

**Table 8. Adult parenteral antimicrobial dosage guidelines**

Antibiotic	Usual Dosages <sup>a</sup>
<b>ANTIBACTERIAL AGENTS</b>	
<i>Penicillins</i>	
Ampicillin	1-2 g q6h
Cloxacillin	1-2 g q4-6h
Penicillin G Sodium	1-2 million units q4-6h
Piperacillin/Tazobactam	3.375 g q6h
Meropenem	500 mg q6h
<i>Cephalosporins</i>	
Cefazolin	1-2 g q8h
Cefoxitin	1-2 g q6-8h
Cefuroxime	0.75-1.5 g q8h
Cefotaxime	1-2 g q8h
Ceftriaxone	1-2 g q24h
Ceftazidime	1-2 g q8h
<i>Fluoroquinolones</i>	
Ciprofloxacin	200-400 mg q12h
Levofloxacin	500-750 mg q24h
Moxifloxacin	400 mg q24h
<i>Macrolides</i>	
Azithromycin	500 mg q24h
<i>Aminoglycosides</i>	
Gentamicin	80 mg q8h
Tobramycin	80 mg q8h
<i>Others</i>	
Clindamycin	600 mg q8h
Co-trimoxazole	10-20 mg/kg/day trimethoprim
Metronidazole	500 mg q8h
Vancomycin	1 g q12h
<b>ANTIFUNGAL AGENTS</b>	
Amphotericin B	0.5-1 mg/kg q24h
Fluconazole	100-400 mg q24h
<b>ANTIVIRAL AGENTS</b>	
Acyclovir	5-10 mg/kg q8h
Ganciclovir	5 mg/kg q12h

<sup>a</sup> Based on normal renal function in a 70 kg patient.

**Table 9. Parenteral to oral conversion suggestions**

Parenteral Drug	Oral Therapy Options <sup>a</sup>
<b>ANTIBACTERIAL AGENTS</b>	
<i>Penicillins</i>	
Ampicillin	Amoxicillin
Cloxacillin	Cloxacillin, Cephalexin
Penicillin	Penicillin V
Piperacillin/Tazobactam	Amoxicillin/Clavulanate Co-trimoxazole +/- Metronidazole Ciprofloxacin +/- Metronidazole
<i>Cephalosporins</i>	
Cefazolin	Cephalexin, Cloxacillin
Cefotaxime or Ceftriaxone	Amoxicillin/Clavulanate Cephalexin Ciprofloxacin, Levofloxacin
Cefoxitin	Cephalexin + Metronidazole Co-trimoxazole + Metronidazole Amoxicillin/Clavulanate
Ceftazidime	Ciprofloxacin
Cefuroxime	Co-trimoxazole Amoxicillin/Clavulanate Azithromycin, Clarithromycin
<i>Fluoroquinolones</i>	
Ciprofloxacin IV	Ciprofloxacin
Levofloxacin IV	Levofloxacin
<i>Macrolides</i>	
Azithromycin	Azithromycin
<i>Others</i>	
Clindamycin	Cloxacillin +/- Metronidazole Cephalexin +/- Metronidazole Clindamycin
<b>ANTIFUNGAL AGENTS</b>	
Fluconazole	Fluconazole
<b>ANTIVIRAL AGENTS</b>	
Acyclovir	Acyclovir

<sup>a</sup> Selection of oral therapy should be based on cultures and sensitivities. In absence of useful cultures, oral therapy may be selected based on potential pathogens, community- versus hospital-acquired infection, pharmacokinetics, spectrum of activity, and cost of each oral agent. Oral agents listed above represent those currently on the WRHA Formulary and **does not** represent all commercially available oral agents.

