IV Q 8 hrs
<10 or HD	1 gm IV Q 12 hrs	2 gm IV Q 12 hrs
CRRT	See CRRT dosing	

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Ampicillin/Sulbactam (Unasyn®)	
CrCl (ml/min)	**Renal Adjustment**
> 50	3 gm IV Q 6 hrs
10-50	1.5 gm IV Q 6 hrs
<10	1.5 gm IV Q 12 hrs
HD	1.5-3 gm IV Q 12 hrs
CRRT	See CRRT dosing

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Aztreonam (Azactam®)		
CrCl (ml/min)	**UTI**	**Systemic infection**
≥ 30	1 gm IV Q 8 hrs	2 gm IV Q 8 hrs (q6h is OK in life threatening infections)

10-30	1 gm IV Q 12 hrs	2 gm IV Q 12 hrs
< 10	1 gm IV Q 24 hrs	1 gm IV Q 12 hrs
Hemodialysis	1 gm IV x 1 dose, then 1 g IV Q pm	
CRRT	See CRRT dosing	

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Baricitinib (Olumiant®)	
Estimated glomerular filtration rate (eGFR)	**Renal Adjustment**
≥60 mL/min/1.73 m2	4 mg once daily
30 to 60 mL/min/1.73 m2	2 mg once daily
15 to 30 mL/min/1.73 m2	1 mg once daily
<15 mL/min/1.73 m2	Not recommended

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Cefazolin (Ancef®)			
CrCl (ml/min)	**UTI (no sepsis); Uncomplicated ABSSSI**	**All other indications**	**Treatment of confirmed GNR from a non-urinary source and MIC > 2**
> 30	1 gm IV Q 8 hrs	2 gm IV Q 8 hrs	Contact stewardship pharmacist as cefazolin may not be the best drug for the patient
10-30	1 gm IV Q 12 hrs	2 gm IV Q 12 hrs	
<10	1 gm IV Q 24 hrs		
HD	1 gm IV Q PM (For outpatient use: 2 gm IV post-HD only)		
CRRT	See CRRT dosing		

Note: The MIC > 2 comment in the last column only applies to gram-negative infections.
Continue using the dosing strategies listed in the first two columns for gram-positive infections.

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Cefepime (Maxipime®)

CrCl (ml/min)	Febrile Neutropenia, critically ill with BMI ≥ 30, or recent or confirmed infection with below organisms &/or MIC*		UTI, no sepsis	All other indications
> 50	2 gm IV x 1 dose (IVP)	**2 gm Q 8 hrs (4 hour infusion)	1 gm Q 12 hrs (IVP)	1 gm Q 6 hrs (IVP)
30-49		**2 gm Q 12 hrs (4 hour infusion)	1 gm Q 24 hrs (IVP)	1 gm Q 8 hrs (IVP)
11-29		**2 gm Q 24 hrs (4 hour infusion)		1 gm Q 12 hrs (IVP)
≤ 10 or HD	1 gm Q PM (IVP) (give after dialysis)			
CRRT	See CRRT dosing			

*Excluding treatment of lower UTIs: GNR with an MIC of 4, Pseudomonas spp., Acinetobacter spp., Hafnia alvei, Enterobacter cloacae, Citrobacter freundii, Klebsiella aerogenes, or Serratia marcescens.

**Extended infusion doses to begin 8 hours after the IV push loading dose.

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Cefoxitin (Mefoxin®)		
CrCl (ml/min)	**Uncomplicated**	**Moderate to Severe Infection**
≥ 50	1 gm IV Q 6 hrs	2 gm IV Q 6 hrs (doses up to 2g IV q4h or 3g IV q6h have been used)
30-49	1 gm IV Q 8 hrs	2 gm IV Q 8 hrs
10-29	1 gm IV Q 12 hrs	2 gm IV Q 12 hrs
< 10	0.5 gm IV Q 24 hrs	1 gm IV Q 24 hrs
Hemodialysis	2 gm IV x 1 dose, then 1 g IV Q pm	
CRRT	1-2 gm IV Q 8 hrs	

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Ceftaroline (Teflaro®)		
CrCl (ml/min)	**Uncomplicated Infection**	**Pneumonia, Severe Infections**

> 50	600 mg IV Q 12 hrs	600 mg IV Q 8 hrs
30-50	400 mg IV Q 12 hrs	600 mg IV Q 12 hrs
15-29	300 mg IV Q 12 hrs	400 mg IV Q 12 hrs
<15 or HD	200-300mg IV Q 12 hrs	
CRRT	See CRRT dosing	

