



## LAB CONNECTIONS

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### IN THIS ISSUE:

- Dr. Suzanne Dale, Clinical Microbiologist, presents the most recent antibiogram.
- In Quality Snapshot, read the first in a series of articles on the HRLMP's approach to quality management.

### WHAT'S NEW?

The American Board of Pathology has reviewed and approved the Quality Control Program of our Department of Pathology and Molecular Medicine, as it meets the requirements for their Maintenance of Certification program (MOC, Part IV).

[Acylcarnitine](#) (fractionation) and carnitine are now ordered as separate tests.

For information on the HRLMP, visit: <http://www.hrlmp.ca>

### Introducing the 2009 St. Joseph's Healthcare/Hamilton Health Sciences Combined Antibiogram

Thanks to the collaborative efforts of the Hamilton Regional Laboratory Medicine Program's Microbiology Department and the SJH and HHS Pharmacy Departments, the 2009 antibiogram is now available for distribution.

The antibiogram is a tool that is useful for clinicians when they are selecting appropriate initial *empiric* therapy for suspected infections.

The antibiogram is organized into tables that represent each major hospital site in Hamilton. Each table contains a listing of common Gram-positive and Gram-negative isolates and provides a percent **sensitive** statistic for appropriate antibiotics. Any areas that are "grayed out" represent drug/bug combinations that are not recommended.

For advice on using the antibiogram, please contact the Microbiologist or the Infectious Diseases Pharmacist on-call through paging. More information on the proper use of the antibiogram can be found on the HHS and SJH intranet.

### YOUR FEEDBACK IS VALUED!

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Your feedback, suggestions and new ideas are most welcome!

/cont'd

# Combined Antibiogram

## CUMULATIVE DATA FOR 2009

Before using this antibiogram you should know:

- 1) The antibiogram is used to direct initial empiric therapy only. Antibiotics need to be reassessed based on bacterial susceptibility testing and patient clinical status.
- 2) Data presented in the antibiogram should be considered in combination with an individual patient's risk factors for resistant organisms, clinical syndrome and hospital epidemiology.
- 3) The antibiogram provides the percentage of isolates which are susceptible to an antibiotic. For life-threatening infections (bacteremia) it is reasonable to choose an antibiotic with the greatest likelihood of coverage.
- 4) The antibiogram is updated regularly. Ensure that you are using the most current version.  
This can be found on the HHS Intranet under "Physician Orientation: Need to Know"
- 5) Susceptibilities presented for **fewer than 30 isolates** are not statistically valid and may not be reliable for guiding empiric treatment decisions.
- 6) A shaded box indicates that the particular antibiotic/microorganism combinations are not recommended.  
Please contact a Microbiologist if you have questions or require additional information about this antibiogram.

## Antibiogram for 2009 – St. Joseph's Healthcare Hamilton

All Specimens excluding Surveillance: % Susceptible, (xxx) = no. of isolates tested

Organisms	No. of Isolates	Ampicillin	Cloxacillin	Cefazolin	Clindamycin	Erythromycin	Rifampin	Vancomycin	Ceftriaxone	Ceftazidime	Piperacillin Tazobactam	Meropenem	Gentamicin	Tobramycin	Amikacin	TMP/SMX	Ciprofloxacin	Tetracycline	Nitrofurantoin (for urine only)
<b>GRAM NEGATIVES:</b>																			
<i>E. coli</i>	1438	58		91					95 (1150)	96	97	100 (264)	91	92	100 (1164)	79	80		95
<i>Klebsiella pneumoniae</i>	259	0		95					98 (209)	97	96	100 (52)	99	98	99 (207)	90	94		25
## <i>Enterobacter spp</i>	94	2		2								100 (15)	94	95	98 (81)	84	94		
<i>Proteus mirabilis</i>	131	89		95					97 (115)	98	100	100 (17)	95	99	100 (115)	85	90		
<i>Pseudomonas aeruginosa</i>	231									89	93	93	88	94	99 (202)		75		
<b>GRAM POSITIVES:</b>																			
<i>Staphylococcus aureus</i> (includes MSSA and MRSA)	639		79	79	See MRSA and MSSA												See MRSA and MSSA		
Methicillin sensitive <i>S. aureus</i> (MSSA)	502		100	62	76	100	100									97	85	98	
*Methicillin resistant <i>S. aureus</i> (MRSA)	137		0*	40	11	100	100									99	5	100	
<i>Enterococcus spp.</i>	461	87						97									59&	22&	88&

## For *Enterobacter* and other SPICE organisms (*Serratia*, *Providencia*, *Morganella*, *P. vulgaris*, *Citrobacter freundii*), treatment with penicillins, cephalosporins, and  $\beta$ -lactam/ $\beta$ -lactamase inhibitor combinations (eg. piperacillin-tazobactam) is not recommended.