**Table 10. Adult dosing recommendations in renal impairment<sup>a</sup>**

Drug	Creatinine Clearance (CrCl) in mL/min <sup>b</sup> (suggested dosage adjustment based on normal dose)				Supplement for Dialysis
<b>Penicillins</b>					
Ampicillin	> 30 (q6h)	10-30 (q6-12h)	< 10 (q12h)		HD
Cloxacillin	NO CHANGE NECESSARY				NO
Penicillin	> 50 (q4-6h)	10-50 (q6-8h)	< 10 (20-50%)		HD
Piperacillin (± Tazobactam)	> 40 (q6h)	20-40 (q8h)	< 20 (q12h)		HD
<b>Cephalosporins</b>					
Cefazolin	> 50 (q8h)	10-50 (q12h)	< 10 (q24h)		HD
Cefotaxime	> 20 (q8h)	< 20 (q12h-c-q24h)			HD
Ceftriaxone	NO CHANGE NECESSARY				NO
Cefoxitin	> 30 (q6-8h)	10-30 (q12-24h)	< 10 (q24h)		HD
Ceftazidime	> 50 (q8h)	30-50 (q12h)	10-30 (q24h)	< 10 (50% q24-48h)	HD, PD
Cefuroxime	> 20 (q8h)	10-20 (q12h)	< 10 (q24h)		HD
<b>Miscellaneous</b>					
Acyclovir	> 50 (q8h)	25-50 (q12h)	10-25 (q24h)	< 10 (50% q24h)	HD
Aminoglycosides <sup>d</sup>	REQUIRES INDIVIDUALIZED DOSING AND MONITORING OF SERUM CONCENTRATIONS				HD, PD
Azithromycin	NO CHANGE NECESSARY				
Ciprofloxacin	> 30 (q12h)	< 30 (q24h)			HD
Clindamycin	NO CHANGE NECESSARY				NO
Fluconazole	> 50 (q24h)	20-50 (50%)	< 20 (25%)		HD
Ganciclovir (induction doses)	50-70 (2.5 mg/kg q12h)	25-50 (2.5 mg/kg q24h)	10-25 (1.25 mg/kg q24h)	< 10 (1.25 mg/kg 3x/wk)	HD
Levofloxacin (e.g. CAP)	> 50 (q24h)	20-49 (500 mg load, then 50% q24h)	10-19 (500 mg load, then 50% q48h)		HD
Meropenem	> 50 (q6h)	30-49 (q8h)	10-29 (q12h)	< 10 (q24h)	HD, PD
Metronidazole	NO CHANGE NECESSARY				HD
TMP-SMX <sup>e</sup>	> 25 (q6-8h)	15-25 (50% q6-8h)	< 15 (2.5-5 mg/kg, generally not recommended)		HD
Vancomycin <sup>f</sup>	> 70 (q12h)	50-70 (q24h)	10-49 (q24-72h)	< 10 (q5-7days)	NO

<sup>a</sup> Suggested dosages – for individualized dosage modifications or more information contact a pharmacist or physician with experience in the treatment of infectious diseases.

<sup>b</sup> To estimate creatinine clearance (CL<sub>CR</sub>) (mL/min) use the following calculation normalized for a 72 kilogram person.

CL<sub>CR</sub> male =  $\frac{(140 - \text{age}) \times 88.4}{S_{CR}}$  (µmoles/L)  
CL<sub>CR</sub> female = 0.85 x CL<sub>CR</sub> male

<sup>c</sup> Use q12h for severe infection (e.g., meningitis).

<sup>d</sup> Monitor serum concentrations.



# Brandon Regional Health Authority Antibiogram for 2011

(Based on data from 2010)

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## DISCLAIMERS

This guide is provided as an educational resource for physicians and other healthcare professionals caring for patients in the Brandon Regional Health Authority. Susceptibility data presented in the guide was obtained from Westman Lab (Brandon) from Jan to Dec, 2010. The authors of the guide have made every effort to ensure that the information contained in it was accurate at the time of publication. Users of the guide are encouraged to consult other references to confirm the information presented in it. The authors are not responsible for errors, omissions, inaccuracies, or the continued completeness of the information contained in the guide. The information in the guide should not be used or relied upon to replace the skill and professional judgment required to determine appropriate patient care and treatment. Also, the guide is not intended to replace or to be used as a substitute for the complete prescribing information prepared by each pharmaceutical manufacturer for their anti-infective agents. Because of possible changes in anti-infective indications, changes in dosage information, differences in patients' responses to therapy, newly described toxicities, drug-drug interactions, and other items of importance, reference to complete prescribing information is recommended before any of the anti-infective agents described in the guide are used.

