

VANCOUVER ACUTE
PHARMACIST PRESCRIBING AUTHORITY

As part of the regional Vancouver Coastal Health pharmacist authority policy, unit-based clinical pharmacists may:

- (1) Modify the dose and/or frequency of oral or parenteral anti-infective drugs based on renal function and clinical status of the patient (as per the attached "Anti-infectives Dosage Adjustments" tables);
- (2) Order serum concentrations for all measurable drug levels, including but not limited to aminoglycosides and vancomycin;
- (3) Modify the dosages of intravenous aminoglycosides and vancomycin based on levels; and
- (4) Order any laboratory test to guide in drug therapy decision making.

For the complete policy, please refer to the VA Formulary at
[http://www.vhpharmsci.com/VHFormulary/Policies/4.7 PHARMACIST AUTHORITY.pdf](http://www.vhpharmsci.com/VHFormulary/Policies/4.7%20PHARMACIST%20AUTHORITY.pdf)

ORAL ANTI-INFECTIVES DOSAGE ADJUSTMENTS
(Based on Estimated Creatinine Clearance)

Medication PO	>50mL/min	30-50mL/min	<30mL/min	HD ¹	CAPD ²
Amoxicillin *	250-500mg TID	250-500mg TID	250-500mg BID	250-500mg BID ³	250mg BID
Amoxicillin/Clavulanate * (Clavulin [®])	250-875mg TID	250-875mg TID	250-875mg BID	250-875mg BID ³	250-875mg BID
Azithromycin	250-500mg daily	250-500mg daily	250-500mg daily	250-500mg daily	250-500mg daily
Cefixime	400mg daily	400mg daily	200mg daily	200mg daily	200mg daily
Cefuroxime axetil	250-500mg BID-TID	250-500mg BID-TID	250-500mg BID	250-500mg BID ³	250-500mg BID
Cephalexin *	250-500mg QID	250-500mg TID-QID	250-500mg BID-TID	250-500mg BID ³	250-500mg BID
Ciprofloxacin *	250-750mg BID	250-750mg BID	500-750mg daily	500-750mg daily ³	500-750mg daily
Clarithromycin XL	1g daily	1g daily	500mg daily	500mg daily	500mg daily
Clindamycin	150-600mg TID	150-600mg TID	150-600mg TID	150-600mg TID	150-600mg TID
Cloxacillin	250-500mg QID	250-500mg QID	250-500mg QID	250-500mg QID	250-500mg QID
Cotrimoxazole (DS ⁴ = TMP ⁵ 160mg; SS ⁶ = TMP ⁵ 80mg)	DS BID ⁷	DS BID ⁷	DS daily ⁷ or SS BID ⁷	DS daily ^{3,7} or SS BID ^{3,7}	SS BID ⁷
Doxycycline	100mg daily-BID	100mg daily-BID	100mg daily-BID	100mg daily-BID	100mg daily-BID
Erythromycin	250-500mg QID	250-500mg QID	250-500mg QID	250-500mg QID	250-500mg QID
Fluconazole *	100-400mg daily	100-200mg daily (400mg daily *)	100-200mg daily	100-200mg q24h ³ or 200-400mg DAD ³	100-200mg daily
Linezolid	600mg BID	600mg BID	600mg BID	600mg BID ³	600mg BID
Metronidazole	500mg BID-TID	500mg BID-TID	500mg BID-TID	500mg BID-TID	500mg BID-TID
Moxifloxacin	400mg daily	400mg daily	400mg daily	400mg daily	400mg daily
Nitrofurantoin	50-100mg QID (MacroBID [®] 100mg BID)	(MacroBID [®] 100mg BID) <40mL/min: Avoid	Avoid	Avoid	Avoid
Penicillin VK	300-600mg BID-QID	300-600mg BID-QID	300-600mg BID-QID	300-600mg BID-QID ³	300-600mg BID-QID
Tetracycline	>80mL/min: 250-500mg QID; 50-80 mL/min: B-TID	250-500mg BID-daily	250-500 mg BID-daily; <10mL/min: Avoid	Avoid	Avoid
Valacyclovir	500-1000mg q8-12h	500-1000mg q8-12h	500-1000mg q12h	500-1000mg daily ³	500-1000mg daily

