

CONTAGIOUS COMMENTS

Department of Epidemiology

Bugs and Drugs 2009

Elaine B. Dowell SM, MLS(ASCP); Marti Roe SM, MLS(ASCP); Ann-Christine Nyquist MD, MSPH

The Microbiology Laboratory is pleased to present the annual antibiogram for 2009. This compilation of annual "Bugs and Drugs" statistics allows us to track and trend antimicrobial susceptibility changes that occur in isolates from TCH patients. The data presented is accumulated throughout the year and an analysis is shared with the organization to allow for informed empiric antimicrobial choices and allow for effective antimicrobial utilization. Obtaining a specimen prior to the initiation of antimicrobial therapy optimizes the likelihood that culture results can target treatment options. This data analysis is also used by the Microbiology Laboratory to update our antimicrobial panels at least annually to better serve our patients. Below is a summary of comparative trends that we have noted during our analysis.

Gram Positives

S. pneumoniae

There were few CSF isolates (5) but they showed a lower susceptibility to penicillin (20%) as compared to 60% susceptible in 2008. Cefotaxime also showed decreased susceptibility with 60% in 2009 and 80% in 2008. Nonvaccine invasive *S. pneumoniae* serotypes are being isolated and preliminary 2010 data shows that 75% of our isolates have been either 19A or 7F. The new Prevnar 13 includes these serotypes.

MRSA

Figure 1 shows MRSA inpatient rates decreasing slightly from 27% in 2008 to 24% in 2009 with stabilization in the outpatient rates (ED and Network of Care) at 52% for both years. This welcome trend has also been observed nationally.

S. anginosus

An emerging pathogen frequently associated with abscess formation, remains consistently susceptible to penicillin and cefotaxime, but has shown decreased susceptibility to erythromycin and clindamycin in 2009.

VRE

Two new TCH patients were identified with vancomycin resistant *Enterococcus faecium*. Ongoing increases in broad spectrum antibiotic (i.e. third generation cephalosporin and carbapenem) and vancomycin usage at TCH may be a factor in patient acquisition of this organism.

Gram Negatives

Haemophilus influenzae is showing a trend of decreasing susceptibility to trimethoprim/sulfamethoxazole. Use of this drug has increased in popularity recently for the treatment of MRSA infections. This increased usage may have had an effect on populations of *Haemophilus spp.* seen in our patients.

Non-fermenting Gram Negative Rods (Pseudomonas spp. and friends)

Panels for gram negative, non-fermenting rods have been updated to comply with Clinical Laboratory Sciences Institute (CLSI) recommendations that separated *S. maltophilia*, *Acinetobacter spp.* and *B. cepacia* from *P. aeruginosa* to allow for reporting of more appropriate antimicrobials for each organism.

Enterobacteriaceae

ESBL isolates have increased to 14 in 2009 compared to 11 in 2008. At TCH in 2009, we isolated ESBL producing *E. coli* in 11 urines and 1 CSF. *K. pneumoniae* positive ESBL was isolated from 1 blood culture and 1 respiratory culture. ESBL producing organisms isolated from an uncomplicated UTI can usually be effectively treated with beta-lactams due to the urine antimicrobial concentrations well above the organism's MIC, and up to >30 fold increase over levels obtained in the blood.

In 2010, the Microbiology Laboratory has begun to report ESBL production in organisms other than *E. coli* and *Klebsiella spp.* This diversion from the usual CLSI recommendation of limited reporting of ESBLs is supported by some experts in the field as a precaution to prevent treatment failure that may occur when cephalosporins are used to treat invasive infections caused by ESBL producing *Enterobacter spp.*, *Serratia spp.* and other Enterobacteriaceae.

Anaerobes

Table 3 is a cumulative susceptibility report for *Bacteroides fragilis* group organisms that was compiled from isolates obtained at three referral hospitals in the U.S. in 2006 – 2008 and is included for informational purposes when treating *B. fragilis* at TCH.

Please be on the lookout for our updated Bugs and Drugs Handbook later this summer/early fall. It will include data from this edition of Contagious Comments and more information in a handy pocket-sized format.

TABLE 1. Antimicrobial Susceptibilities at The Children's Hospital – 2009

Staphylococcus (% susceptible)								
ORGANISMS	NUMBER OF ISOLATES TESTED	ANTIMICROBIALS						
		Penicillin (IV / PO)	Oxa-/ Naf-/ Dicloxacillin (IV / PO)	Cefazolin Cephalixin (IV / PO)	Trimethoprim / Sulfa (IV / PO)	Erythromycin (IV / PO)	Clindamycin (IV / PO)	Vancomycin (IV)
• <i>Staph aureus</i> (MSSA)	553	0	100	100	99	76	86	100
• <i>Staph aureus</i> (MRSA)	448	0	0	0	99	12	76	100
Staph coagulase negative	203		36	36	66	28		100

Testing by Microscan panels – Confirmation of MRSA by PBP2⁺ testing or ChromAgar.