## HOW TO USE THE ANTILOGRAM PORTION OF THE GUIDE (Tables 1-6)

- The information presented in the antibiogram is intended only to guide initial empiric anti-infective agent therapy in the Brandon Regional Health Authority.
- Initial broad-spectrum empiric therapy should be focused to the most appropriate narrow-spectrum agent(s) based on the laboratory identification of pathogen(s) and known susceptibility patterns/results, if the situation permits.
- Consideration should be given to equally efficacious but less expensive anti-infective agents for empiric therapy or when streamlining of therapy is desired, if the situation permits.

## SUGGESTED CRITERIA FOR IV TO ORAL ANTIBIOTIC CONVERSION IN ADULTS

- Clinical improvement of infectious signs and symptoms (e.g., temperature defervescence, decreased white blood cell count).
- Patient is clinically stable (excludes patients in the intensive care unit, patients with febrile neutropenia, or patients with life threatening infections).
- Patient can tolerate oral feeding and medications (bowel sounds, no diarrhea/ nausea/ vomiting).
- For rapid step-down, choose agents with high bioavailability (e.g., clindamycin, trimethoprim-sulfamethoxazole, fluoroquinolones).
- If anti-infective agent susceptibilities are known, anti-infective therapy should be tailored based on available data.

**Table 1. In vitro activity of selected anti-infective agents tested against Gram-negative bacilli<sup>a</sup>**

Organism (number tested): January through December 2010	Percent Susceptible											
	Ampicillin	Piperacillin	Piperacillin-Tazobactam	Cefazolin	Ceftriaxone	Ceftazidime	Imipenem	Gentamicin	Tobramycin	Ciprofloxacin	Trimethoprim-Sulfamethoxazole	Nitrofurantoin <sup>b</sup>
<i>Citrobacter freundii</i> (114)		78	87		87	85	100	97	100	92	87	93
<i>Enterobacter aerogenes</i> (65)		90	91		93	91	99	100	100	99	97	11
<i>Enterobacter cloacae</i> (271)		82	88		87	89	99	100	100	97	93	27
<i>Escherichia coli</i> (6074) <sup>c</sup>	58	64	98	92	96	96	100	94	95	83	77	96
<i>Klebsiella oxytoca</i> (222)			95	92	98	99	100	100	100	98	97	74
<i>Klebsiella pneumoniae</i> (802)			99	97	98	98	100	100	100	96	96	46
<i>Proteus mirabilis</i> (296)	87	95	100	96	98	98	n.d.	99	100	95	80	
<i>Pseudomonas aeruginosa</i> (676)		93	95			92	96	94	99	79		

<sup>a</sup> Isolates tested and reported are from all sources combined (Jan to Dec., 2010); data compiled according to the recommendations of the Clinical and Laboratory Standards Institute (CLSI) in their document M39-A3 (2009).  
<sup>b</sup> Nitrofurantoin is indicated for acute cystitis only.  
<sup>c</sup> Susceptibility of Piperacillin-Tazobactam versus *Escherichia coli* was determined by testing 60 isolates from the Health Sciences Centre (all sources) as part of the CANWARD Study, 2010 (Zhanel et al.).  
 n.d. = no data – absence of data for certain drug-organism combinations reflects limitations of the testing method currently used by DSM microbiology laboratories.  
 No data are available for Meropenem.

