

CONTAGIOUS COMMENTS

Department of Epidemiology

Bugs and Drugs 2006

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The Children's Hospital Microbiology Laboratory presents the Antimicrobial Susceptibility Data for 2006. To comply with new recommendations from the Clinical Laboratory Standard Institute (CLSI) this year we have not included susceptibility data for isolates when less than 30 were tested. Some organisms have been deleted and a notation is added when we report fewer than 30 isolates. This new reporting recommendation is intended to limit data that might be misleading due to a small data set.

Table 1

We are reporting fewer gram negatives this year. Urine and non-urine isolates for *E. coli* do not show any significant difference in susceptibility rates. Other gram-negative organisms reported include both urine and non-urine isolates with the exception of *Proteus mirabilis*, which includes only urine isolates. Thirty five isolates of *Shigella spp.* were tested due to an outbreak last summer. The *Shigella spp.* have been combined because the speciation is not usually known when antimicrobials are selected. *Salmonella spp.* isolates are included because of clinical significance despite the low number of isolates.

Only two isolates were confirmed as Extended Spectrum Beta-Lactamase (ESBL) producers, however, it is important to keep in mind that the following organisms may produce inducible beta-lactamases: *Serratia spp.*, *Pseudomonas spp.*, *Proteus spp.*, *Citrobacter spp.*, *Enterobacter spp.* and *Acinetobacter spp.*

ORGANISMS	NUMBER OF ISOLATES	ANTIMICROBIALS							
		Ampicillin/Amoxicillin (IV / PO)	Cefazolin/cephalexin (IV / PO)	Cefuroxime/ceftriaxone (IV / PO)	Cefotaxime/ceftriaxone (IV)	Gentamicin (IV)	Tobramycin (IV)	Trimethoprim/sulfa (IV / PO)	Ciprofloxacin ¹ (IV / PO)
<i>Haemophilus species</i>	42	31			100			79	
<i>E. coli</i> (urine)	694	47	97	99	99	97	98	69	97
<i>E. coli</i> (non-urine)	42	69	100	100	100	100	100	86	98
<i>Enterobacter cloacae</i>	47	10	10	45	77	100	100	88	100
<i>Klebsiella pneumoniae</i>	56	R	91	96	100	94	94	91	100
<i>Klebsiella oxytoca</i>	26	R	69	94	100	100	100	94	100
<i>Proteus mirabilis</i>	33	76	85	100	100	100	97	82	91
<i>Salmonella spp.</i>	(21)	90			100				95
<i>Serratia marcescens</i>	(20)	0	0	0	85	95	85	95	100
<i>Shigella spp.</i>	35	46			100				41

Testing by Microscan panels (except *Haemophilus* by E-test)
¹Fluoroquinolone drugs are generally not FDA approved for use in children < 18 yrs except for complicated UTIs and pyelonephritis.

Two Isolates identified as ESBL.

R = Resistant (Intrinsic) () Small number of isolates

Table 2

In Table 2, *Acinetobacter spp.* and *A. xylosoxidans* isolates for 2006 have been combined with 2005 data to meet criteria for reporting the antibiogram. *Pseudomonas spp.* in patients with cystic fibrosis appear to be more resistant as compared to 2005, but a new 2006 policy tests only inpatient specimens.

ORGANISMS	NUMBER OF ISOLATES	ANTIMICROBIALS										
		Ticarcillin/clav Timentin (IV)	Piperacillin (IV)	Ceftazidime (IV)	Aztreonam (IV)	Imipenem / Cilastatin (IV)	Ciprofloxacin ³ (IV)	Gentamicin (IV)	Tobramycin (IV)	Meropenem	Piperacillin / Taz	Minocycline
* <i>Acinetobacter spp.</i> ¹	(19)			74			84		79	89		
<i>Pseudomonas aeruginosa</i>												
-Non CF ²	81	99	100	99	95	94	88	90	98	99	100	
-CF-mucoid ¹	72	50		55	67	46	43		55	65		
-CF-nonmucoid ¹	57	31		51	58	42	47		49	61		
* <i>A. xylosoxidans</i> ¹	(21)	71				71	23			66		
<i>S. maltophilia</i> ¹	(22)	35		23							95	59

¹ Cystic fibrosis isolates by E-test. May include >1 isolate/patient.
² Testing by Microscan
³ Not FDA approved for use in children < 18 yrs except for complicated UTI/pyelonephritis

* 2005 and 2006 data combined
 () Small number of isolates

Table 3 (see next page)

For the coagulase-negative staphylococci, *Staphylococcus epidermidis* rates are reported separately because of its predominance. Other species include *S. hominis* (19), *S. capitis* (5), and *S. lugdunensis* (4). Clindamycin is not reported for the coagulas-negative Staphylococci because the "D-test" must be performed to detect the *erm* gene that codes for inducible resistance to clindamycin that may be present in many staphylococci. Call the microbiology laboratory if you need clindamycin susceptibility testing on one of these isolates.