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Ceftazidime/Avibactam (Avycaz®)	
CrCl (ml/min)	**Renal Adjustment**
> 50	2.5 gm IV Q 8 hrs
31-50	1.25 gm IV Q 8 hrs
16-30	0.94 gm IV Q 12 hrs
6-15	0.94 gm IV Q 24 hrs
≤ 5 or HD	0.94 gm IV Q 48 hrs
CRRT	See CRRT dosing

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Ceftolozane/Tazobactam (Zerbaxa®)		
CrCl (ml/min)	**Uncomplicated Infection**	**Pneumonia, Severe Infections**
> 50	1.5 gm IV Q 8 hrs	3 gm IV Q 8 hrs
30-50	750 mg IV Q 8 hrs	1.5 gm IV Q 8 hrs
15-29	375 mg IV Q 8 hrs	750 mg IV Q 8 hrs
HD	750 mg IV x 1 dose, then 150mg IV q8h	2.25g IV x 1 dose, then 450mg IV q8h
CRRT	See CRRT dosing	

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Ciprofloxacin (Cipro®)	
CrCl (ml/min)	**Renal Adjustment**
≥ 30	500 mg PO Q 12 hrs, 400 mg IV Q 12 hrs

< 30	500 mg PO once daily 400 mg IV once daily
Hemodialysis	500 mg PO once daily 400 mg IV once daily On dialysis days, give after dialysis.
CRRT	See CRRT dosing

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Clindamycin (Cleocin®) IV		
Standard Dose	600 mg IV Q 8 hrs	No adjustment for renal dysfunction
Necrotizing fasciitis	900 mg IV Q 8 hrs	

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Enoxaparin (Lovenox®)		
CrCl (ml/min)	**Prophylactic Dose**	**Treatment Dose**
≥ 30	40 mg daily	1 mg/kg BID*
< 30	30 mg daily	1 mg/kg daily*

* If CrCl < 20 ml/min and on treatment dose, dose will be decreased to once daily and anti-factor Xa level drawn 4 hours post-dose to evaluate if continued Lovenox use is appropriate.

* If patient weight > 190 kg and on treatment dose, pharmacy will automatically obtain anti-factor Xa level 4 hours post-dose.

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Famotidine (Pepcid®)	
CrCl (ml/min)	**Renal Adjustment**
≥ 50	20 mg PO/IV BID
< 50	20 mg PO/IV daily

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Fluconazole (Diflucan) – IV only

Low dose IV fluconazole (< 200 mg) will be interchanged to the smallest commercially available bag (200 mg) when oral formulation is not an option.

CrCl (ml/min)	Renal Adjustment	
> 10	< 200 mg IV daily ordered & Tablet or Suspension is not an option due to intolerability or questionable GI absorption	200 mg IV daily
Hemodialysis		400 mg IV post-HD only

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Fondaparinux (Arixtra®) **(contraindicated in patients with CrCl < 30 ml/min)**
For patients with CrCl < 30 ml/minute who are on the prophylactic dose of Arixtra (2.5 mg daily), pharmacy will automatically change to Lovenox 30 mg daily.

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Levofloxacin (Levaquin®) **Pertains to IV or PO dosing.**		
CrCl (ml/min)	**Initial Dose**	**Subsequent Doses**
≥ 50	750 mg	750 mg q 24 hrs
20-49	750 mg	750 mg q 48 hrs
10-19	750 mg	500 mg q 48 hrs
Hemodialysis	750 mg	500 mg q 48 hrs
CRRT	See CRRT dosing	

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Meropenem (Merrem®)			
Creatinine clearance (ml/min)	**Excluding treatment of lower UTIs (no sepsis): Confirmed or recent infection with a GNR with MIC ≥ 2, Pseudomonas spp., or Acinetobacter spp.**		**All other diagnoses**
> 50	1 gm IV x 1 dose (IVP)	*1 gm IV q 8 hrs (over 3 hrs)	500 mg IV q 6 hrs
26 – 50		*1 gm IV q 12 hrs (over 3 hrs)	500 mg IV q 8 hrs
10 – 25	500 mg IV q 12 hrs		500 mg IV q 12 hrs
< 10	500 mg IV daily		500 mg IV daily

Hemodialysis	500 mg IV QPM (1800) On dialysis days, give after dialysis.	500 mg IV QPM (1800) On dialysis days, give after dialysis.
CRRT	See CRRT dosing	

*Extended infusion doses to begin 4 hours after the IV push loading dose.

