Special Considerations – Antibiotics

Amoxicillin	– Best activity of the oral beta-lactam agents against *Streptococcus pneumoniae*
Cephalexin	– For skin / soft tissue infections add TMP / SMX if MRSA suspected – Not recommended for non-urinary Gram negative infections – Not effective for bite wounds – amoxicillin / clavulanate is drug of choice for human / bite wounds
Ceftazidime	– Should be reserved for treatment of *Pseudomonas aeruginosa* infections – **No** reliable Gram positive coverage *(Staphylococcus / Streptococcus or Enterococcus)*
Piperacillin / tazobactam	– Q6H dosing recommended. Excellent anaerobic coverage (adding metronidazole not required) – Empiric agent of choice for febrile neutropenia, severe polymicrobial infections and sepsis of GI source
Ertapenem / Imipenem / Meropenem	– **Use is restricted to prevent selection of carbapenem resistance** – **Ertapenem is restricted to outpatient therapy** – Excellent anaerobic coverage (adding metronidazole not required) – Indicated for severe sepsis in patients with previous ESBL / AmpC organisms or recent travel to South Asia – **NOT INDICATED** as empiric therapy of community acquired infections – **NOT INDICATED** as first line therapy of nosocomial infections **Note**: Imipenem has activity against Enterococcus faecalis but meropenem / ertapenem do not.
Macrolides (azithromycin / clarithromycin)	– Not recommended as monotherapy for pneumonia. Add ceftriaxone or amoxicillin +/- clavulanate – Inferior to amoxicillin for otitis media / sinusitis / acute exacerbation chronic bronchitis – **NOT INDICATED** for acute bronchitis
Doxycycline	– indicated for community acquired pneumonia +/- amoxicillin or ceftriaxone
Vancomycin (IV)	– Beta-lactams have better clinical outcome. Switch to beta-lactam if organism is susceptible. – **Dosing**: Loading dose 25 – 30 mg / kg. Maintenance dose 15 mg / kg Q8 – 12H
Vancomycin (oral)	– treatment of C.difficile infection (125 mg QID)
Ciprofloxacin	– No reliable Gram positive activity *(Staphylococcus / Streptococcus / Enterococcus)* – Not recommended as empiric therapy for serious Gram negative infections (increased resistance) – Only oral agent with activity against *Pseudomonas aeruginosa* (750 mg bid)
Moxifloxacin	– No reliable *Staphylococcus / Enterococcus* / anaerobic coverage – No *Pseudomonas aeruginosa* activity – Not recommended for UTI as insufficient drug levels in urine
Fosfomycin (oral therapy)	– Single dose therapy for acute, uncomplicated cystitis – Excellent activity against *E.coli* [including ESBL / AmpC] – No activity against *Staphylococcus saprophyticus* – **Note**: not recommended for upper urinary tract infection / systemic infections