TABLE 3. Antimicrobial Susceptibilities at The Children's Hospital – 2006 Staphylococcus (% susceptible)

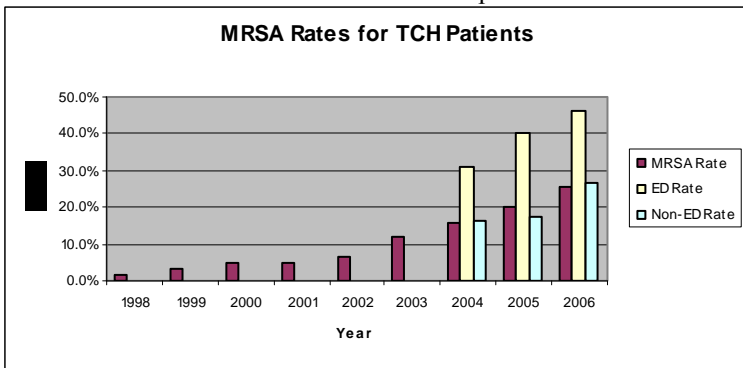
ORGANISMS	NUMBER OF ISOLATES TESTED	ANTIMICROBIALS						
		Penicillin (IV / PO)	Oxa-/ Nat-/ Diclloxacin (IV / PO)	Cefazolin Cephalixin (IV / PO)	Trimethoprim / Sulfa (IV / PO)	Erythromycin (IV / PO)	Clindamycin (IV / PO)	Vancomycin (IV)
Staph aureus								
-Staph aureus (MSSA)	269	16	100	100	99	74	80	100
-Staph aureus (MRSA)	221	0	0	0	98	11	68	100
Staph epidermidis	147	9	27	27	75	30		100

Testing by Microscan panels – Confirmation of MRSA by PBP2' testing.

Community-Acquired MRSA (CA-MRSA) is on the rise

In the 1990's the University of Chicago Children's Hospital reported the first community-acquired MRSA without the classic risk factors. Subsequent study revealed a unique mobile staphylococcal chromosomal cassette (SCC) carrying the *mecA* gene termed SCC_{mec}. The *mecA* gene encodes an extra penicillin-binding protein (PBP) 2a that has decreased affinity for β-lactam antibiotics, allowing cell wall synthesis to continue despite inactivation of native PBPs. Unlike healthcare-associated strains, CA-MRSA strains retain susceptibility to many non-β-lactam antimicrobial drugs such as trimethoprim-sulfamethoxazole and clindamycin

CA-MRSA may be highly invasive due to the presence of a gene-encoded cytotoxin, Panton-Valentine leukocidin (PVL). PVL causes tissue necrosis and leukocyte destruction and may play a role in the severity of skin- and soft-tissue infections. TCH's Microbiology Laboratory has isolated MRSA from many patients with cellulitis and "spider bite" diagnoses in the outpatient setting. Beginning in 2003, ED MRSA rates (ED, Urgent Care, Parker ED and CHC) are reported separately from all other patients (includes inpatients and regular clinic patients). The chart below shows the increasing MRSA rate in all TCH patients from 1998 through 2006. The ED MRSA rate is almost twice the MRSA rate seen in other TCH patients.



The increasing rate of MRSA infections makes it imperative to get appropriate cultures (aspirates are much preferred instead of swabs) before empiric treatment. Patients admitted to the hospital who are critically ill require initial treatment with vancomycin if MRSA is suspected.

Table 4

Invasive *Streptococcus pneumoniae* isolates were more resistant in 2006 but number of isolates continues to decrease. Respiratory *S. pneumoniae* isolates show no variation. Only one patient with known colonization, transferred to TCH from an outside hospital, had a VRE confirmed in our laboratory.

TABLE 4. Antimicrobial Susceptibilities at The Children's Hospital – 2006 Streptococcus (% susceptible)

ORGANISMS	NUMBER OF ISOLATES	ANTIMICROBIALS															
		Penicillin		Cefotaxime		Erythromycin		Clindamycin		Trimethoprim/ Sulfa		Cefotaxime		Ampicillin/ Amoxicillin (IV / PO)		Vancomycin (IV)	
<i>S. pneumoniae</i> ¹ Invasive	23	43	43	14	87	13	57	78	70								100
		$S \leq 0.06$	$I = 0.12-1$	$R \geq 2$	$S \leq 0.5$	$I = 1$	$R \geq 2$										
<i>S. pneumoniae</i> ¹ Localized (resp.)	65	37	46	17	88	4	8	69	83	57							100
		$S \leq 0.05-0.12$	$I = 0.12-1$	$R \geq 4$	$S \leq 1.0$	$I = 2$	$R \geq 4$										
Viridan Strep ¹ Invasive	22	40	50	10			59	86			91						100
Strep. anginosus ¹ Group Invasive	23	97	3								100						100
Enterococcus ² faecalis	72														100		100
Enterococcus ² faecium	26														58		96*

¹Testing by E-test. Gentamicin Synergy Screen – *E. faecalis* = 88% Susceptible
²Testing by Microscan panel. Gentamicin Synergy Screen – *E. faecium* = 96% Susceptible
 * One VRE (transfer patient)

To preserve our ability to treat increasing resistant and more difficult to treat infections we need to appropriately culture infections and use antibiograms to help us empirically treat until we have identified the causative organism.



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