¹HD = hemodialysis; ²CAPD = continuous ambulatory peritoneal dialysis; ³on dialysis days, give at least one dose after dialysis; ⁴DS = Double Strength; ⁵TMP = trimethoprim; ⁶SS = Single Strength; ⁷refer to IV dosing for treatment of severe systemic infections.

* For invasive infections, higher doses and/or intervals may be required.

INTRAVENOUS ANTI-INFECTIVES DOSAGE ADJUSTMENTS
(Based on Estimated Creatinine Clearance)

Medication IV	>50mL/min	30-50mL/min	<30mL/min	HD ¹	CAPD ²
Acyclovir	5-10mg/kg ³ q8h	5-10mg/kg ³ q12h	5-10mg/kg ³ q24h	2.5-5mg/kg q24h ³	2.5-5mg/kg q24h
Amikacin	5mg/kg q8h or 7.5mg/kg q12h guided by levels	7.5mg/kg q24h guided by levels	7.5mg/kg guided by levels	5-7.5mg/kg DAD ³ guided by levels	
Ampicillin	1-2g q4-6h	1-2g q6-8h	1-2g q8-12h	1-2g q12h	1g q12h
Azithromycin	500mg q24h	500mg q24h	500mg q24h	500mg q24h	500mg q24h
Cefazolin	1-2g q8h	1-2g q12h	1-2g q12-24h	1-2g DAD ³ or 1g q24h ^{3,4}	1g q24h or 500mg q12h
Cefotaxime	1-2g q8h (Meningitis: 2g q6h)	10-50mL/min: 1-2g q8-12h (Meningitis: 2g q8h)	<10mL/min: 1-2g q24h (Meningitis: 2g q12h)	1-2g DAD ³ or 1-2g q24h ³	1g q24h
Cefoxitin	1-2g q6-8h	1-2g q8h	1-2g q8-12h	1-2g DAD ³ or 1-2g q24h ³	1g q24h
Ceftazidime	1-2g q8h	1-2g q12h	1-2g q12-24h	1-2g DAD ³ or 1g q24h ^{3,4}	1g q24h
Ceftriaxone	1-2g q24h	1-2g q24h	1-2g q24h	1-2g q24h ³	1-2g q24h
Cefuroxime	0.75-1.5g q8h	0.75-1.5g q8-12h	0.75-1.5g q12h	0.75-1.5g q24h ³	0.75-1.5g q24h
Ciprofloxacin	200-400mg q12h	200-400mg q12h	400mg q24h	400mg q24h ³	400mg q24h
Clindamycin	300-600mg q8h	300-600mg q8h	300-600mg q8h	300-600mg q8h	300-600mg q8h
Cloxacillin	0.5-2g q4-6h	0.5-2g q4-6h	0.5-2g q4-6h	0.5-2g q4-6h	0.5-2g q4-6h
Cotrimoxazole (mg/kg TMP ⁵)	2.5-5mg/kg/ dose q6h ⁶	2.5-5mg/kg/ dose q8h ⁶	2.5-5mg/kg/ dose ⁷ q12h	2.5-5mg/kg/ q24h ³	2.5-5mg/kg/ q24h
Daptomycin	4-6mg/kg q24h	4-6mg/kg q24h	4-6mg/kg q24h	4-6mg/kg q48h or 6mg/kg DAD ³	4-6mg/kg q48h
Ertapenem	1g q24h	1g q24h	500mg q24h	500mg q24h ³	500mg q24h
Erythromycin	0.5-1g q6h	0.5-1g q6h	0.5-1g q6h	0.5-1g q6h	0.5-1g q6h
Fluconazole	100-400mg q24h	100-200mg q24h (400mg q24h ⁴)	100-200mg q24h	100-200mg q24h ^{3,4} or 200-400mg DAD ³	100-200mg q24h
Ganciclovir	>70mL/min: 5mg/kg q12h; 50-69mL/min: 2.5mg/kg q12h	2.5mg/kg q24h	1.25mg/kg q24h	1.25mg/kg 3x/ week DAD ³	1.25mg/kg 3x/ week
Gentamicin	*	*	*	2mg/kg load, then 1-1.5mg/kg DAD ³	
Imipenem	500mg q6-8h	500mg q8h	500mg q12h	250-500mg q12h	250-500mg q12h
Levofloxacin	750mg q24h	20-50mL/min: 750mg q48h	<20mL/min: 750mg, then 500mg q48h	750mg, then 500mg qHD ¹	750mg, then 500mg q48h
Linezolid	600mg q12h	600mg q12h	600mg q12h	600mg q12h ³	600mg q12h
Meropenem	0.5g q6h or 2g q8h ⁴	0.5g q8h or 2g q12h ⁴	0.5-1g q12h (<25mL/min)	0.5-1g q24h ³	0.5-1g q24h
Metronidazole	500mg q8-12h	500mg q8-12h	500mg q8-12h	500mg q8-12h	500mg q8-12h
Moxifloxacin	400mg daily	400mg daily	400mg daily	400mg daily	400mg daily
Penicillin G	0.5-4MU q4-6h	0.5-4MU q6h	Maximum 6-9MU/day	Maximum 6MU/day ³	Maximum 6MU/day
Piperacillin-Tazobactam	3.375g q6h or 4.5g q6-8h	3.375g q6h	2.25g q6h	2.25g q8h ³	2.25g q8h
Tobramycin	*	*	*	2mg/kg load, then 1-1.5mg/kg DAD ³	
Vancomycin	**	**	**	25mg/kg load, then 500-750mg qHD ¹	25mg/kg q4-7 days
Voriconazole	6mg/kg q12h x 2, then 4mg/kg q12h	Avoid IV formulation (may use PO)	Avoid IV formulation (may use PO)	Avoid IV formulation (may use PO)	Avoid IV formulation (may use PO)

