Special Considerations – Antibiotics

Amoxicillin	– Best activity of the oral beta-lactam agents against *Streptococcus pneumoniae*
Cephalexin	– Recommended for skin / soft tissue infections. Add TMP / SMX if abscesses and MRSA suspected – **Not** recommended for Gram negative infections other than cystitis – **Not** effective for bite wounds – amoxicillin / clavulanate is drug of choice for human / animal bite wounds
Ceftazidime	– Should be reserved for treatment of *Pseudomonas aeruginosa* infections – **No** reliable Gram positive coverage *(Staphylococcus / Streptococcus or Enterococcus)*
Piperacillin / tazobactam	– Empiric agent of choice for febrile neutropenia, severe polymicrobial infections
Ertapenem / Imipenem / Meropenem	– **Restrict use to prevent selection of carbapenem resistance** – **NOT INDICATED** as empiric therapy of community acquired infections – **NOT INDICATED** as first line therapy of nosocomial infections – Indicated for severe sepsis in patients with previous ESBL / AmpC organisms or recent travel to South Asia – Excellent anaerobic coverage **Note**: Imipenem has activity against *Enterococcus* faecalis but meropenem / ertapenem do not. **– Ertapenem is restricted to outpatient therapy**
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 (viral illness)
Doxycycline	– Alternative for community acquired pneumonia if penicillin / amoxicillin allergy
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)	– Agent of choice for moderate / severe / hospitalized *C. difficile* infection
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)	– Alternative agent to nitrofurantoin for acute, uncomplicated cystitis in patients with decreased renal function (eGFR < 60 mL / min) – 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	$0.27-0.54
Ampicillin	IV	2 g	Q4 – 6H	$22.44-33.66
Amoxicillin / clavulanate	PO	875 / 125 mg	Q12H	$0.50
Cloxacillin	PO	500 mg – 1 g	Q6H	$0.85-1.70
	IV	2 g	Q4H	$22.50
Penicillin V	PO	300 mg	Q6H	$0.82
Penicillin G	IV	3 million units	Q4H	$5.65
Piperacillin / tazobactam	IV	3.375 – 4.5 g (use 4.5 g for *P.aeruginosa*)	Q6H	$14.66-19.55
Cephalexin	PO	500 mg – 1 g	Q6H	$0.57-1.04
Cefazolin	IV	2 g (use 3 g if BMI > 35)	Q8H	$6.95
Cefuroxime	IV	1.5 g	Q8H	$17.94
Cefuroxime axetil	PO	500 – 750 mg	Q12H	$0.64-0.95
Ceftriaxone	IV	2 g	daily	$2.62
		2 g (meningitis / CNS infection)	Q12H	$5.08
Cefixime	PO	400 mg	daily	$2.11
Ceftazidime	IV	2 g	Q8H	$21.20
Meropenem[R]	IV	500 mg	Q6H	$14.96
	IV	1 g (2 g meningitis / CNS infection)	Q8H	$17.97 - 35.94
Ertapenem[R]	IV	1 g	daily	$40.94
Imipenem / cilastatin[R]	IV	500 mg	Q6H	$35.32
Ciprofloxacin**	PO	500 – 750 mg (use 750 mg for *P.aeruginosa*)	Q12H	$0.16-0.24
	IV	400 mg	Q12H	$6.42
Levofloxacin**	PO	750 mg	daily	$0.79
	IV	750 mg	daily	$49.21
Moxifloxacin**	PO	400 mg	daily	$0.51
	IV	400 mg	daily	$14.41
Sulfamethoxazole / trimethoprim**	PO	800 / 160 mg	Q12H	$0.23
	IV	800 / 160 mg (10 mL)	Q6H	$57.20
Nitrofurantoin	PO	100 mg	Q12H	$0.66
Fosfomycin[R]	PO	3 g	One dose	$10.72
Gentamicin	IV	480 mg (7 mg / kg)	daily	$96.97
Tobramycin	IV	480 mg (7 mg / kg)	daily	$12.33
Azithromycin	PO	500 mg	daily × 3	$0.33
	IV	500 mg	daily × 3	$5.75
Clarithromycin XL	PO	1 g	daily	$2.39
Doxycycline	PO	100 mg	Q12H	$0.40
Clindamycin**	PO	300 – 450 mg (use 450 mg for osteomyelitis)	Q6 – 8H	$0.77-1.54
	IV	600 mg	Q8H	$7.71
Vancomycin	IV	1 g (15 mg / kg)	Q8 – 12H	$11.50-17.25
	PO	125 mg (capsule) [*C.difficile* infection]	Q6H	$14.73
Daptomycin[R]	IV	300 – 400 mg (4 – 6 mg / kg)	daily	$104.40-139.20
Linezolid[R]**	PO	600 mg	Q12H	$32.61
	IV	600 mg	Q12H	$31.06
Metronidazole**	PO	500 mg (use Q8H for *C.difficile* infection)	Q8 – 12H	$0.27-0.40
	IV	500 mg	Q12H	$6.76
Amphotericin B	IV	50 mg	daily	$93.19
Fluconazole**	PO	400 mg	daily	$1.39
	IV	400 mg	daily	$12.20
Voriconazole[R]	PO	200 mg	Q12H	$3.26
	IV	200 mg	Q12H	$62.00
Micafungin[R]	IV	100 mg	daily	$83.00
Acyclovir	IV	750 mg	Q8H	$26.55
Valacyclovir	PO	1 g	Q8H	$1.45

