Volume 3, Issue 1 February 2009

Antibiotic Commonsense

"An investment in knowledge always pays the best interest." Benjamin Franklin

How do we mitigate a crisis in antibiotic resistance?*

A Global Problem

The decrease in new antimicrobial drug development coupled with increasing resistance to microbial pathogens has brought about a crisis in antibiotic resistance around the world. Epidemic antibiotic resistance has resulted in the pandemic of methicillin-resistant *Staphylococcus aureus* (MRSA) infections, the spread of resistance among respiratory infections such as *Streptococcus pneumoniae and Mycobacterium tuberculosis,* and epidemic increases in multidrug-resistant gram-negative bacilli.[1] Antibiotic use in animals, including those used to promote growth in animals raised for food, also play a role in antibiotic resistance.

Multidrug-resistant organisms are considered a substantial threat to U.S. public health and national security because of the significant impact they have on morbidity and mortality according to the National Academy of Science's Institute of Medicine, the Interagency Task Force (federal interagency task force on antimicrobial resistance) and the Infectious Disease Society of America (IDSA).

What are we doing?

According to a meta-analysis using data from 2,547 adults from nine trials, doctors should not be prescribing antibiotics to adults for a common rhinosinusitis infection even if symptoms last longer than 7 to 10 days. The authors say that "Common clinical signs and symptoms cannot identify a subgroup for which treatment is clearly justified given the cost, adverse events and bacterial resistance associated with antibiotic use."[2] The authors concluded, "Although our results do not apply to children or patients with suppressed immune systems, they should reassure physicians that only watchful waiting and symptomatic relief are warranted for almost all adult patients with acute rhinosinusitis-like complaints."[3]

Prescription and healthcare records of 20,000 Manitoba children (4/96-4/00) were reviewed and assessed for non-adherence to evidence-based antibiotic prescribing. The study found that 45% of physician visits for viral respiratory tract infection resulted in an antibiotic prescription, and 20% of antibiotic prescription were for second-line antibiotics. Pediatricians and other specialists were more likely than general practitioners to prescribe second-line antibiotics for initial therapy. Interestingly, children in households with higher incomes were less likely to receive an antibiotic prescription for a viral respiratory infection. Adherence to evidence-based prescribing was 60% more likely in physicians trained in the United States and Canada than in those trained elsewhere.[4]

According to a retrospective study using the National Hospital Ambulatory Medical Service (NHAMCS) databases, more children were prescribed antibiotics for otitis media in 2004 than in 1996. In 1996, 79.2% of children diagnosed with otitis media in the emergency department received prescriptions for antibiotics compared with 91.3% in 2004.[5]

Studies of antibiotic overuse often rely on physician reports of diagnosis which may overestimate bacterial illness. A recent study reported that physicians tend to over diagnose bacterial infections when pediatric patients present with upper respiratory infections. Videotapes of 66 pediatric visits for upper respiratory symptoms were analyzed to determine diagnosis by reviewing agreement between the physician's diagnosis and criteria-based diagnosis (symptoms, physician description of PE findings and diagnostic tests). Antibiotic overuse occurred three times more frequently when physician diagnoses were used instead of criteria-based diagnoses. Concordance between physician diagnoses and criteria-based diagnoses were 100% with streptococcal pharyngitis, 73% with acute otitis media, and only 17% with sinusitis.[6]

Unfortunately, we may not be communicating up-to-date information to the public on antibiotic usage when they most need it. When consumer websites were reviewed recently, less than half of the websites were updated to reflect new recommendations on antibiotic use for acute otitis media.[7]

What's happening in Pierce County?

When the Health Department conducted a random-digit dialing telephone survey of Pierce County residents in the spring of 2007, 38% of respondents agreed with the statement, "Antibiotics kill germs that cause colds, the flu,

*** Reviewed by members of the Antibiotic Utilization Committee, Pierce County Antibiotic Resistance Task Force**

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How do we mitigate a crisis in antibiotic resistance? (continued)

and most earaches and sore throats." The 400 respondents were at least 18 years old and able to communicate in English.

The Puget Sound Health Alliance recently posted an updated "community checkup" on their website: www.pugetsoundhealthalliance.org. This report is intended to provoke discussion across communities on how to reduce the inappropriate use of antibiotics, especially for people with colds or sore throats. It is based on claims data with dates of service between 1/1/04 and 9/30/07. Two antibiotic usage measurements are listed below:

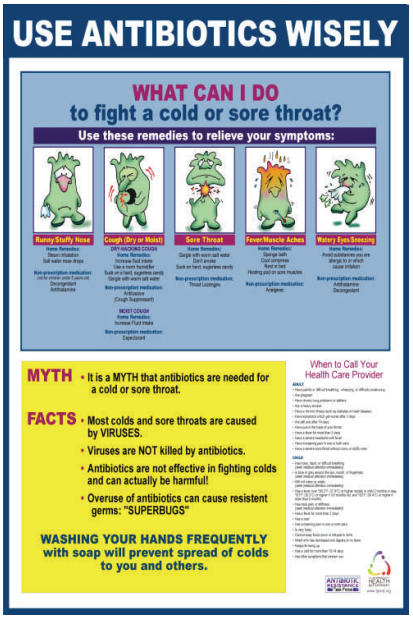
- The percentage of children age 18 months to 18 years who were diagnosed with an upper respiratory tract infection and were NOT prescribed an antibiotic for three days after the diagnosis:
  - Pierce County Average 95%
  - Regional Average 94%
- The percentage of children age 2 to 18 years who were seen for pharyngitis and received a Group A strep test before antibiotics were prescribed:
  - Pierce County Average 77%
  - Regional Average 70%

Let's work together and do even better in 2009! Think about joining our Pierce County Antibiotic Task Force (see below for contact information).

