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

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®)	250-500mg TID	250-500mg TID	250-500mg BID	250-500mg BID[3]	
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 *	250-500mg BID	250-500mg BID	500mg daily	500mg daily[3]	500mg 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)	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

[1]HD = hemodialysis; [2]CAPD = continuous ambulatory peritoneal dialysis; [3]on dialysis days, give at least one dose after dialysis; [4]DS = Double Strength; [5]TMP = trimethoprim; [6]SS = Single Strength; [7]refer 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[8] q8h	5-10mg/kg[8] q12h	5-10mg/kg[8] 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]	1 g 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	1-2 g 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[7] q24h[3]	2.5-5mg/kg[7] q24h
Daptomycin	4-6mg/kg q24h	4-6mg/kg q24h	4-6mg/kg q48h	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	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	0.5g q8h or	0.5-1g q12h	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)

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

* See Aminoglycoside Dosing Guidelines.
** See Vancomycin Dosing Guidelines.

Vancouver CoastalHealth
Promoting wellness. Ensuring care.

ASPIRES
smart prescribing

ANTI-INFECTIVE COMPARISON CARD

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

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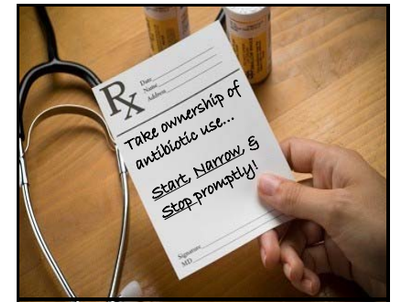

TIPS FOR USING ANTI-INFECTIVES WISELY

- 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.

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VGH ANTIBIOGRAM 2014-2015

Compiled by Medical Microbiology, Pharmaceutical Sciences, and ASPIRES

ANTIMICROBIAL	GROUP A STREPTOCOCCI	STREPTOCOCCUS PNEUMONIAE	VIRIDANS STREPTOCOCCI	STAPHYLOCOCCUS AUREUS (MSSA) [b]	METHICILLIN-RESISTANT S. AUREUS (MRSA) [c]	STAPHYLOCOCCUS EPIDERMIDIS	ENTEROCOCCUS FAECALIS [d]	ENTEROCOCCUS FAECIUM	HAEMOPHILUS INFLUENZAE [e]	ESCHERICHIA COLI [f]	KLEBSIELLA PNEUMONIAE [g]	PROTEUS MIRABILIS	ENTEROBACTER CLOACAE	SERRATIA MARCESCENS	CITROBACTER FREUNDII	ACI NETOBACTER SP.	PSEUDOMONAS AERUGINOSA	STENOTROPHOMONAS MALTOPHILIA	BACTEROIDES FRAGILIS	PEPTOSTREPTOCOCCUS SP.
% SUSCEPTIBLE																				
AMOXICILLIN/CLAVULANATE	100	85	100	0	0	99	16	100	78	91	91	0	0	0	0	0	0	0	90	100
AMOXICILLIN	100	85	19	0	0	99	16	83	52	0	74	0	0	0	0	0	0	0	0	96
AMPICILLIN	100	85	19	0	0	99	16	83	52	0	74	0	0	0	0	0	0	0	0	96
CLOXACILLIN	—	0	100	0	31	0	0	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 [h]	—	—	—	100	0	0	99	16	—	98	96	99	74	100	82	92 [i]	95	0	98	98
IMIPENEM/CILASTATIN [ii]	—	—	—	—	0	0	99	0	—	100	99	95	99	97	100	99	87	0	98	100
MEROPENEM [ii]	—	—	—	—	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	0	0	97	—	—	—	0	0	0	0	0	0	0	0	—
CEFTAZIDIME	—	0	0	0	0	0	0	100	88	94	98	72 [i]	98 [i]	72 [i]	85 [i]	89	56	0	0	—
CEFTRIAXONE	100	97	—	0	0	0	0	100	88	94	96	70 [i]	98 [i]	72 [i]	30 [i]	0	0	0	0	—
CIPROFLOXACIN [j]	—	0	—	—	—	— [k]	0	100	74	94	85	98	99	94	95	83	0	0	0	0
MOXIFLOXACIN [j]	—	99	—	—	—	0	0	100	—	—	—	—	—	—	—	—	0	0	65	63
COTRIMOXAZOLE	0	—	—	95	95	41	0	0	70	73	90	83	93	100	86	94	0	99	0	0
GENTAMICIN	0	0	0	—	—	— [d]	— [d]	—	—	89	97	92	99	96	95	93	95	0	0	0
TOBRAMYCIN	0	0	0	—	—	— [d]	— [d]	—	—	87	95	90	99	81	96	97	98	0	0	0
AZITHROMYCIN [l]	80	68	—	—	0	0	0	95	—	0	0	0	0	0	0	0	0	0	0	0
CLARITHROMYCIN XL [l]																				
ERYTHROMYCIN [l]																				
DOXYCYCLINE	—	84	—	95	89	89	—	—	95	69	82	0	88	0	100	91	0	0	0	—
TETRACYCLINE	—	59	—	95	89	89	22	31	95	69	82	0	88	0	80	91	0	0	0	—
CLINDAMYCIN	80	—	67	84	40	44	0	0	0	0	0	0	0	0	0	0	0	0	72	63
METRONIDAZOLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96	96
NITROFURANTOIN [m]	0	0	0	—	—	0	99	0	0	98	34	0	18	0	95	0	0	0	0	0
LINEZOLID	—	—	—	100	100	100	—	—	0	0	0	0	0	0	0	0	0	0	0	—
VANCOMYCIN [n]	100	100	100	100	100	100	100	>95	0	0	0	0	0	0	0	0	0	0	0	—

