2007

Wisconsin Antibiotic Resistance Report
Invasive *Streptococcus pneumoniae*

Highlights

- The proportion of invasive *S. pneumoniae* isolates with high-level penicillin resistance increased from 4.8% in 2006 to 7.9% in 2007. At the national level, resistance has increased yearly since 2004. Wisconsin penicillin resistance has remained below the national average since 1999.

- The proportion of isolates with reduced susceptibility to multiple drugs (penicillin $\geq$ non-betalactam antibiotics) increased from ~ 8.3% in 2006 to 14.9% in 2007. This is the highest MDR rate seen since the surveillance was initiated in 1999.

- Fluoroquinolone resistance is rare. However, this is the first year that 2 isolates have been fully resistant to Levofloxacin.

- The percentage of total non-susceptible isolates increased in the Western, Southern, and Northern regions, but decreased in the Northern and Southeastern regions since 2006.

Surveillance

Enhanced passive surveillance is used to identify invasive isolates of S. *pneumoniae* in Wisconsin. This activity is coordinated by the Wisconsin Division of Public Health through the invasive bacterial disease surveillance program. Participating hospitals and laboratories voluntarily submit invasive bacterial isolates to the Wisconsin State Laboratory of Hygiene along with a report form that specifies the organism, source of specimen, and patient demographic characteristics. Duplicate isolates (e.g., from a hospital laboratory and a reference laboratory) and isolates obtained from non-Wisconsin residents are excluded.

Invasive isolates are defined as those obtained from blood, CSF, pleural fluid, or another normally sterile body site. In 2007 a total of 27 facilities submitted invasive pneumococcal isolates.

Laboratory Methods

Pneumococcal susceptibility testing was performed at the Wisconsin State Laboratory of Hygiene (WSLH). Susceptibilities to penicillin, cefotaxime, ceftriaxone, levofloxacin and meropenem were determined using the E-test. Susceptibilities to erythromycin, vancomycin, trimethoprim-sulfa-methoxazole, tetracycline and chloramphenicol were performed using disc diffusion. Minimum inhibitory concentrations (MICs) were interpreted as susceptible, intermediate or resistant according to the National Committee for Clinical Laboratory Standards Institute (CLSI) guidelines.

Results

TABLE 1.

Demographic characteristics of patients reported with invasive pneumococcal disease, Wisconsin, 2006 and 2007

	2007		2006	
Age	**Number**	**(%)**	**Number**	**(%)**
<5 years	40	(11%)	33	(9%)
5-19 years	15	(4%)	12	(3%)
20-39 years	34	(9%)	39	(10%)
40-59 years	89	(24%)	111	(29%)
60-79 years	128	(35%)	104	(28%)
80+ years	64	(17%)	78	(21%)
Gender				
Male	184	(50%)	201	(53%)
Female	186	(50%)	176	(47%)
Region of residence				
Northeastern	72	(19%)	47	(12%)
Northern	49	(13%)	54	(14%)
Southeastern	155	(42%)	180	(48%)
Southern	62	(17%)	55	(15%)
Western	32	(9%)	41	(11%)
Source of isolate				
Blood	356	(96%)	356	(94%)
Cerebrospinal fluid	12	(3%)	14	(4%)
Other	2	(1%)	7	(2%)
Total	**370**	**(100%)**	**377**	**(100%)**

TABLE 2.

Pneumococcal isolates with reduced susceptibility to penicillin and ≥ 2 non-beta-lactam antibiotics

Year	Multi-drug Resistance	%
1999	43/410	10.5%
2000	32/289	11.1%
2001	29/255	11.4%
2002	43/352	12.2%
2003	35/418	8.4%
2004	19/320	5.9%
2005	22/355	6.2%
2006	31/377	8.3%
2007	55/370	14.9%

Results

TABLE 3.
Antimicrobial susceptibility of 370 *S. pneumoniae* isolates in 2007

	Susceptible	Intermediate	Resistant	Total Non-susceptible
β-lactam drugs				
penicillin	76.1%	16.0%	7.9%	23.9%
ceftriaxone (n=358 non-*CSF isolates)	342/358 95.5%	14/358 3.9%	2/358 0.6%	16/358 4.5%
ceftriaxone (n=12 *CSF isolates)	10/12 83.3%	2/12 16.7%	0/12 0%	2/12 16.7%
cefotaxime (n=358 non-*CSF isolates)	337/358 94.1%	14/358 3.9%	7/358 2.0%	21/358 5.9%
cefotaxime (n=12 *CSF isolates)	12/12 83.3%	2/12 16.7%	0/12 0%	2/12 16.7%
meropenem	90.4%	4.4%	5.2%	9.6%
Other drugs				
chloramphenicol	99.2%	0%	0.8%	0.8%
erythromycin	80.5%	0%	19.5%	19.5%
tetracycline	90.5%	0.3%	16.5%	9.5%
trimethoprim-sulfamethoxazole	81.8%	1.7%	16.5%	18.2%
levofloxacin	1-isolate with full resistance			
vancomycin	All isolates were suseptible			