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Meropenem/vaborbactam (Vabomere®)	
eGFR (ml/min/1.73m)	**Renal Adjustment**
≥ 50	4 gm IV q 8 hrs
30 – 49	2 gm IV q 8 hrs
15 – 29	2 gm IV q 12 hrs
< 15 or HD	1 gm IV q 12 hrs
CRRT	See CRRT dosing

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Nirmatrelvir/ritonavir (Paxlovid®)	
Estimated glomerular filtration rate (eGFR) (mL/min)	**Renal Adjustment**
≥ 60	300/100 mg BID x 5 days
≥ 30 to < 60	150/100 mg BID x 5 days
< 30 or HD	300/100 mg x 1 dose, then 150/100 mg daily x 4 days (if HD, schedule doses for 1800)

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Oseltamivir (Tamiflu®)	
CrCl (ml/min)	**Renal Adjustment**
> 60	75 mg BID
30 – 60	75 mg DAILY
< 30	30 mg DAILY
CRRT	75 mg BID
Hemodialysis	30 mg post HD only (initial dose may be given immediately with subsequent doses after each dialysis)

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Piperacillin/Tazobactam (Zosyn®) Extended Infusion Pharmacy will adjust all doses to extended infusion as outlined below.			
Piperacillin/Tazobactam (Zosyn®)	Loading Dose	BMI < 30	BMI ≥ 30
CrCl > 20 ml/min or CRRT	4.5 gm IV x 1 dose (30min infusion), followed by BMI based dosing strategy	*3.375 gm IV q 8 hrs (4 hour infusion)	*4.5 gm IV q 8 hrs (4 hour infusion)
CrCl ≤ 20 or HD or peritoneal dialysis		*3.375 gm IV q 12 hrs (4 hour infusion)	
CRRT		See CRRT dosing	

*Extended infusion doses to begin 4 hours after the loading dose given over 30 minutes.

Piperacillin/Tazobactam (Zosyn®) Standard Infusion Standard Infusion will only be used when IV compatibility/line access issues preclude the use of extended infusion.		
CrCl (ml/min)	**All Other Indications**	**Nosocomial Pneumonia**
> 40	3.375 gm IV Q 6 hrs	4.5 gm IV Q 6 hrs
20 – 40	2.25 gm IV Q 6 hrs	3.375 gm IV Q 6 hrs
< 20	2.25 gm IV Q 8 hrs	2.25 gm IV Q 6 hrs
Hemodialysis	2.25 gm IV Q 12 hrs + 0.75 gm after each dialysis session	2.25 gm IV Q 8 hrs + 0.75 gm after each dialysis session

CAPD	2.25 gm IV Q 12 hrs no additional bolus dose	2.25 gm IV Q 8 hrs no additional bolus dose

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Drug	Loading Dose	Maintenance Dosage for CRRT			High Dose*
		CVVH	CVVHD	CVVHDF	
Ampicillin	2g	1-2g q8-12h	1-2g q8h	1-2g q6-8h	2g q4-6h
Ampicillin/sulbactam	3g	1.5-3g q8-12h	1.5-3g q8h	1.5-3g q6-8h	3g q6h
Aztreonam	2g	1-2g q12h	1g q8h or 2g q12h	1g q8h or 2g q12h	2g q8h
Cefazolin	2g	1-2g q12h	1g q8h or 2g q12h	1g q8h or 2g q12h	2g q8h
Cefepime	2g	1-2g q12h	1g q8h or 2g q12h	1g q8h or 2g q12h	1g q6h or 2g q8h
Ceftaroline	600mg	400-600mg q12h			600mg q8h
Ceftazidime/avibactam	2.5g	1.25g IVq8h			2.5g q8h (based on ceftazidime data)
Ceftolozane/tazobactam	3g	750mg q8h	1.5g q8h	1.5g q8h	1.5g q8h (data lacking for higher dose)
Ciprofloxacin	N/A	400mg q12-24h	400mg q12-24h	400mg q12h	400mg q8-12h
Levofloxacin	750mg	750mg q48h	750mg q48h	750mg q24h	750mg q24h
Meropenem	1g	500mg-1g q12h	500mg q8h/1g q12h	500mg q8h/1g q12h	500mg q6h/1g q8h
Meropenem/vaborbactam	4g	1-2g q8h (extended)			2g q8h (extended); based on meropenem data
Piperacillin/tazobactam	4.5g	3.375-4.5g IV q8h (extended)			