\* Methicillin resistant *S. aureus* (MRSA) are resistant to all  $\beta$ -lactams (penicillins, cephalosporins,  $\beta$ -lactam/  $\beta$ -lactamase inhibitor combinations and carbapenems).

& For *Enterococcus spp.* ciprofloxacin, tetracycline and nitrofurantoin can only be used in UTI.

### Streptococcus pneumoniae: % Susceptible

Organisms	Number	Penicillin (Oral)	Penicillin (Parenteral)	Penicillin (Parenteral, non-meningeal)	Penicillin (Parenteral, meningeal)	Cefotaxime (non-meningeal)	Cefotaxime (meningeal)	Moxifloxacin	Meropenem	Vancomycin	TMP/SMX	Erythromycin
Blood and CSF Specimens: <i>Streptococcus pneumoniae</i> (# tested)	17			100	88	100	100	100	100 (16)	100		
All specimens except blood and CSF: <i>Streptococcus pneumoniae</i> (# tested)	52	87	94			100 (12)		98 (51)			87	77

### Antimicrobial Cost Considerations

IV DRUG	APPROX. COST/day	ORAL DRUG	APPROX. COST/day	APPROX. SAVINGS/Day
Azithromycin 500mg DAILY	\$24.00	Azithromycin 250mg DAILY	\$2.00	\$22.00
Cefazolin 1g Q8H	\$40.00	Cephalexin 500mg QID	\$2.00	\$38.00
Cefuroxime 750mg Q8H	\$15.00	Cefuroxime Axetil 500mg BID	\$2.50	\$12.50
Ciprofloxacin 400mg Q 12H	\$12.00	Ciprofloxacin 500mg Q12H	\$0.25	\$11.75
Clindamycin 600mg Q8H	\$24.00	Clindamycin 300mg QID	\$1.50	\$22.50
Co-trimoxazole 160/800mg Q12H	\$30.00	Co-trimoxazole 1 DS BID	\$0.25	\$29.75
Fluconazole 400mg DAILY	\$16.00	Fluconazole 400mg DAILY	\$4.25	\$11.75
Levofloxacin 500mg DAILY	\$29.00	Levofloxacin 500mg DAILY	\$0.75	\$28.25
Metronidazole 500mg Q12H	\$5.00	Metronidazole 500mg Q 12H	\$0.25	\$4.75
Moxifloxacin 400mg DAILY	\$25.00	Moxifloxacin 400mg DAILY	\$7.00	\$18.00

### Reserved Antimicrobials at HHS only

(Please see <http://corpweb/body.cfm?id=2381> for the complete policy)

Group A (Reserved by Indication and Requires Endorsement by Infectious Diseases Within 24 Hours)	Group B (Reserved by Indication Only)
Amikacin	Piperacillin/Tazobactam
Colistin	Ceftazidime
Linezolid	Vancomycin
Meropenem	Acyclovir
Lipid formulation amphotericin	Ganciclovir / Valganciclovir
Caspofungin	Ciprofloxacin
Voriconazole	Levofloxacin

### Reserved Antimicrobials at SJHH only

Requiring Approval of Infectious Diseases Within 24 Hours	Reserved by Indication
Amikacin	Ceftazidime
Colistin	Piperacillin/Tazobactam
Linezolid	Ciprofloxacin (IV)
Meropenem	Moxifloxacin
Caspofungin	
Lipid Formulation Amphotericin B	
Voriconazole	

**Sequential Antimicrobial Therapy** The following antimicrobials are eligible for conversion of route of administration from IV to oral. **Criteria for change:**

- Able to tolerate oral food or medications
- Afebrile
- Clinically stable
- WBC normal or trending to normal

Azithromycin	Clindamycin	Metronidazole
Ciprofloxacin	Fluconazole	Levofloxacin (HHS only)
moxifloxacin (SJHH only)		

### Helpful Websites

Centers for Disease Control and Prevention | [www.cdc.gov](http://www.cdc.gov)

Johns Hopkins Infectious Diseases | [www.hopkins-abxguide.org](http://www.hopkins-abxguide.org)

Do Bugs Need Drugs (Capitol Health Region) | [www.dobugsneeddrugs.org/healthcare/index.html](http://www.dobugsneeddrugs.org/healthcare/index.html)