How do we solve the problem?

The long-term solution to microbial resistance is continuous steady development of new antibiotics and other strategies to improve targeted therapy as well as well-coordinated, well-funded domestic and international monitoring, tracking and prevention/control plans to respond to drug-resistance.[2] Unfortunately, drugs "are developed and allocated on the basis of market criteria (generation of profit and ability to pay) rather than on the basis of benefit to the public at large".[8] The Infectious Disease Society of America has been working with members of Congress to create legislation to stimulate antibiotic R&D since 2004.

Physicians, nurses, patients and their families, pharmacists, and antibiotic manufacturers must work together to keep antibiotics available and effective over the long-term. We must all promote and practice the judicious use of antibiotics, including targeted therapy, to slow down the rate of antibiotic resistance.



Resources

1. Spellberg B, Guidos R, Gilbert D et al. The epidemic of antibiotic-resistant infections: A call to action for the medical community from the Infectious Disease Society of America. *CID*. 2008; 46: 154-164.
2. Young J, Sutter AD, Merenstein D, et al. Antibiotics for adults with clinically diagnosed acute rhinosinusitis: a meta-analysis of individual patient data. *The Lancet*. 2008;371:908-914.
3. Ibid
4. Kozyrskyj AL, Dahl ME, Chateau DG et al. Evidence-based prescribing of antibiotics for children: role of socioeconomic status and physician characteristics. *CMAJ* 2004;171(2):139-45.
5. Fischer T, Singer A, Lee C, Thode H. National Trends in ED antibiotic prescribing for children with acute otitis media 1996-2004. *Acad Emerg Med* 2007; 14:S96.
6. Cox ED, Saluja S, Criteria-based diagnosis and antibiotic overuse for upper respiratory infections. *Ambulatory Pediatrics 2008;8:250-254.*
7. Holland ML, Fagnano M. Appropriate antibiotic use for acute otitis media: What consumers find using web searches. *Clinical Pediatrics* 2008 47(5);452-6.
8. Spellberg B, Guidos R, Gilbert D et al. The epidemic of antibiotic-resistant infections: A call to action for the medical community from the Infectious Disease Society of America. *CID*. 2008; 46: 000-000.

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ANTIBIOTIC RESISTANCE Task Force

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2007 Antimicrobial Susceptibility Summary
Pierce County, Washington

All civilian and military hospital laboratories within Pierce County reported antibiotic susceptibility testing results for the time period between January 1, 2007 and December 31, 2007. Inpatient and outpatient data have been included. Data represents only bacterial isolates that were collected for diagnostic purposes; no surveillance cultures are included.

Starting in 2008, all isolates will be reported as long as there are ≥3 days separating isolates. However, no standard mechanisms for eliminating duplicate isolates were agreed on across hospitals for 2007, which may negatively impact the reliability of percent susceptible data for this period. Another factor that can impact percent susceptible data is variation in test methods used in determining susceptibility.

A county-wide antibiogram may be most useful in providing context to individual hospital susceptibility trends. This would be especially important when small numbers of certain pathogens are reported by individual facilities making the percent susceptible/resistant appear artificially inflated due to the small denominators (e.g. *S. pneumoniae*).

Note: Antibiotics are usually effective clinically when susceptibility is > than 60%. If susceptibility is <30%, do not use antibiotic for empiric treatment as it is not effective clinically.[1]

Percent (%) Susceptible (Remainder are non-susceptible, resistant or intermediate)

Gram Negative Organisms*	No. Tested*	Ampicillin	Augmentin	Piperacillin	Pip/Taz	Cefazolin	Ceftriaxone	Ceftazidime	Imipenem	Gentamicin	Tobramycin	Nitrofuratoin	Ciprofloxacin	Levofloxacin	Tetracycline	Trimeth/sulfa
Citrobacter, freundii	338	0	**	**	94	0	86	83	100	92	95	93	87	92	**	81
Enterobacte, aerogenes	328	0	**	**	83	2	88	84	100	100	98	16	90	95	**	96
Enterobacter cloacae	605	4	**	**	89	0	80	76	100	97	97	33	88	96	**	86
Escherichia coli	16,521	59	**	**	99	92	98	97	100	94	95	96	87	86	**	80
Klebsiella pneumoniae	2,416	0	**	**	99	94	96	95	100	97	95	39	90	94	**	90
Proteus mirabilis	1,493	68	**	**	100	90	98	97	89	88	91	0	75	76	**	66
Serratia marcescens	337	0	**	**	100	0	100	100	99	99	96	0	93	91	**	98
*Acinetobacter baumannii****	254	0	**	**	65	0	0	42	79	84	85	0	48	47	**	70
Pseudomonas aeruginosa	2,119	**	**	**	98	**	**	85	89	86	94	**	74	70	**	0

