

CONTAGIOUS COMMENTS

Department of Epidemiology

Bugs and Drugs

Sarah K. Parker, MD, 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 cumulative antimicrobial susceptibility testing data for 2011. Clinical Laboratory Standard Institute (CLSI) recommends the collection, analysis, and presentation of these data. This information is shared with the organization to allow for informed empiric antimicrobial choices and effective antimicrobial utilization. Obtaining a specimen prior to the initiation of antimicrobial therapy optimizes the likelihood that culture results can target treatment options. Below is a summary of comparative trends that we have noted during our analysis.

Gram Positive Organism

Staphylococci (Table 1)

MRSA, MSSA, and coagulase negative staphylococcal isolates show no difference in reported susceptibilities from last year. MRSA rates remain at 35% total, and 50% for cultures sent from the emergency department and Network of Care locations. The recovery of MRSA as a percent of all *S. aureus* isolates peaked in 2007, and has remained stable since. Approximately 85% of our MRSA/MSSA isolates are susceptible to clindamycin, and 99% to trimethoprim/sulfamethoxazole. We have had no isolates of vancomycin resistant staphylococci.

Streptococci (Table 2)

Thirty-two patient non-respiratory *S. pneumoniae* isolates were sent to the Focus Technologies for typing in 2010. The most predominant serotypes were 7F (10), 19A (10), and 22F (5). Of the 32 isolates, 22 were not in PCV 7 (Prevnar), but are in PCV 13 (ten 7F, ten 19A, one 3, and one 6A); ten isolates were serotypes that are not included in either PCV 7 or PCV 13. Susceptibility to penicillin for meningial isolates is only 46%, and for non-meningial 76%.

A decrease in number of *S. anginosus* isolates occurred in 2010. The trend of decreased susceptibility to Erythromycin and Clindamycin observed in previous years was reversed.

Viridans Streptococcus, Group A (GAS), and Group B streptococci continue to be increasingly resistant to erythromycin and clindamycin. For GAS, only isolates from non-sterile sites are tested and included in the table.

Enterococci (Table 2)

We identified vancomycin resistant *E. faecium* (VRE) in six patients, two of whom were newly identified in 2010. This number includes stool surveillance cultures. Problems with this organism in a hospital's patient population are associated with increased in usage of broad spectrum antibiotics.

Gram Negative Organism

Haemophilus species (Table 3)

Haemophilus species isolates demonstrated a decrease in susceptibility to ampicillin/amoxicillin, now at 32%. Most isolates are from respiratory sources. Of the five isolates sent for typing, all were non-typeable.

Enterobacteriaceae

Please note that our high numbers of total Enterobacteriaceae isolates has allowed us to separate the data into two tables separate tables for urine (table 4) versus non-urine isolates (table 3).

Thirty-two *E. coli* and two *K. pneumoniae* isolates were identified as extended spectrum beta lactamase (ESBL) containing organisms, an increase from 14 in 2009. The 2010 ESBL isolates were all recovered from urine, which may not change treatment due to high concentrations of beta-lactam antibiotics in urine that may be able to overcome resistance. Four ESBL isolates in organisms other than *E. coli* or *K. pneumoniae* were also identified; these isolates were recovered from wounds or respiratory specimens.

A new challenge for the Microbiology Laboratory is to identify carbapenem-resistant enterobacteriaceae (CRE). This is complicated as two mechanisms of resistance are known: a carbapenemase (metallo-beta-lactamase) and cephalosporinase combined with porin loss. Identification of CRE is important from an infection control perspective regardless of the mechanism of resistance. FDA recommended breakpoint revisions have been delayed, which in turn delays updated breakpoints for our susceptibility analyzer, Microscan. Therefore, laboratories are advised to conduct verification of CLSI revised breakpoints. Children's Hospital Colorado Microbiology has begun this verification process.

Non-fermenting Gram Negative Rods (Table 5)

In 2010 we updated the *Pseudomonas aeruginosa* and non-fermenter antimicrobial panels, and changed reporting of fluoroquinolone susceptibility to ciprofloxacin.