**Table 2. In vitro activity of selected anti-infective agents tested against Gram-positive cocci<sup>a</sup>**

Organism (number tested): January through December 2010	Percent Susceptible												
	Penicillin	Ampicillin	Oxacillin <sup>b</sup>	Vancomycin	High-Level Gentamicin <sup>c</sup>	High-Level Streptomycin <sup>c</sup>	Erythromycin <sup>d</sup>	Clindamycin	Trimethoprim-Sulfamethoxazole	Rifampin <sup>e</sup>	Linezolid	Tetracycline	Nitrofurantoin <sup>f</sup>
<i>Enterococcus faecalis</i> (69)		96		97	n.d.	n.d.		76	96	n.d.	n.d.	97	97
<i>Enterococcus</i> spp. (1448)		91		99	n.d.	n.d.							92
<i>Staphylococcus aureus</i> (2208)			81	100			68	76	96	n.d.	n.d.	97	99
Coagulase-negative <i>Staphylococci</i> (259) <sup>g</sup>			45	100			41	61	68	99	100	87	99
<i>Streptococcus pyogenes</i> (n.a.) <sup>h</sup> (Group A <i>Streptococcus</i> )	100												
<i>Streptococcus agalactiae</i> (148) <sup>h</sup> (Group B <i>Streptococcus</i> )	100		100				70	79					

<sup>a</sup> Isolates tested and reported are from all sources (surveillance isolates excluded), Jan to Dec, 2010; data compiled according to the recommendations of the Clinical and Laboratory Standards Institute (CLSI) in their document M39-A3 (2009).  
<sup>b</sup> Oxacillin accurately predicts the activity of all semi-synthetic penicillins, including cloxacillin, beta-lactam/beta-lactamase inhibitor combinations, and cephalosporins for *Staphylococcus aureus* and Coagulase-negative *Staphylococci*.  
<sup>c</sup> Susceptibility to high level gentamicin or high level streptomycin indicates that these agents can be used in combination with a cell wall active agent (e.g. ampicillin or vancomycin) for synergy. Gentamicin and streptomycin should never be used alone as treatment for *Enterococcus* spp.  
<sup>d</sup> Erythromycin activity predicts the activity of azithromycin and clarithromycin for staphylococci and streptococci.  
<sup>e</sup> Rifampin should NOT be used alone as treatment for infection.  
<sup>f</sup> Nitrofurantoin is indicated for acute cystitis only.  
<sup>g</sup> Data for Coagulase-negative *Staphylococci* were obtained from isolates tested at the St. Boniface Hospital Microbiology Laboratory, Jan to Dec, 2010. Data for *Streptococcus agalactiae* were obtained from 148 vaginal/rectal isolates tested at the St. Boniface Hospital Microbiology Laboratory in 2003.  
<sup>h</sup> n.a. = not applicable – Susceptibility testing of *Streptococcus pyogenes* is not routinely performed as 100% are susceptible to penicillin. If treating infection in a penicillin allergic patient, contact the lab for testing of second line agents.  
 n.d. = no data

**Table 3. In vitro activity of selected anti-infective agents tested against *Streptococcus pneumoniae*<sup>a</sup>**

Infection Type (number tested)	Percent Susceptible						
	Penicillin (oral)	Penicillin (intravenous)	Ceftriaxone	Vancomycin	Levofloxacin	Clarithromycin	Clindamycin
<i>HSC and SBH Data<sup>b</sup></i>							
Meningitis (66)		77	95	100			73
Non-Meningitis infection (66)	77	94	97	100	98	62	86
<i>National Data<sup>b</sup></i>							
Meningitis (219)		84	98	100			79
Non-Meningitis infection (219)	84	97	99	100	99	77	94

<sup>a</sup> Isolates tested and reported are from all sources combined. National data were extracted from the 2010 CANWARD Study (Zhanel et al.). Health Sciences Centre (HSC) and St. Boniface Hospital (SBH) data were obtained by testing a random selection of *Streptococcus pneumoniae* isolates collected at HSC and SBH between January and December, 2010.  
<sup>b</sup> For *Streptococcus pneumoniae*, different susceptibility breakpoints for penicillin and ceftriaxone exist depending on whether meningitis or a non-meningitis infection is being treated (CLSI, M100-S19). For penicillin, when treating a non-meningitis infection different breakpoints exist for oral and intravenous dosing. For non-meningitis infections, susceptibility to intravenous penicillin predicts susceptibility to amoxicillin. Oral agents are not appropriate for the treatment of bacterial meningitis.