Anti-infective	Route	Dose*	Interval	Cost / day
Amoxicillin	PO	500 mg – 1 g	Q8H	$0.16-0.32
Ampicillin	IV	2 g	Q4 – 6H	$23.24 – 34.86
Amoxicillin / clavulanate	PO	875 / 125 mg	Q12H	$1.11
Cloxacillin	PO	500 mg – 1 g	Q6H	$1.08 – 2.16
	IV	2 g	Q4H	$14.10
Penicillin V	PO	300 mg	Q6H	$0.79
Penicillin G	IV	3 million units	Q4H	$4.71
Piperacillin / tazobactam	IV	3.375 – 4.5 g (use 4.5 g for *P.aeruginosa*)	Q6H	$15.20 – 18.80
Cephalexin	PO	500 mg – 1 g	Q6H	$0.46 – 0.93
Cefazolin	IV	2 g (use 3 g if BMI > 35)	Q8H	$5.99
Cefuroxime	IV	1.5 g	Q8H	$15.78
Cefuroxime axetil	PO	500 – 750 mg	Q12H	$1.78 – 2.67
Ceftriaxone	IV	2 g	daily	$2.04
		2 g (meningitis / CNS infection)	Q12H	$5.08
Cefixime	PO	400 mg	daily	$2.72
Ceftazidime	IV	2 g	Q8H	$53.79
Meropenem[R]	IV	500 mg	Q6H	$16.60
	IV	1 g (2 g meningitis / CNS infection)	Q8H	$20.85 – 41.70
Ertapenem[R]	IV	1 g	daily	$52.22
Imipenem / cilastatin[R]	IV	500 mg	Q6H	$25.84
Ciprofloxacin**	PO	500 – 750 mg (use 750 mg for *P.aeruginosa*)	Q12H	$0.32 – 2.30
	IV	400 mg	Q12H	$4.26
Levofloxacin**	PO	750 mg	daily	$0.31
	IV	750 mg	daily	$44.21
Moxifloxacin**	PO	400 mg	daily	$1.13
	IV	400 mg	daily	$17.51
Sulfamethoxazole / trimethoprim**	PO	800 / 160 mg	Q12H	$0.10
	IV	800 / 160 mg (10 mL)	Q6H	$54.24
Nitrofurantoin	PO	100 mg	Q12H	$0.72
Fosfomycin[R]	PO	3 g	One dose	$14.31
Gentamicin	IV	480 mg (7 mg / kg)	daily	$93.34
Tobramycin	IV	480 mg (7 mg / kg)	daily	$16.60
Azithromycin	PO	500 mg	daily × 3	$0.48
	IV	500 mg	daily × 3	$6.81
Clarithromycin XL	PO	1 g	daily	$2.00
Doxycycline	PO	100 mg	Q12H	$0.12
Clindamycin**	PO	300 – 450 mg (use 450 mg for osteomyelitis)	Q6 – 8H	$0.46 – 1.00
	IV	600 mg	Q8H	$20.94
Vancomycin	IV	1 g (15 mg / kg)	Q8 – 12H	$10.30 – 15.75
	PO	125 mg (capsule)	Q6H	$8.32
Daptomycin[R]	IV	300 – 400 mg (4 – 6 mg / kg)	daily	$110.40 – 147.20
Linezolid[R]**	PO	600 mg	Q12H	$2.63
	IV	600 mg	Q12H	$39.00
Metronidazole**	PO	500 mg (use Q8H for *C.difficile* infection)	Q8 – 12H	$0.25 – 0.38
	IV	500 mg	Q12H	$2.95
Amphotericin B	IV	50 mg	daily	$84.50
Fluconazole**	PO	400 mg	daily	$0.60
	IV	400 mg	daily	$9.58
Voriconazole[R]	PO	200 mg	Q12H	$4.06
	IV	200 mg	Q12H	$124.00
Micafungin[R]	IV	100 mg	daily	$100.00
Acyclovir	IV	750 mg	Q8H	$49.19
Valacyclovir	PO	1 g	Q8H	$1.56

*Based on a 70 kg adult with normal renal and hepatic function

**Agents with > 80% bioavailability – Use oral route whenever possible

NOTE: Automatic stop of antibiotics at **7 days (exception: azithromycin 3 days)** – Indicate on orders if longer duration required.

R – Restricted Antimicrobial – refer to the Inside Net /Clinical Resources/Pharmacy /Antimicrobial Stewardship Program Website: "Restricted and Non-formulary Antimicrobial Agents-Criteria for Use" or contact Pharmacy

Interior Health

Antimicrobial Susceptibility Report 2017

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Gram Positive Organisms • Interior Health – 2017

% Susceptible	# of Isolates	Amoxicillin	Ampicillin	Cefazolin	Ceftriaxone	Clindamycin	Cloxacillin	Erythromycin	Linezolid[NF]	Gent synergy	Nitrofurantoin[U]	Penicillin (IV)	Penicillin (oral)	Ciprofloxacin[U]	Doxycycline	Trimeth/Sulfa	Vancomycin
Enterococcus faecalis	2336	99	99	R	R	R	R	R	99	78	99			77			99
Enterococcus faecium	372	R	R	R	R	R	R	R	99	49				R			59
Aerococcus urinae	396	100	100		100						99			85		NR	
Staphylococcus aureus	5424			83	NR	81	83		99					NR	98	98	100
S.aureus (MRSA-clinical)	901	R	R	R	R	62	R		100					NR	98	95	100
S.aureus (MRSA–screens)	122	R	R	R	R	46	R		100					NR	98	94	100
Staph lugdunensis	190			98		88	98		100					NR	98	99	100
Staph epidermidis	283			45			45		100					NR		81	100
Coag Neg Staph -other	136			66			66		100					NR		81	100
Streptococcus pneumoniae	321	100	100		100	89	NR	80				†98 ‡99	91	NR	81	91	100
Strep agalactiae (Group B)	2065	100	100	100	100	53	NR	58				100	100	NR		R	100
Strep pyogenes (Group A)	929	100	100	100	100	93	NR	94				100	100	NR		R	100
Strep anginosus group	204		100		100	87						100	100				100
Strep bovis group	61		100		100						84						100