*The actual number of isolates tested against each agent may vary.
**Indicates not tested against that drug.
***Data influenced by multi-resistant strains brought in by military patients from SW Asia & Germany

[1] Gilbert DN, Moellering RC, Eliopoulos GM, Sande MA. *The Sanford Guide to Antimicrobial Therapy 2006:* 36th edition. Antimicrobial Therapy, Inc.

2007 Antimicrobial Susceptibility Summary
Pierce County, Washington (*continued)*

Percent (%) Susceptible (Remainder are non-susceptible, resistant or intermediate)

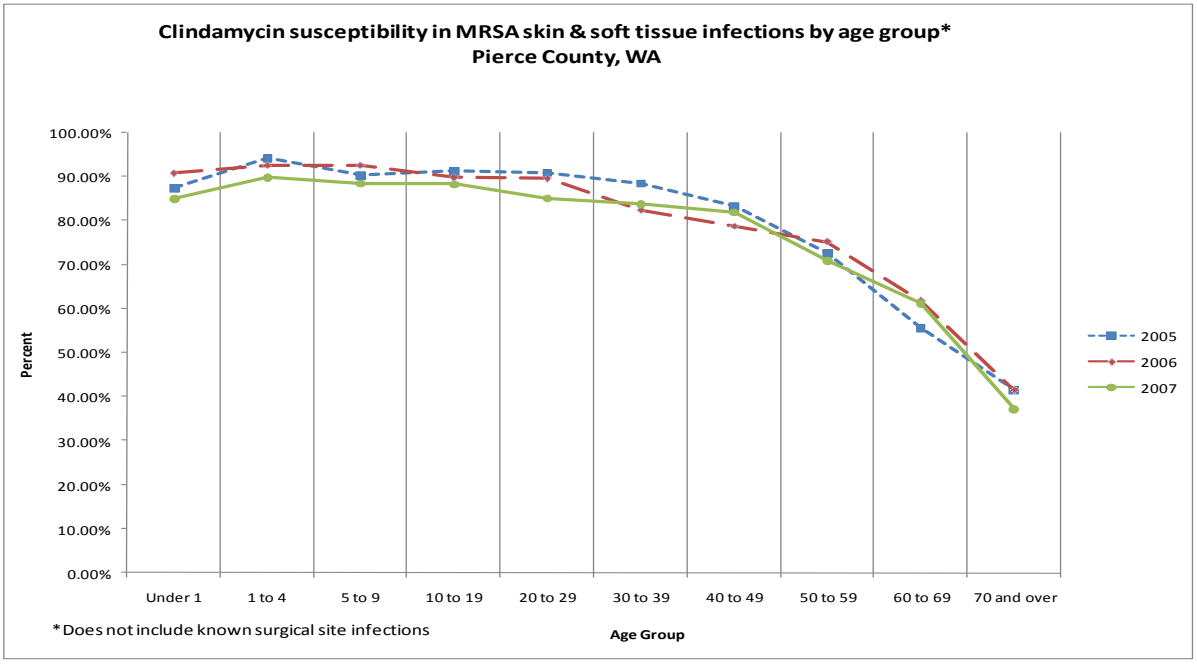
Gram Positive Organisms	No. Tested*	Penicillin	Augmentin	Oxacillin	Cefazolin	Clindamycin	Erythromycin	Gentamicin	Nitrofuratoin	Levofloxacin	Tetracycline	Rifampin	Trimeth/sulfa	Vancomycin
Enterrococcus species	2,252	91	**	**	**	**	**	75	91	67	**	**	**	95
Staphylococcus aureus§	14,812	3	**	46	50	81	36	99	100	58	94	99	99	100
Staphylococcus coagulase neg.	1,289	8	14	36	**	67	34	87	98	42	80	**	67	100

*The actual number of isolates tested against each agent may vary.
**Indicates not tested against that drug.
§*Staph aureus* isolates not sensitive to oxacillin are considered resistant to other beta-lactams, including cephalosporins.

Streptococcus pneumoniae

Invasive Isolates (Blood, CSF)	No. Tested	% Susceptible	% Intermediate	% Resistant
Penicillin	95	69.47	23.16	7.37
3rd gen Cephalosporin	79	97.47	1.27	1.27
Macrolide‡	94	88.30	0.00	11.70
Levofloxacin	94	100.00	0.00	0.00
Vancomycin	63	100.00	0.00	0.00
Trimeth-Sulfa	62	83.87	1.61	14.52

‡Macrolides include erythromycin and azithromcyin



Source: Tacoma-Pierce County Health Department