¹HD = hemodialysis; ²CAPD = continuous ambulatory peritoneal dialysis; ³DAD = on dialysis days, give dose after dialysis; ⁴For more aggressive therapy; ⁵TMP = trimethoprim; ⁶give q12h for UTIs; ⁷up to 10 mg/kg/dose for more aggressive therapy; ⁸up to 15 mg/kg/dose for herpes encephalitis, VZV infection.

* See Aminoglycoside Dosing Guidelines.

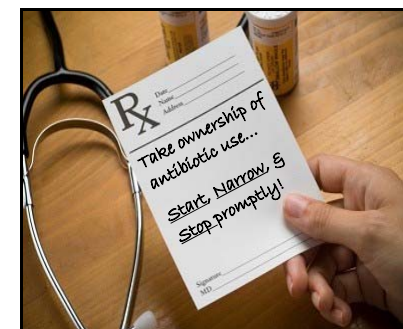
** See Vancomycin Dosing Guidelines.

ANTI-INFECTIVE COMPARISON CARD

Vancouver General Hospital, University of British Columbia Hospital
& G F Strong Rehabilitation Centre

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UPDATE NO. XXXIX



TIPS FOR USING ANTI-INFECTIVES WISELY

- **Sample:** Obtain appropriate cultures
- **Match:** Correlate cultures with clinical picture
- **Antibiotics:** Choose empiric antibiotics based on syndrome and local susceptibilities
- **Review:** Revisit empiric antibiotic choice at 2-3 days
- **Taper:** Stepdown IV to PO when appropriate
- **Stop** antibiotic therapy once infection resolved; avoid prolonged treatment

THE BEST METHOD TO PREVENT THE SPREAD OF INFECTIONS IS GOOD HAND HYGIENE!