Candida species (Table 6)

All *C. albicans* isolates were susceptible to fluconazole, and all *Candida* species were susceptible to amphotericin, micafungin and 5FC. More antifungal data will be included next year because of a change in policy: all yeasts (*Candida* species) from sterile sites will automatically be tested for susceptibility to: amphotericin, micafungin, fluconazole, and voriconazole. In addition, all CSF isolates will be tested for susceptibility to flucytosine (5FC).

Anaerobes (Table 7)

This cumulative anaerobic organism susceptibility report published in the latest CLSI manual was compiled from isolates obtained in 2007-2009 at three referral hospitals in the U.S. . This is included for informational purposes. An automatic susceptibility panel for *P. acnes* has been established. All sterile site isolates will be tested against penicillin, clindamycin, meropenem, and ceftriaxone. So far, no resistance to these drugs has been detected in our isolates.

Get Your “Bugs and Drugs” Pocket Handbook!

A concise, pocket sized “Bugs and Drugs” handbook is available through the Department of Epidemiology; feedback on how to make the handbook more helpful is appreciated. If you would like a handbook, contact: carolyn.brock@childrenscolorado.org. You can also access “Bugs and Drugs” on the Planet TCH internal website under the Epidemiology/Infection Control page.

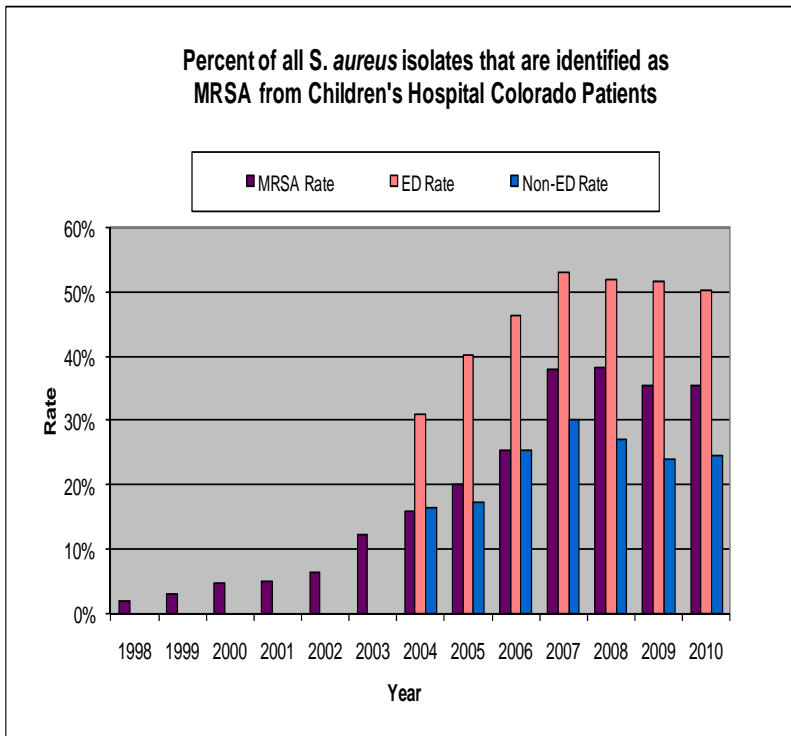


TABLE 1. Antimicrobial Susceptibilities at Children's Hospital Colorado – 2010 Staphylococcus (% susceptible)						
ORGANISMS	NUMBER OF ISOLATES TESTED	ANTIMICROBIALS				
		Oxa-/ Naf-/ Dicloxacillin	Trimethoprim / Sulfa	Erythromycin	Clindamycin	Vancomycin
<i>Staph aureus</i> (MSSA)	620	100	99	74	86	100
<i>Staph aureus</i> (MRSA)	516	R	98	14	86	100
<i>Staph epidermidis</i>	147	32	67	29		100