**Table 4. In vitro activity of selected anti-infective agents tested against Methicillin Susceptible and Methicillin Resistant *Staphylococcus aureus* isolates from the Health Sciences Centre, 2010<sup>a</sup>**

Organism (number tested)	Percent Susceptible							
	Oxacillin <sup>b</sup>	Vancomycin	Trimethoprim-Sulfamethoxazole	Erythromycin	Clindamycin	Tetracycline	Linezolid	
Methicillin Susceptible <i>Staphylococcus aureus</i> (1307)	100		97	76	80	97		
Methicillin Resistant <i>Staphylococcus aureus</i> (454)	0	100	93	22	69	93	100	

<sup>a</sup> Isolates tested and reported are from all sources (surveillance isolates excluded), Jan to Dec, 2010; data compiled according to the recommendations of the Clinical and Laboratory Standards Institute (CLSI) in their document M39-A3 (2009).  
<sup>b</sup> Oxacillin accurately predicts the activity of all semi-synthetic penicillins, including cloxacillin, beta-lactam/beta-lactamase inhibitor combinations, and cephalosporins for *Staphylococcus aureus*.

**Table 5. In vitro activity of selected anti-infective agents tested against anaerobic isolates collected at the Health Sciences Centre, Winnipeg<sup>a</sup>**

Organism	Percent Susceptible						
	Penicillin	Amoxicillin-Clavulanate	Piperacillin-Tazobactam	Cefixitin	Clindamycin	Imipenem	Metronidazole
<i>Bacteroides fragilis</i> group (48) (includes <i>Bacteroides fragilis</i> )		77	100	63	49	100	98

<sup>a</sup> Isolates tested and reported are all from wound specimens. Data were extracted from the ongoing CANAEROBES study (Zhanel et al., 2010).

**Table 6. In vitro activity of selected anti-fungal agents tested against *Candida* species collected from hospitals in Winnipeg<sup>a</sup>**

Organism (number tested)	Percent Susceptible				
	Fluconazole	Itraconazole	Voriconazole	Flucytosine	Caspofungin
<i>Candida albicans</i> (30)	100	100	100	97	100
<i>Candida glabrata</i> (30)	97	7	97	100	100

<sup>a</sup> Data obtained by testing a random sample of *C. albicans* and *C. glabrata* isolates from Health Sciences Centre and St. Boniface Hospital, collected between Jan 2008 and Dec 2009. Isolates tested and reported are from blood only.

**Table 7. Adult oral antimicrobial dosage guidelines<sup>a</sup>**

Antibiotic	Usual Dosages
<b>ANTIBACTERIAL AGENTS</b>	
<i>Penicillins</i>	
Amoxicillin	250 – 500 mg tid
Amoxicillin/Clavulanate	250 – 500 mg tid
Cloxacillin	250 – 500 mg qid
Penicillin V	300 mg qid
<i>Cephalosporins</i>	
Cephalexin	250 – 500 mg qid
<i>Macrolides</i>	
Azithromycin	250 – 500 mg daily
Clarithromycin	250 – 500 mg bid
Erythromycin	250 – 500 mg qid
<i>Fluoroquinolones</i>	
Ciprofloxacin	250 – 750 mg bid
Levofloxacin	500 – 750 mg daily
Moxifloxacin	400 mg daily
<i>Others</i>	
Clindamycin	300 – 450 mg tid
Co-trimoxazole	DS (double strength) bid
Doxycycline	100 mg bid
Nitrofurantoin	50 – 100 mg qid
Trimethoprim	100 mg bid
Metronidazole	500 mg tid
<b>ANTIFUNGAL AGENTS</b>	
Fluconazole	100 – 400 mg daily
Itraconazole	200 – 400 mg daily
Voriconazole	200 – 400 mg daily
<b>ANTIVIRAL AGENTS</b>	
Acyclovir	200 – 800 mg 5x/day
Valacyclovir	500 mg – 1 g tid