† Data based on meningitis breakpoints – more susceptible if non-CNS infections

‡ Data based on non-meningitis breakpoints

Legend

U urinary tract infections only

R inherent resistance

NR not recommended / poor activity

NF non-formulary, restricted to specific indications

Miscellaneous Organisms • Interior Health – 2017

% Susceptible	# of Isolates	Ampicillin	Amoxicillin	Amoxicillin/ clavulanate	Ceftriaxone	Cefuroxime	Ciprofloxacin	Clindamycin	Doxycycline	Erythromycin	Meropenem	Metronidazole	Penicillin	Piperacillin/ tazobactam	Trimeth/Sulfa	Vancomycin
Actinotignum (Actinobaculum) schalii	60	98	98		100		R		100						NR	
Bacteroides fragilis group	62			94				72			98	100	NR	90		
Campylobacter jejunii	160						71			99						
Haemophilus influenzae	360	64		75	100	75			98						71	
Cutibacterium (Propionibacterium) acnes	50	100	100		100			92			100	R	100			100

Gram Negative Organisms • Interior Health – 2017

% Susceptible	# of Isolates	Ampicillin	Amox / Clav	Cephalexin[U]	Cefixime	Ceftriaxone	Ceftazidime	Ciprofloxacin	Fosfomycin	Gentamicin	Meropenem	Nitrofurantoin[U]	Pip / Tazo	Doxycycline	Tobramycin	Trimeth/Sulfa
Citrobacter freundii complex	200	R	R	R	R	R	R	89		96	100	95	NR		95	88
Citrobacter koseri	145	R	97	R	100	100	NR	100		100	100	92	100		100	100
Enterobacter aerogenes	142	R	R	R	R	R	R	99	NR	100	100	R	NR		100	100
Enterobacter cloacae complex	528	R	R	R	R	R	R	95	NR	98	99	R	NR		99	90
Escherichia coli	13557	61	83	46	91	93	NR	81	97	93	100	98	97		93	82
Klebsiella oxytoca group	471	R	94	R	97	96	NR	96		99	100	84	96		98	95
Klebsiella pneumoniae	1724	R	93	R	97	97	NR	93	78	98	99	NR	98		97	95
Morganella morganii	140	R	R	R	NR	NR	NR	80	R	86	100	R	99		92	77
Proteus mirabilis	554	75	95	79	96	96	NR	93	78	93	100	R	97		94	87
Proteus vulgaris group	35	R	84	R	R	NR	NR	100	NR	97	100	R	100		100	97
Providencia spp	36	R	R	R	R	NR	NR	89	NR	R	100	R	R		R	100
Serratia marcescens	105	R	R	R	NR	NR	NR	92	NR	99	97	R	NR		90	98
Salmonella spp	134	82		NR	95	95	NR	79	NR	NR	100	73			NR	98
Acinetobacter baumanii complex	37	R	R				77	95	R	100	97		91	100	100	100
Pseudomonas aeruginosa	1155	R	R	R	R	R	92	90	R	92	94		89	R	99	R
Stenotrophomonas maltophilia	48													98		96

Legend

U urinary tract infections only

R inherent resistance

NR not recommended / poor activity

NF non-formulary, restricted to specific indications

Special Considerations – Organisms

Gram Positive Organisms **Note:** If 3/4 or 4/4 positive blood cultures with Gram positive organisms, always repeat to ensure clearance of bacteremia after starting antibiotic therapy. Continuous bacteremia requires investigation for endocarditis	***S. aureus*** – Restrict vancomycin to MRSA / severe cefazolin allergy. Vancomycin has inferior efficacy against MSSA – For MRSA aim for vancomycin trough of 15 – 20 mg / L for bacteremia and deep seated infections – *S. aureus* in urine (non catheterized) may indicate systemic / distal site infection
	S. pneumoniae – Penicillin / amoxicillin effective for the vast majority of infections – Significant macrolide resistance. Doxycycline resistance increasing
	Enterococcus faecalis – Synergistic therapy (ampicillin + ceftriaxone), (ampicillin + gentamicin*), (vancomycin + gentamicin*) recommended for endovascular infection (endocarditis) * synergistic dose 1 mg / kg Q 8 – 12 hrs. **Note**: cephalosporins, meropenem, ertapenem, clindamycin and TMP-SMX have NO enterococcal activity
	Streptococcus anginosus group (S.anginosus, S.constellatus, S.intermedius) – Cause deep seated abscesses often in association with anaerobes
Gram Negative Organisms	***E. coli*** – Quinolones not recommended empirically due to significant resistance – Carbapenem resistant strains still very rare in Interior Health
	Citrobacter freundii, Enterobacter species: – Produce an inducible cephalosporinase (AmpC) and are predictably resistant to most beta-lactam antibiotics except carbapenems (imipenem, meropenem, ertapenem)
	P. aeruginosa – Isolation from superficial wounds may represent colonization not infection
Yeast	***Yeast*** – Never dismiss yeast in blood culture as a contaminant. – Yeast in sputum culture – not likely pathogen unless Cryptococcus spp. – Empiric therapy for serious non-Candida albicans infections – micafungin. – Fluconozole recommended for Candida albicans (>99% susceptibility)