*Parameters

- Ultrafiltration/dialysate flow rate of > 2 L/hr
- Residual renal function

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Acyclovir (Zovirax®) IV dosing only *Use IBW; if TBW >20% IBW, use adjBW*			
CrCl (ml/min)	**HSV encephalitis/Herpes zoster**	**Herpes simplex infections**	**Prevention of HSV/VZV when unable to tolerate PO**
> 50	10mg/kg/dose IV q8h	5mg/kg/dose IV q8h	5mg/kg/dose IV q12
25-50 or CRRT	10mg/kg/dose IV q12h	5mg/kg/dose IV q12h	5mg/kg/dose IV q24
10-24	10mg/kg/dose IV q24h	5mg/kg/dose IV q24h	2.5mg/kg/dose IV q24h
<10 or HD	5mg/kg/dose IV q24h	2.5mg/kg/dose IV q24h	

* Please clarify indication with provider prior to selecting a dosing strategy

** When transitioning a patient from PO valacyclovir to IV acyclovir, please consider this conversion:
Valacyclovir 1,000mg PO TID Acyclovir 5mg/kg/dose IV q8h

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Apixaban (Eliquis®) Nonvalvular Atrial Fibrillation	
Normal Dose	5 mg BID (may be taken without regard to food)
TWO of the following: Age ≥ 80 years Body weight ≤ 60 kg Serum creatinine ≥ 1.5	2.5 mg BID (may be taken without regard to food)

Apixaban (Eliquis®) Postoperative Thromboprophylaxis (Knee or Hip)	
Normal Dose	2.5 mg BID
Initiate therapy after hemostasis established (~12-24 hours post-op). Use for 12 days for knee replacement. Use for 35 days for hip replacement.	

Apixaban (Eliquis®) DVT/PE Treatment	
Treatment Dose	10 mg BID x 7 days, then 5 mg BID.
Reduction in the risk of recurrence	2.5 mg BID after at least 6 months of treatment for DVT/PE.
Dose adjustment: None necessary; however, patients with a SCr > 2.5 or CrCl < 25 were excluded from the clinical trials.	

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Dabigatran (Pradaxa®) Nonvalvular Atrial Fibrillation	
CrCl (ml/min)	**Recommended Dose**
> 30	150 mg BID
15-30	75 mg BID
< 15 or HD patient	Not recommended

Dabigatran (Pradaxa®) DVT/PE Treatment	
CrCl (ml/min)	**Recommended Dose**
> 30	Parenteral anticoagulant x 5-10 days, then 150 mg BID
< 50 + PGP inhibitors	Avoid Use
< 30 or HD patient	Avoid Use (not studied)

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Edoxaban (Savaysa®) Nonvalvular Atrial Fibrillation	
CrCl (ml/min)	**Recommended Dose**
> 95	Avoid Use Increased risk of ischemic stroke compared to warfarin
51-95	60 mg daily
15-50	30 mg daily
< 15 or HD patient	Avoid Use

Edoxaban (Savaysa®) DVT/PE Treatment	
CrCl (ml/min)	**Recommended Dose**
> 50	Parenteral anticoagulant x 5-10 days, then 60 mg daily if weight > 60 kg 30 mg daily if weight ≤ 60 kg
> 50 + PGP inhibitor (verapamil, quinidine, or short-term use azithromycin, clarithromycin, erythromycin, itraconazole, ketoconazole)	30 mg daily

15-50	Parenteral anticoagulant x 5-10 days, then 30 mg daily
< 15 or HD patient	Avoid Use

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Rivaroxaban (Xarelto®) Nonvalvular Atrial Fibrillation	
CrCl (ml/min)	**Recommended Dose**
> 50	20 mg daily (with evening meal)
15-50	15 mg daily (with evening meal)
< 15 or HD patient	Avoid Use

Rivaroxaban (Xarelto®) Postoperative Thromboprophylaxis	
CrCl (ml/min)	**Recommended Dose**
> 30	10 mg daily
< 30	Avoid Use
Initiate therapy after hemostasis established (~10 hours post-op). Use for 12-14 days for knee replacement. Use for 35 days for hip replacement.	

Rivaroxaban (Xarelto®) DVT/PE Treatment	
CrCl (ml/min)	**Recommended Dose**
> 30	15 mg BID x 21 days, then 20 mg daily (with food)
< 30	Avoid Use

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Sulbactam/durlobactam (Xacduro®)	
CrCl (ml/min)	**Renal Adjustment**
≥ 130	1 g sulbactam/1 g durlobactam q 4 hours
45-129	1 g sulbactam/1 g durlobactam q 6 hours
30-44	1 g sulbactam/1 g durlobactam q 8 hours

15-29	1 g sulbactam/1 g durlobactam q 12 hours
< 15	Initiation – 1 g sulbactam/1 g durlobactam q 12 hours for the first 3 doses, then q 24 hours after the third dose Continuation – 1 g sulbactam/1 g durlobactam q 24 hours

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