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

**TABLE 2. Antimicrobial Susceptibilities at Children's Hospital Colorado – 2010
Streptococcus (% susceptible)**

ORGANISMS	NUMBER OF ISOLATES	ANTIMICROBIALS											
		Penicillin			Cefotaxime			Erythromycin	Clindamycin	Trimethoprim/Sulfa	Cefotaxime	Ampicillin/ Amoxicillin	Vancomycin
		S	I	R	S	I	R						
<i>S. pneumoniae</i> ¹ Meningeal (2008-2010)	(13)	46		54	77	8	15						100
<i>S. pneumoniae</i> ¹ Non-meningeal	131	76	18	5	75	14	11	56	73	61			100
Viridans Strep ¹ Invasive	53	32	51	17				34	79		85		100
<i>Strep. anginosus</i> ¹ invasive Group	(17)	88	12	0				82	94		100		100
Beta Strep Group A ¹	45	S						96	96			S	
Beta Strep Group B ¹	60	S						52	68			S	
Beta Strep Group B ¹ (prenatal screens)	131	S						58	58			S	
<i>Enterococcus faecalis</i> ²	83											100	100
<i>Enterococcus faecium</i> ²	40											42	85

¹Testing by E-test.
²Testing by Microscan panel.
 () = small numbers
 S = Always susceptible to penicillin, ampicillin and cephalixin.

Gentamicin Synergy Screen – *E. faecalis* = 90% Susceptible
 Gentamicin Synergy Screen – *E. faecium* = 92% Susceptible

Two new VRE patients were identified in 2010, included in data above.

TABLE 3. Antimicrobial Susceptibilities at Children's Hospital Colorado – 2010 Gram Negative Organisms (% susceptible)

ORGANISMS	NUMBER OF ISOLATES	ANTIMICROBIALS					
		Ampicillin / Amoxicillin	Cefazolin /Cephalexin	Cefotaxime/ Ceftriaxone	Gentamicin	Trimethoprim / sulfa (IV / PO)	Ciprofloxacin
<i>Haemophilus species</i>	47	32		100		77	
<i>E. coli</i>	84	44	98	98	95	79	86
<i>Enterobacter cloacae</i>	53	R	R	68	98	98	98
<i>Klebsiella pneumoniae</i>	(28)	R	93	93	93	82	89
<i>Klebsiella oxytoca</i>	32	R	69	100	100	94	100
<i>Serratia marcescens</i>	30	R	R	97	97	93	93
<i>Salmonella species</i>	35	91		97		97	
<i>Shigella species*</i>	(28)	71		100		53	
() = small numbers * = Data combined 2007 – 2010 R = Resistant (Intrinsic)							

TABLE 4. Antimicrobial Susceptibilities at Children's Hospital Colorado – 2010 Gram Negative Organisms isolated from Urine (% susceptible)

ORGANISMS	NUMBER OF ISOLATES	ANTIMICROBIALS							
		Ampicillin / Amoxicillin	Cefazolin /Cephalexin	Cefuroxime	Cefotaxime/ Ceftriaxone	Gentamicin	Nitrofurantoin	Trimethoprim / sulfa (IV / PO)	Ciprofloxacin
<i>E. coli</i>	996	54	71	99	100	85	99	72	95
<i>Enterobacter cloacae</i>	(28)	R	R	21	68		36	93	100
<i>Klebsiella pneumoniae</i>	63	R	86	89	95	95	64	81	94
<i>Klebsiella oxytoca</i>	(19)	R	63	89	100	100	89	79	100
<i>Proteus mirabilis</i>	32	84	94	100	100	94	R	84	100
() Small number of isolates R = Resistant (Intrinsic) Haemophilus testing by E-test Other testing by Microscan panels									
Not included in data above: 32 <i>E. coli</i> ESBL 2 <i>K. pneumoniae</i> ESBL									
Note: Patients with ESBL producing organisms isolated from urine who have uncomplicated UTI may respond to therapy with beta-lactam agents									