*CSF = Cerebrospinal fluid

FIGURE 1.
Temporal trends in *S. pneumoniae* penicillin resistance (MIC ≥2.0 µg/ mL)

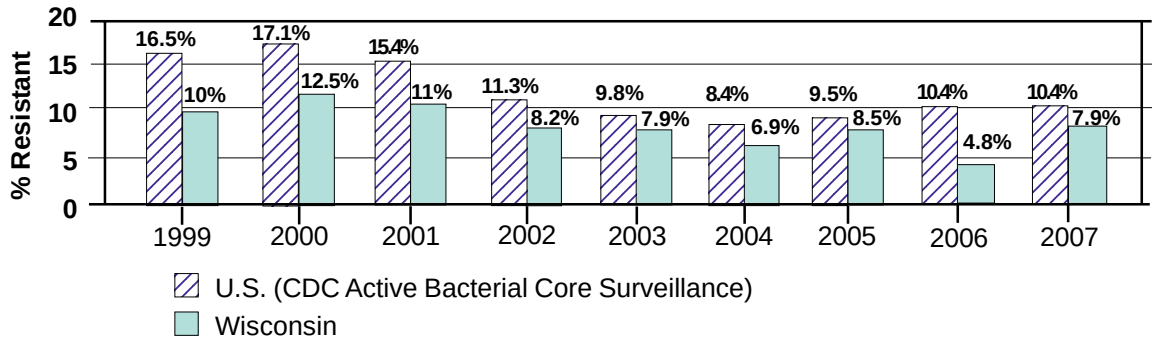
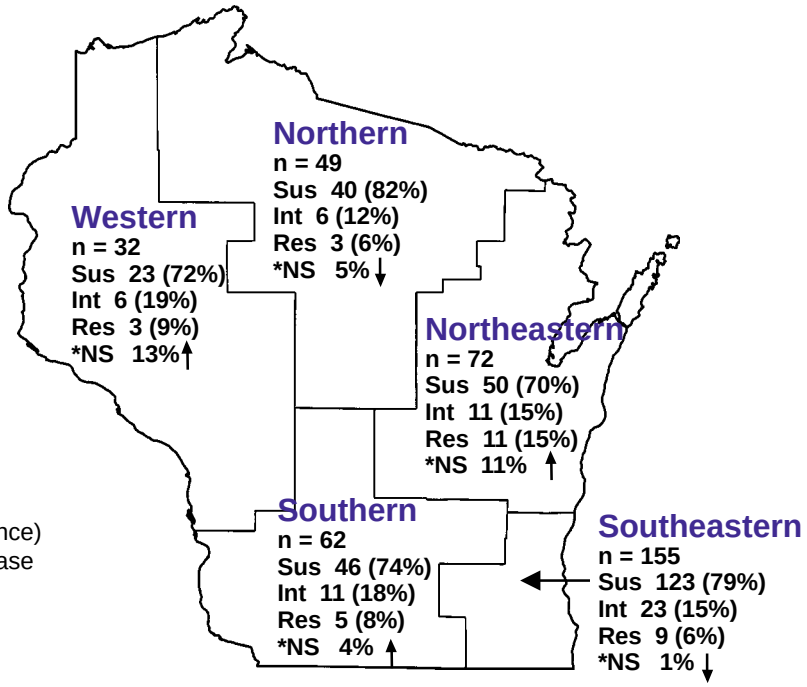


FIGURE 2.

***S. pneumoniae* Penicillin susceptibility by region for the year 2007**



***NS=non-susceptible**
(intermediate or full resistance)
% (↑↓) increase or decrease compared to 2006

About WARN

Wisconsin **A**ntibiotic **R**esistance **N**etwork (**WARN**) is a coalition of Wisconsin health care providers, professional organizations, and public health agencies concerned about antibiotic resistance and inappropriate antibiotic use.

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For More Information

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WISCONSIN ANTIBIOTIC RESISTANCE NETWORK