*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 2020

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Gram Positive Organisms • Interior Health – 2020

% 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	1285	100	100	R	R	R	R	R	100	84	99			83		R	100
Enterococcus faecium	136	23	23	R	R	R	R	R	99	54	R			R		R	60
Aerococcus urinae	260	100	100				NR				100					NR	
Staphylococcus aureus	4097			82		85	82		100					NR	95	95	100
S.aureus (MRSA)	763	R	R	R	R	74	R		100					NR	95	86	100
S.aureus (MSSA)	3334			100		87	100		100					NR	98	96	100
Staph lugdunensis	213			98		91	98		100					NR	97	99	100
Staph epidermidis	234			47		66	47		100					NR	86	75	100
Streptococcus pneumoniae	152	99			100	84		76				70 † 79 ‡	82	NR	74	83	100
Strep agalactiae (Group B)	1246	100	100		100	53		62				100	100	NR		R	100
Strep pyogenes (Group A)	641	100	100		100	67		64				100	100	NR	74	R	100
*Strep anginosus group**	170		100		100	86						100	100	NR			100
*Strep viridans group** (blood cultures)*	42				100							80					100

† Data based on meningitis

‡ Data based on non-meningitis breakpoints

* Streptococcus anginosus group includes: Streptococcus anginosus, Streptococcus constellatus and Streptococcus intermedius

** Streptococcus viridans group includes: Streptococcus mitis group, Streptococcus mutans group, Streptococcus salivarius group and Streptococcus sanguinis group

Legend
U urinary tract infections only
R inherent resistance
NR not recommended / poor activity
NF non-formulary, restricted to specific indications

Gram Negative Organisms • Interior Health – 2020

% Susceptible	# of Isolates	Ampicillin	Amox/Clav	Cephalexin[U]	Cefixime	Ceftriaxone	Ceftazidime	Ciprofloxacin	Fosfomycin[U]	Gentamicin	Meropenem	Nitrofurantoin[U]	Pip / Tazo	Doxycycline	Tobramycin	Trimeth/Sulfa
Citrobacter freundii complex	149	R	R	R	NR	NR	NR	90		96	99	93	NR		97	88
Citrobacter koseri	103	R	96	R	97	97	NR	95		100	100	84	97		100	99
Klebsiella aerogenes	125	R	R	R	NR	NR	NR	98	R	100	100	R	NR		100	100
Enterobacter cloacae complex	411	R	R	R	NR	NR	NR	95	R	100	99	R	NR		99	94
Escherichia coli	9945	63	82		91	92	NR	75	99	94	100	97	90		95	82
Klebsiella oxytoca group	334	R	93	NR	88	93	NR	98	R	99	100	89	93		99	96
Klebsiella pneumoniae	773	R	93	NR	95	95	NR	89	R	98	100	NR	93		98	94
Morganella morganii	118	R	R	R	NR	NR	NR	81	R	93	99	R	94		97	81
Proteus mirabilis	431	81	96		96	97	NR	94	NR	93	100	R	97		96	88
Serratia marcescens	91	R	R	R	NR	NR	NR	92	R	100	99	R	NR		97	100
Salmonella spp	89	88		NR	100	100	NR	87		NR	100				NR	96
Acinetobacter baumanii complex	34	R	R				NR	97	R	100	100		NR	100	100	100
Pseudomonas aeruginosa	877	R	R	R	R	R	94	89	R	99	94		91	R	100	R
Stenotrophomonas maltophilia	43													100		95

Miscellaneous Organisms • Interior Health – 2020

% Susceptible	# of Isolates	Amoxicillin	Ampicillin	Amoxicillin / clavulanate	Azithromycin	Ceftriaxone	Cefuroxime	Ciprofloxacin	Clindamycin	Doxycycline	Meropenem	Metronidazole	Penicillin	Piperacillin / tazobactam	Trimeth/Sulfa	Vancomycin
Actinotignum schalii	42	98	98			100		R							NR	
Bacteroides fragilis group	45			85					74		98	100	NR	89		
Campylobacter spp	128				99			81								
Haemophilus influenzae	116		61	81		100	81			67					55	
Cutibacterium acnes	42		100			100			100		100	R	100			100

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*** – Consult Infectious Diseases for *S. aureus* bacteremia – Restrict vancomycin to MRSA / severe cefazolin allergy. Vancomycin has inferior efficacy against MSSA. – *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 and doxycycline resistance
	E. 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 and adverse event profile – 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 – Consult Infectious Diseases for *P. aeruginosa* bacteremia – Isolation from superficial wounds may represent colonization not infection.
Yeast	***Yeast*** – Consult Infectious Diseases for candidemia – Never dismiss yeast in blood culture as a contaminant. – Yeast in sputum culture – not likely pathogen unless *Cryptococcus* spp. – Micafungin – empiric therapy for candidemia / severe non-*C. albicans* infections