Choice of anti-infective should be selected based on efficacy, toxicity, and cost considerations. This reference card provides select *in vitro* bacterial susceptibility patterns and common drug dosing regimens. Clinical response and patient factors must also be assessed when selecting an appropriate agent.

The Anti-Infective Comparison Card has been produced as a collaborative effort of Pharmaceutical Sciences, ASPIRES (*Antimicrobial Stewardship Programme: Innovation, Research, Education and Safety*), the Division of Medical Microbiology and Infection Control, and the Division of Infectious Diseases.

For more information, please contact:

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PHARMACIST-MANAGED IV-PO CONVERSION PROGRAM

As part of the regional Vancouver Coastal Health Pharmacist Authority Policy, Clinical Pharmacists will review and change the route of parenteral anti-infectives in accordance to established criteria.

Oral conversion should be considered if patient:

- continues to need medication;
- is clinically stable;
- is capable of tolerating the oral dosage from (e.g. taking other oral medications & full liquid diet or solids) ; and
- has no factors affecting oral absorption (e.g. presence of gastrointestinal abnormalities or drug interactions).

LIST OF IV ANTI-INFECTIVES ELIGIBLE FOR PO CONVERSION

Group 1

THESE ANTI-INFECTIVES ARE EQUIVALENT GIVEN IV OR PO (Similar drug levels achieved with oral dosage form of same drug)

- Ciprofloxacin → 250-500 mg PO BID (750 mg PO BID severe)
- Clindamycin → 300-450 mg PO TID (600 mg PO TID severe)
- Co-trimoxazole → 1-2 DS PO BID (2 DS PO TID-QID severe)
- Fluconazole → 200 mg PO Daily (400-800 mg PO Daily severe)
- Linezolid → 600 mg PO BID
- Moxifloxacin → 400 mg PO Daily
- Metronidazole → 500 mg PO BID-TID
- Voriconazole → 3 mg/kg PO BID (4 mg/kg PO BID severe)

Group 2

(Lower drug levels achieved with oral dosage form of same drug)
Note: Patient must be clinically improving prior to step-down

- Acyclovir to Valacyclovir → Dose based on indication
- Ampicillin to Amoxicillin → 250-500 mg PO TID (1 g PO TID severe)
- Azithromycin to Clarithromycin XL → 500-1000 mg PO Daily
OR Azithromycin → 250-500 mg PO Daily
- Cefazolin to Cephalexin → 250-500 mg PO QID (1 g PO QID severe)
- Cefuroxime to Cefuroxime axetil → 250-500 mg PO BID (TID severe)
- Penicillin G to Penicillin V → 300-600 mg PO QID mild infections only

RESERVED ANTIMICROBIAL DRUGS (RAD)

These drugs have a 3-day automatic stop date (unless a specific duration is indicated).

Refer to the VA Formulary for more details at

[http://www.vhpharmsci.com/VHFormulary/Policies/3.5 RESERVED ANTIMICROBIAL DRUGS.pdf](http://www.vhpharmsci.com/VHFormulary/Policies/3.5%20RESERVED%20ANTIMICROBIAL%20DRUGS.pdf)

Ceftazidime	Ceftriaxone	Ciprofloxacin IV	Daptomycin	Imipenem
Linezolid	Meropenem	Moxifloxacin IV	Piperacillin-tazobactam	Tigecycline