**TABLE 5. Antimicrobial Susceptibilities at The Children's Hospital – 2010
Non-Enterobacteriaceae (% susceptible)**

ORGANISMS	NUMBER OF ISOLATES	ANTIMICROBIALS										
		Ticarcillin/clav (Timentin)	Ceftazidime	Aztreonam	Levofloxacin	Tobramycin	Meropenem	Piperacillin / Tazobactam (Zosyn)	Minocycline	Trimeth / Sulfa	Ciprofloxacin	Gentamicin
<i>Acinetobacter spp.</i> ¹	(22)		64		94	82	95	86	100	82		
<i>Pseudomonas aeruginosa</i>												
• Non CF ²	119		96	85				98			95	82
• CF-mucoid ¹	(26)		77	77	35	81	81	85				
• CF-nonmucoid ¹	(28)		79	61	57	54	71	79				
<i>Stenotrophomonas maltophilia</i> ¹	42	19	10		74		R		100	98		

¹ Cystic fibrosis isolates performed by E-test.
² Non-CF testing performed by Microscan panel.
 () Small number of isolates.

TABLE 6. Antimicrobial Susceptibilities at Children's Hospital Colorado – 2010 <i>Candida species</i> (# of isolates susceptible)				
Antifungal	# Tested	# Susceptible	# Resistant	Comments
Amphotericin	12	12		
Micafungin	13	13		
Fluconazole	13	12	1*	*This represents a single isolate of <i>C. glabrata</i> that was resistant to both Fluconazole and Voriconazole.
Voriconazole	10	9	1*	
Flucytosine (5FC)	6	6		
*Testing performed by UTHSC at San Antonio				
Fluconazole comments: MICs ≤ 32 ug/ml for <i>C. glabrata</i> require maximum dosages <i>C. krusei</i> is intrinsically resistant				

Table 7. Cumulative Antimicrobial Susceptibility Report for Anaerobic Organisms Isolates collected from US hospitals January 1, 2007 – December 31, 2009																	
ANAEROBIC ORGANISMS	NUMBER OF ISOLATES	ANTIMICROBIALS															
		Ampicillin-sulbactam (Unasyn)		Piperacillin/tazobactam (Zosyn)		Cefoxitin		Ertapenem		Meropenem		Penicillin/ampicillin		Clindamycin		Metronidazole	
Percent Susceptible (%S) and Percent Resistant (%R)		%S	%R	%S	%R	%S	%R	%S	%R	%S	%R	%S	%R	%S	%R	%S	%R
<i>Fusobacterium nucleatum-necrophorum</i>	44	100	0	100	0	100	0	100	0	*	0	100	0	100	0	100	0
Anaerobic gram-positive cocci	168	98	1	100	0	100	0	100	0	*	0	96	3	78	20	98	1
<i>P. acnes</i>	34	100	0	100	0	100	0	100	0	*	0	100	0	91	3	3	97
<i>B. fragilis</i> group	1580	86	4	95	2	65	9	97	1	*	1			50	39	100	0
*% S for meropenem is not reported due to lack of data Data adapted from CLSI M100-S21 January 2011																	

We are modifying our distribution process for Contagious Comments. If you wish to receive this publication please provide us with your E-mail address below.

Name: _____

E-mail Address: _____

Both the Contagious Comments and Bug Watch publications are always posted on Children's Hospital Colorado website at:
<http://www.childrencolorado.org/news/publications/index.aspx>

Please return your E-mail address to: Carolyn Brock, The Children's Hospital, Epidemiology – Box B276, 13123 E. 16th Avenue, Aurora, CO 80045 or E-mail address: carolyn.brock@childrencolorado.org.

Thank you for your interest in our publication.

CONTAGIOUS COMMENTS
Department of Epidemiology©

EDITOR:

Carolyn Brock, Program Assistant
Children's Hospital Colorado, Dept. of Epidemiology, B-276
13123 E. 16th Avenue, Aurora, CO 80045
Phone: 720-777-6072; FAX: 720-777-7295

<mailto:carolyn.brock@childrencolorado.org>

<http://www.thechildrenshospital.org>

We Recycle!