AidsInfo (US Dept of Health and Human Services) | [www.aidsinfo.nih.gov/](http://www.aidsinfo.nih.gov/)

HHS Pharmacy Intranet site | <http://corpweb/body.cfm?id=106>

## Antibiogram for 2009 – McMaster University Medical Centre

All Specimens excluding Surveillance: % Susceptible, (xxx) = no. of isolates tested

Organisms	No. of Isolates	Ampicillin	Cloxacillin	Cefazolin	Clindamycin	Erythromycin	Rifampin	Vancomycin	Cefotaxime	Ceftazidime	Piperacillin Tazobactam	Meropenem	Gentamicin	Tobramycin	Amikacin	TMP/SMX	Ciprofloxacin	Nitrofurantoin (for urine only)	
<b>GRAM NEGATIVES:</b>																			
<i>E. coli</i>	888	58		87					96 (737)	96	96	100 (150)	94	94	100 (741)	77	80	97	
<i>Klebsiella pneumoniae</i>	185	0		95					98 (153)	97	98	100 (32)	96	98	100 (153)	90	96	30	
## <i>Enterobacter spp</i>	98	1		2								100 (13)	100	100	100 (84)	95	98		
<i>Proteus mirabilis</i>	93	77		95					88 (84)	95	100	100 (20)	100	100	100 (73)	72	70		
<i>Pseudomonas aeruginosa</i>	202									93	96	91 (198)	79	84	81 (187)		76		
<b>GRAM POSITIVES:</b>																			
<i>Staphylococcus aureus</i> (includes MSSA and MRSA)	535		87	87	See MRSA and MSSA												See MRSA and MSSA		
Methicillin sensitive <i>S. aureus</i> (MSSA)	460		100		73	71	100	100									99	86	
*Methicillin resistant <i>S. aureus</i> (MRSA)	75		0*		48	15	99	100									100	19	
<i>Enterococcus spp.</i>	324	90						98										58&	98&

## For *Enterobacter* and other SPICE organisms (*Serratia*, *Providencia*, *Morganella*, *P. vulgaris*, *Citrobacter freundii*), treatment with penicillins, cephalosporins, and  $\beta$ -lactam/ $\beta$ -lactamase inhibitor combinations (eg. piperacillin-tazobactam) is not recommended.

\* Methicillin resistant *S. aureus* (MRSA) are resistant to all  $\beta$ -lactams (penicillins, cephalosporins,  $\beta$ -lactam/  $\beta$ -lactamase inhibitor combinations and carbapenems).

& For *Enterococcus spp.* ciprofloxacin and nitrofurantoin can only be used in UTI.

### Streptococcus pneumoniae: % Susceptible

Organisms	Number	Penicillin (Oral)	Penicillin (Parenteral)	Penicillin (Parenteral, non-meningeal)	Penicillin (Parenteral, meningeal)	Cefotaxime (non-meningeal)	Cefotaxime (meningeal)	Levofloxacin	Meropenem	Vancomycin	TMP/SMX	Erythromycin
Blood and CSF Specimens: <i>Streptococcus pneumoniae</i> (# tested)	15			87	60	87	80	100	79	100		
All specimens except blood and CSF: <i>Streptococcus pneumoniae</i> (# tested)	26	88	100			100 (11)		96			76	72

## Antibiogram for 2009 – Hamilton General Hospital

All Specimens excluding Surveillance: % Susceptible, (xxx) = no. of isolates tested

Organisms	No. of Isolates	Ampicillin	Cloxacillin	Cefazolin	Clindamycin	Erythromycin	Rifampin	Vancomycin	Cefotaxime	Ceftazidime	Piperacillin Tazobactam	Meropenem	Gentamicin	Tobramycin	Amikacin	TMP/SMX	Ciprofloxacin	Nitrofurantoin (for urine only)
<b>GRAM NEGATIVES:</b>																		
<i>E. coli</i>	732	56		89					96 (594)	96	96	100 (138)	92	93	100 (601)	78	77	96
<i>Klebsiella pneumoniae</i>	180	0		93					97 (161)	97	94	100 (19)	98	99	100 (161)	96	94	22
## <i>Enterobacter spp</i>	102	1		1								100 (15)	94	96	100 (86)	86	73	
<i>Proteus mirabilis</i>	83	90		98					100 (73)	100	100	100 (10)	96	98	100 (73)	86	87	
<i>Pseudomonas aeruginosa</i>	203									87	87	84	88	90	90 (180)		73	
<b>GRAM POSITIVES:</b>																		
<i>Staphylococcus aureus</i> (includes MSSA and MRSA)	545		72	72														See MRSA and MSSA
Methicillin sensitive <i>S. aureus</i> (MSSA)	397		99		77	74	100	100									97	85
*Methicillin resistant <i>S. aureus</i> (MRSA)	75		0*		47	9	98	100									99	14
<i>Enterococcus spp.</i>	324	90						97										55& 90&