ANTI-INFECTIVES RESTRICTIONS

Amphotericin B Liposomal:	Restricted to ID, L/BMT, SOT, & ICU for contraindications to amphotericin B deoxycholate
Cefoxitin:	Restricted to OB/GYN or <i>Mycobacterium abscessus</i> infections
Colistin:	Restricted to ID & SOT for pneumonia in cystic fibrosis
Daptomycin:	Restricted to ID & ICU for resistant Gram positive organisms resistant or for intolerance to vancomycin or linezolid
Ganciclovir:	Restricted to transplant, hematology, oncology, or ophthalmology
Linezolid:	Restricted to Gram positive infections resistant to vancomycin or for intolerance to vancomycin
Meropenem:	Restricted to multi-drug resistant organisms where other agents cannot be used due to intolerance or resistance
Micafungin:	Restricted to ID, L/BMT, SOT, & ICU for fungal infections resistant to fluconazole or for intolerance to fluconazole
Posaconazole:	Restricted to L/BMT for fungal prophylaxis and zygomycetes treatment
Tigecycline:	Restricted to ID & ICU as last-line for multi-drug resistant organisms or for intolerance to other antibiotics
Valganciclovir:	Restricted to transplant, hematology, oncology, or ophthalmology
Voriconazole:	Restricted to prophylaxis/treatment of <i>Aspergillus</i> , <i>Scedosporium</i> , <i>Fusarium</i> , or for intolerance to amphotericin B deoxycholate or fluconazole

VGH ANTIMIOGRAM 2014-2015

Compiled by Medical Microbiology,
Pharmaceutical Sciences, and
ASPIRES

ANTIMICROBIAL	% SUSCEPTIBLE																			
AMOXICILLIN/CLAVULANATE	100	100	85	100	0	0	99	16	100	78	91	91	0	0	0	0	0	0	90	100
AMOXICILLIN	100	100	85	19	0	0	99	16	83	52	0	74	0	0	0	0	0	0	0	96
AMPICILLIN	100	100	85	19	0	0	99	16	83	52	0	74	0	0	0	0	0	0	0	96
CLOXACILLIN	—	0	0	100	0	0	31	0	0	0	0	0	0	0	0	0	0	0	0	0
PENICILLIN G SOD	100	100 ^(a)	85	19	0	0	99	16	0	0	0	0	0	0	0	0	0	0	0	96
PENICILLIN V POT	100	100	85	19	0	0	99	16	0	0	0	0	0	0	0	0	0	0	0	96
PIPERACILLIN/TAZOBACTAM ^(b)	—	—	—	100	0	0	99	16	—	98	96	99	74	100	82	92 ⁽ⁱ⁾	95	0	98	98
IMIPENEM/CLASTATIN ^(b)	—	—	—	—	0	0	99	0	—	100	99	95	99	97	100	99	87	0	98	100
MEROPENEM ^(b)	—	—	—	—	0	0	—	0	—	100	99	100	99	97	100	99	93	0	96	100
CEPHALEXIN	100	0	0	100	0	31	0	0	0	81	87	39	0	0	0	0	0	0	0	—
CEFAZOLIN	100	0	0	100	0	31	0	0	0	83	88	39	0	0	0	0	0	0	0	—
CEFUROXIME ^(e)	100	0	100	—	0	0	0	0	0	97	—	—	0	0	0	0	0	0	0	—
CEFTAZIDIME	—	0	0	0	0	0	0	0	0	100	88	94	98	72 ⁽ⁱ⁾	98 ⁽ⁱ⁾	72 ⁽ⁱ⁾	85 ⁽ⁱ⁾	89	56	0
CEFTRIAXONE	100	100	97	—	0	0	0	0	0	100	88	94	96	70 ⁽ⁱ⁾	98 ⁽ⁱ⁾	72 ⁽ⁱ⁾	30 ⁽ⁱ⁾	0	0	—
CIPROFLOXACIN	—	0	—	—	—	—	—	—	—	—	100	74	94	85	98	99	94	95	83	0
MOXIFLOXACIN ⁽ⁱ⁾	—	99	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	0	65
COTRIMOXAZOLE	0	0	—	95	95	41	0	0	0	70	73	90	83	93	100	86	94	0	99	0
GENTAMICIN	0	0	0	0	—	—	—	—	—	—	—	—	—	—	—	—	—	0	0	0
TOBRAMYCIN	0	0	0	0	—	—	—	—	—	—	87	95	90	99	81	96	97	98	0	0
AZITHROMYCIN ⁽ⁱ⁾	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CLARITHROMYCIN XL ⁽ⁱ⁾	80	68	—	—	0	0	0	0	0	95	0	0	0	0	0	0	0	0	0	0
ERYTHROMYCIN ⁽ⁱ⁾	—	84	—	95	89	89	—	—	95	69	82	0	88	0	100	91	0	0	0	—
DOXYCYCLINE	—	59	—	95	89	89	22	31	95	69	82	0	88	0	80	91	0	0	0	—
TETRACYCLINE	80	—	67	84	40	44	0	0	0	0	0	0	0	0	0	0	0	0	72	63
CLINDAMYCIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96
METRONIDAZOLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96
NITROFURANTOIN ^(m)	0	0	0	0	—	—	—	—	—	—	99	0	0	98	34	0	18	0	0	0
LINEZOLID	—	—	—	100	100	100	—	—	—	—	—	—	—	—	—	—	—	—	—	—
VANCOMYCIN ^(h)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