TABLE 2. Antimicrobial Susceptibilities at The Children's Hospital – 2009

Non-Enterobacteriaceae (% susceptible)												
ORGANISMS	NUMBER OF ISOLATES	ANTIMICROBIALS										
		Ticarcillin/clav Timentin (IV)	Ceftazidime (IV)	Aztreonam (IV)	Imipenem / Cilastatin (IV)	Levofloxacin	Gentamicin IV	Tobramycin (IV)	Meropenem	Piperacillin / Taz	Minocycline	Trimeth / Sulfa
Acinetobacter species ¹	(13)		62			88		77	92	77		85
<i>Pseudomonas aeruginosa</i>												
• Non CF ²	114		98	83		90		96		100		
• CF-mucoid ¹	(23)		78	74				91	83			
• CF-nonmucoid ¹	44		77	72				77	77			
<i>S. maltophilia</i> ¹	39	5	13			41			R		90	87

¹Cystic fibrosis isolates by E-test.
² Testing by Microscan panels.

() Small number of isolates

TABLE 3. Cumulative Antimicrobial Susceptibility Report for Bacteroides fragilis Group Organisms

Data: Isolates collected from three referral US hospitals January 1, 2006 – December 31, 2008
 Published from CSLI 2010

ANAEROBIC ORGANISMS	NUMBER OF ISOLATES	ANTIMICROBIALS														
		Ampicillin-subactam		Piperacillin-tazobactam		Cefoxitin		Erapenem		Meropenem		Clindamycin		Metronidazole		
Percent Susceptible (%S) and Percent Resistant (%R)		%S	%R	%S	%R	%S	%R	%S	%R	%S	%R	%S	%R	%S	%R	
<i>B. fragilis</i> group (all 7 species listed)		1083	86	4	95	2	64	10	96	2	97	2	56	37	100	0

TABLE 4. Antimicrobial Susceptibilities at The Children's Hospital – 2009

Streptococcus (% susceptible)													
ORGANISMS	NUMBER OF ISOLATES	ANTIMICROBIALS											
		Penicillin			Cefotaxime			Erythromycin	Clindamycin	Trimethoprim/Sulfa	Cefotaxime	Ampicillin/ Amoxicillin (IV / PO)	Vancomycin (IV)
		S ≤ 0.06	I = 4	R ≥ 0.12	S ≤ 0.5	I = 1	R ≥ 2						
<i>S. pneumoniae</i> ¹ Meningeal	(5) 2009	20		80	60	20	20						100
	(5) 2008	60		40	80		20						100
		S ≤ 2	I = 4	R ≥ 8	S ≤ 1	I = 2	R > 4						
<i>S. pneumoniae</i> ¹ Non-meningeal	96	82	14	4	77	21	2	65	79	61			100
		S ≤ 0.12	I 0.25 - 2	R ≥ 4									
Viridans Strep ¹ Invasive	40	48	42	10				40	85		87		100
<i>Strep. anginosus</i> ¹ Group Invasive	(24)	79	21	0				58	79		100		100
Beta Strep Group A ¹	(24)	S*						100	100			S	
Beta Strep Group B ¹	54*	S						65	53			S	
<i>Enterococcus</i> ² <i>faecalis</i>	74											100	100
<i>Enterococcus</i> ² <i>faecium</i>	46											46	95
¹ Testing by E-test. ² Testing by Microscan panel. S = Always susceptible to penicillin, Ampicillin and Cephalexin. Consider *clindamycin for invasive disease.		Gentamicin Synergy Screen – <i>E. faecalis</i> = 84% Susceptible Gentamicin Synergy Screen – <i>E. faecium</i> = 100% Susceptible * Includes TCH's patients and referred pregnant patients Three VRE patients (Two patients identified in 2009)											

TABLE 5. Antimicrobial Susceptibilities at The Children's Hospital – 2009

<i>Candida albicans</i> (# of isolates susceptible)				
ORGANISMS	NUMBER OF ISOLATES	ANTIMICROBIALS		
		Fluconazole	Flucytosine	
			Number of Isolates	
<i>Candida albicans</i>	(24)	100	(8)	100
*Testing by UTHSC at San Antonio 2007 - 2009 combined				



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Department of Epidemiology

EDITOR:

Kelly DeStefano, Staff Assistant III
The Children's Hospital, Dept. of Epidemiology, B-276
13123 E. 16th Avenue, Aurora, CO 80045
Phone: 720-777-6072; FAX: 720-777-7293

Destefano.kelly@tchden.org
<http://www.thechildrenshospital.org>

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