CANDIDA SPECIES	FLUCONAZOLE	ITRACONAZOLE	VORICONAZOLE	POSACONAZOLE	MICAFUNGIN	AMPHOTERICIN B	AMPHOTERICIN B LIPOSOMAL
C. albicans	+++	+/-	+++	+++	+++	+++	++
C. glabrata	+++	+/-	+++	+	+++	+++	+++
C. tropicalis	+++	+++	+++	+++	+++	+++	+++
C. parapsilosis	+++	+	+++	+++	+++	+++	+++
C. krusei	—	—	—	+++	+++	++	++
C. guilliermondii	0	0	0	++	++	+	+
C. lusitaniae	0	0	0	++	++	+	+
ASPERGILLUS							
A. fumigatus	-	++	++	+++	+++	++	++
A. flavus	-	++	+++	+++	+	+	+
A. terreus	-	++	+++	+++	++	+	+
OTHER							
Cryptococcus	+++	+	+/-	-	-	-	-
Fusarium	-	-	-	+++	+++	+++	+++
Scedosporium	-	-	+/-	+++	+++	+++	+++
Mucormycosis	+++	+++	++	++	++	++	++
Blastomyces	-	-	-	-	-	-	-
Coccidioides	-	-	-	-	-	-	-
Histoplasma	+++	+++	++	++	+++	+++	+++

LEGEND

— Not considered first-line therapy, but may be appropriate in specific clinical situations.

0 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 meningeal infections, S.pneumoniae is 78% susceptible to penicillin.
b) MSSA respresents 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) ESBL E.coli rate is 13% at VGH.
g) ESBL Klebsiella rate is 6% at VGH.
h) Please use this agent judiciously to prevent emergence of antibiotic-resistant organisms.
i) In vitro tests may over estimate susceptibility to beta-lactam/beta-lactam inhibitor combination.
j) Prolonged use of cephalosporins may result in development of resistance.
k) For urine, E. faecalis is 49% susceptible.
l) Active against atypical pathogens (Mycoplasma, Chlamydophila, Legionella), although not routinely tested
m) Only indicated for urinary tract infections.

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

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 *Mycobacterium abscessus* 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 *Aspergillus*, *Scedosporium*, *Fusarium*, or for intolerance to amphotericin B deoxycholate or fluconazole