CANDIDA SPECIES

ANTIMICROBIAL	<i>C. albicans</i>	<i>C. glabrata</i>	<i>C. tropicalis</i>	<i>C. parapsilosis</i>	<i>C. krusei</i>	<i>C. guilliermondii</i>	<i>C. lusitanae</i>	<i>A. fumigatus</i>	<i>A. flavus</i>	<i>A. terreus</i>	Cryptococcus	Fusarium	Scedosporium	Mucormycetum	Blastomycosis	Coccidioides	Histoplasma
FLUCONAZOLE	+++	+/-	+++	+++	-	+++	+	-	-	-	+++	+	-	-	+++	+++	+++
TRACONAZOLE	+++	+/-	+++	+++	+	+++	+	+++	+++	+++	+++	+/-	-	-	+++	+++	+++
VORICONAZOLE	+++	+	+++	+++	++	+++	++	+++	+++	+++	+++	++	+/-	-	+++	+++	+++
POSACONAZOLE	+++	+	+++	+++	++	+++	++	+++	+++	+++	+++	++	+	-	+++	+++	+++
MICAFUNGIN	+++	+++	+++	+	+++	++	++	++	++	++	++	++	++	-	+++	+++	+++
AMPHOTERICIN B	+++	+++	+++	+++	++	+++	++	++	++	++	++	++	++	-	+++	+++	+++
AMPHOTERICIN B LIPOSOMAL	+++	++	+++	+++	++	+++	++	++	++	++	++	++	++	-	+++	+++	+++

ASPERGILLUS

OTHER

LEGEND
 — Not considered first-line therapy, but may be appropriate in specific clinical situations.
 + Organism is inherently resistant or not recommended due to poor clinical response.
 Contact Medical Microbiologist on-call, ASPIRES, or Pharmaceutical Sciences for details.

a) For meningitis infections, *S. pneumoniae* is 78% susceptible to penicillin.
 b) MSSA represents 71% of all Staphylococcus isolates at VGH.
 c) Includes hospital- and community-associated MRSA.
 d) Consider synergy with aminoglycosides for serious infections (e.g. endocarditis).
 e) Based on community and literature susceptibility data.
 f) ESB. E.coli rate is 13% at VGH.
 g) ESB. Klebsiella rate is 6% at VGH.
 h) In vitro tests may over estimate susceptibility to beta-lactam/beta-lactam inhibitor combination.
 i) Prolonged use of cephalosporins may result in development of resistance.
 j) For urine, *E. faecalis* is 49% susceptible.
 k) Active against atypical pathogens (Mycoplasma, Chlamydia, Legionella), although not routinely tested
 m) Only indicated for urinary tract infections and eGFR greater than 40 mL/min.