## For *Enterobacter* and other SPICE organisms (*Serratia*, *Providencia*, *Morganella*, *P. vulgaris*, *Citrobacter freundii*), treatment with penicillins, cephalosporins, and  $\beta$ -lactam/ $\beta$ -lactamase inhibitor combinations (eg. piperacillin-tazobactam) is not recommended.

\* Methicillin resistant *S. aureus* (MRSA) are resistant to all  $\beta$ -lactams (penicillins, cephalosporins,  $\beta$ -lactam/  $\beta$ -lactamase inhibitor combinations and carbapenems).

& For *Enterococcus spp.* ciprofloxacin and nitrofurantoin can only be used in UTI.

### *Streptococcus pneumoniae*: % Susceptible

Organisms	Number	Penicillin (Oral)	Penicillin (Parenteral)	Penicillin (Parenteral, non-meningeal)	Penicillin (Parenteral, meningeal)	Cefotaxime (non-meningeal)	Cefotaxime (meningeal)	Levofloxacin	Meropenem	Vancomycin	TMP/SMX	Erythromycin
<b>Blood and CSF Specimens:</b> <i>Streptococcus pneumoniae</i> (# tested)	14			93	79	100	86	100	86	100		
<b>All specimens except blood and CSF:</b> <i>Streptococcus pneumoniae</i> (# tested)	27	89	100			100 (4)		93			93	85

## Antibiogram for 2009 – Henderson Hospital

All Specimens excluding Surveillance: % Susceptible, (xxx) = no. of isolates tested

Organisms	No. of Isolates	Ampicillin	Cloxacillin	Cefazolin	Clindamycin	Erythromycin	Rifampin	Vancomycin	Cefotaxime	Ceftazidime	Piperacillin Tazobactam	Meropenem	Gentamicin	Tobramycin	Amikacin	TMP/SMX	Ciprofloxacin	Nitrofurantoin (for urine only)
<b>GRAM NEGATIVES:</b>																		
<i>E. coli</i>	780	56		90					97 (646)	96	97	100 (135)	92	94	100 (653)	80	78	95
<i>Klebsiella pneumoniae</i>	178	0		95					99 (142)	99	96	100 (36)	99	99	100 (142)	95	96	31
## <i>Enterobacter spp</i>	57	1		0								100 (6)	98	98	100 (51)	96	98	
<i>Proteus mirabilis</i>	83	90		98					100 (71)	99	100	100 (12)	96	98	100 (71)	88	93	
<i>Pseudomonas aeruginosa</i>	118									93	94	94 (114)	94	97	100 (100)		77	
<b>GRAM POSITIVES:</b>																		
<i>Staphylococcus aureus</i> (includes MSSA and MRSA)	379		74	74	See MRSA and MSSA										See MRSA and MSSA			
Methicillin sensitive <i>S. aureus</i> (MSSA)	279		100		78	77	100	100								98	84	
*Methicillin resistant <i>S. aureus</i> (MRSA)	100		0*		38	20	100	100								99	10	
<i>Enterococcus spp.</i>	322	88						99									50&	90&

## For *Enterobacter* and other SPICE organisms (*Serratia*, *Providencia*, *Morganella*, *P. vulgaris*, *Citrobacter freundii*), treatment with penicillins, cephalosporins, and  $\beta$ -lactam/ $\beta$ -lactamase inhibitor combinations (eg. piperacillin-tazobactam) is not recommended.

\* Methicillin resistant *S. aureus* (MRSA) are resistant to all  $\beta$ -lactams (penicillins, cephalosporins,  $\beta$ -lactam/  $\beta$ -lactamase inhibitor combinations and carbapenems).

& For *Enterococcus spp.* ciprofloxacin and nitrofurantoin can only be used in UTI.

### Streptococcus pneumoniae: % Susceptible

Organisms	Number	Penicillin (Oral)	Penicillin (Parenteral)	Penicillin (Parenteral, non-meningeal)	Penicillin (Parenteral, meningeal)	Cefotaxime (non-meningeal)	Cefotaxime (meningeal)	Levofloxacin	Meropenem	Vancomycin	TMP/SMX	Erythromycin
<b>Blood and CSF Specimens:</b> <i>Streptococcus pneumoniae</i> (# tested)	10			100	80	100	100	100	100	100		
<b>All specimens except blood and CSF:</b> <i>Streptococcus pneumoniae</i> (# tested)	7	71	86			100 (2)		100			71	71

Suzanne Dale is a Clinical Microbiologist with the HRLMP and Assistant Professor in the Department of Pathology and Molecular Medicine. Linda Tweedle provided LIS support for creating the Biogram. We thank Norma Stewart for assistance with the newsletter layout.

## QUALITY SNAPSHOT:

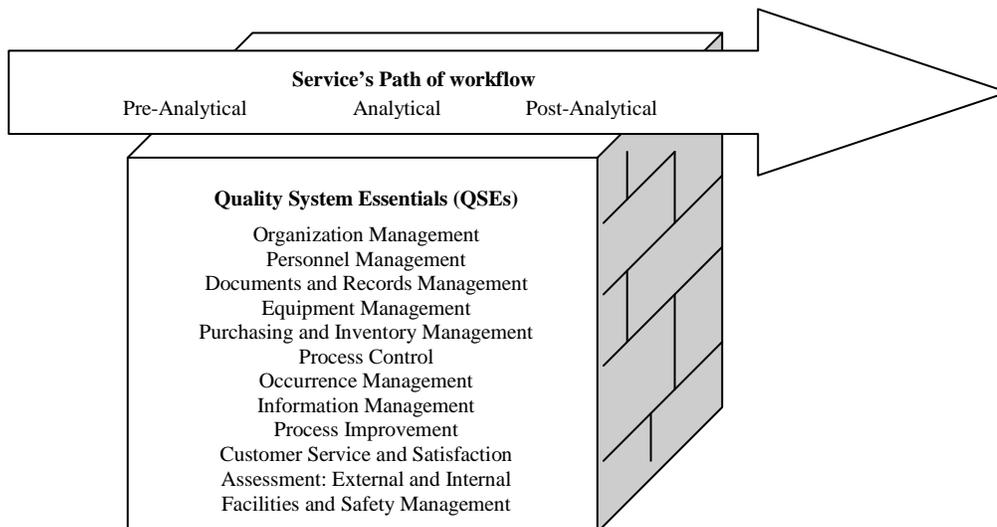
As described in the last issue of Lab Connections, the HRLMP's quality goal is to provide accurate, reproducible and clinically relevant test results. The Total Test Process was presented with examples of how our Quality Management System functions to prevent errors before they can do harm.

### Is that all there is to the laboratory Quality Management System?

*"If any journey begins with a single step, then the journey toward total quality management must begin with an understanding of the relationship between medical laboratory quality activities and the technical activities that produce laboratory results for patient care." (1)*

Any healthcare quality management system requires a set of key quality elements to be in place for the organization's work operations to function in a manner that meets the stated quality objectives. This emphasizes the need for a systematic approach that both promotes and provides for the highest level of service quality and patient safety. (2)

The foundational building blocks of the laboratory quality systematic approach are comprised of 12 Quality System Essentials, (QSE's) (Fig. 1) that apply to each stage of the Total Test Process. These QSE's depict the necessary infrastructure in any organization, including healthcare organizations that provide care, treatment and services to patients. (2)



**Figure 1. The Quality Management System Model.**

*Adapted from HS1-A2 A Quality Management System Model for Health Care*

Our journey into the Quality System Essentials will continue in future editions of Lab Connections as we explore the 12 QSEs and give examples of why they are important and how they are implemented across the HRLMP.

### References:

1. Berte, LM. Laboratory Quality Management: A Roadmap. Clin Lab Med 2007;27: 771-790
2. CLSI [Formerly NCCLS]. CLSI document HS1-A2 - A Quality Management System Model for Health Care; Approved Guideline – Second Edition. Wayne (PA): Clinical and Laboratory Standards Institute; 2004.

**Cathie McCallum, Quality Manager, HRLMP, and  
Tom Dorland, Quality Specialist, HRLMP**

## TRAINING PROGRAMS:

Congratulations to the 2010 graduates who successfully completed the Residency Training Program! For information and the latest news on our residency training programs please follow the link:

<http://www.fhs.mcmaster.ca/pathres/news/index.html>.

Information on the postdoctoral fellowship training program can be obtained by following the link:

<http://fhs.mcmaster.ca/pathology/education/postdoctoralfellowshiptraining.htm/>