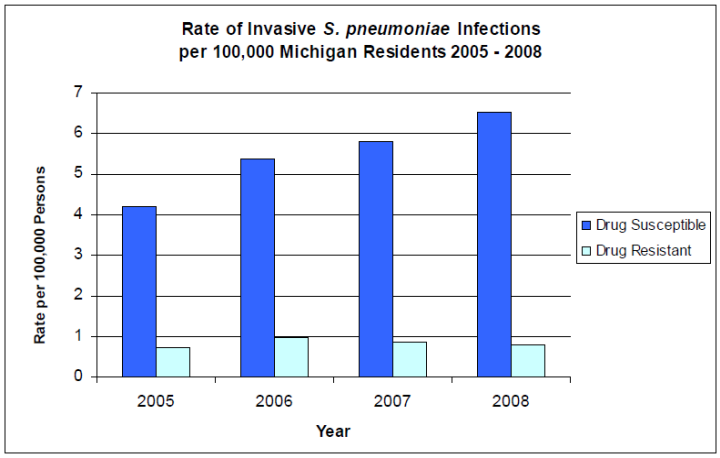
# Invasive Streptococcus pneumoniae Reporting in Michigan, 2005 to 2008

**Background:**

*Streptococcus pneumoniae* is a lancet-shaped, gram-positive, facultative anaerobic bacterium. Pneumococci can manifest as several types of bacterial infections based on site of infection. Until 2010, susceptible cases that occurred in children less than five years of age, along with all drug resistant isolates, were reportable. Cases were reported through the Michigan Disease Surveillance System (MDSS); isolates that tested intermediate or resistant to one or more antimicrobials formerly required an additional faxed form to report drug susceptibility results. A surveillance evaluation was completed for data collected in this manner from 2005 through 2008. The key results of this evaluation are contained in this report. Presently, improvements have been made for *S. pneumoniae* surveillance including a change in the case definition for invasive, susceptible cases of *S. pneumoniae* to include all ages as reportable by the local health departments to the Michigan Department of Community Health (MDCH). Additionally, a new MDSS forms allows for the collection of susceptibility results electronically.

**Michigan Results:**

***Figure 1. Reported incidence of invasive infection in Michigan:***




***Characteristics of Patients with Drug-Resistant Streptococcus pneumoniae:***

Of 333 cases of Drug-Resistant *Streptococcus pneumoniae* (DRSP) reported during 2005–2008, 318 (95%) had information available on the type of infection. The majority were either pneumonia, 182 (57%), and/or bacteremia, 177 (56%). Eighteen cases were meningitis (6%), 7 (2%) were cellulitis, 4 (1%) were otitis media and 33 (10%) were other infections.

Information regarding patients' underlying conditions was available for 210 (63%) DRSP cases; most, 167 (80%), reported the presence of an underlying condition and 59 (28%) reported other prior illness. Types of underlying conditions reported were: 43 (20%) emphysema/COPD, 36 (17%) cardiovascular disease/CAD, 31 (15%) diabetes mellitus, 25 (12%) current smoker, 17 (8%) immunosuppressive therapy, and 16 (8%) heart failure/CHF.

**Key areas for improvement in reporting — vaccination status and timeliness:**

*Known vaccination status*: Percent of cases with reported vaccination status among DRSP cases (N=333) given in Total (T), Adult (A) and Youth (Y) percent. Youth is classified as under 18 years old.

| Pneumococcal Polysaccharide Vaccine (PPV) Vaccination Status (%) | Pneumococcal Conjugate Vaccine (PCV) Vaccination Status (%) |
|---|---|
| Unknown (T 81.7) (A 81.2) (Y 83.1) | Unknown (T 80.8) (A 87.6 ) (Y 60.2) |
| Vaccinated (T 8.1) (A 10.0) (Y 2.4 ) | Vaccinated (T 10.2) (A 2.0 ) (Y 34.9) |
| Unvaccinated (T 10.2) (A 8.8) (Y 14.5) | Unvaccinated (T 9.0) (A 10.4 ) (Y 4.8) |

*Time to Report*: From date of first positive culture to date reported for all invasive *S. pneumoniae* infections (N=2028). (NOTE: According to the Michigan Communicable Disease Rules, all cases of invasive *S. pneumoniae* are required to be reported within 24 hours of discovery or diagnosis.)

| No. (%) in 24 hours | No. (%) in 7 days | No. (%) in 14 days | No. (%) in 21 days | No. (%) in 28 days |
|---|---|---|---|---|
| 17 (0.84) | 675 (33.28) | 1188 (58.58) | 1434 (70.7) | 1535 (75.69) |

***Table 1: Antibiogram for S. pneumoniae in Michigan***:

| Antimicrobial Class (N= 240) | 2005 | | 2006 | | 2007 | | 2008 | |
|---|---|---|---|---|---|---|---|---|
| **N(%)** | S | I/R | S | I/R | S | I/R | S | I/R |
| **Penicillins** | 6 (10.9) | 49 (89.1) | 12 (18.2) | 54 (81.8) | 9 (15.8) | 48 (84.2) | | |
| **Non-meningitis** | | | | | | | 34 (75.6)* | 11 (24.4)* |
| **meningitis** | | | | | | | 9 (20.0) | 36 (80.0) |
| **β-Lactams/ β - Lactamase inhibitor combination** | 7 (77.8) | 2 (22.2) | 8 (80.0) | 2 (20.0) | 7 (100.0) | 0 (0.0) | 2 (40.0) | 3 (60.0) |
| **Cephems** | 15 (55.6) | 12 (44.4) | 24 (60.0) | 16 (40.0) | 17(58.6) | 12(41.4) | 10 (37.0) | 17 (63.0) |
| **Carbapenems** | 2 (40.0) | 3 (60.0) | 1 (33.3) | 2 (66.7) | 4 (57.1) | 3 (42.9) | 4 (50.0) | 4 (50.0) |
| **Ansamycins** | 3 (100.0) | 0 (0.0) | 1 (50.0) | 1 (50.0) | 0 (0.0) | 0 (0.0) | 1 (100.0) | 0(0.0) |
| **Quinolones** | 30 (100.0) | 0 (0.0) | 38 (100.0) | 0 (0.0) | 27 (100.0) | 0 (0.0) | 30 (96.8) | 1 (3.2) |
| **Folate Pathway Inhibitor** | 7 (30.4) | 16 (69.6) | 8 (38.1) | 13 (61.9) | 8 (33.3) | 16 (66.7) | 5 (21.7) | 18 (78.3) |
| **Lincosamides** | 2 (33.3) | 4 (66.7) | 3 (50.0) | 3 (50.0) | 1 (50.0) | 1 (50.0) | 3 (60.0) | 2 (40.0) |
| **Macrolides** | 9 (24.3) | 28 (75.7) | 10 (26.3) | 28 (73.7) | 4 (16.0) | 21 (84.0) | 3 (9.0) | 30 (91.0) |
| **Oxaxolidinones** | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| **Glycopeptides** | 28 (100.0) | 0 (0.0) | 39 (100.0) | 0 (0.0) | 27 (100.0) | 0 (0.0) | 31 (100.0) | 0 (0.0) |
| **Phenicols** | 9 (90.0) | 1 (10.0) | 13 (100.0) | 0(0.0) | 2 (100.0) | 0 (0.0) | 7 (100.0) | 0 (0.0) |
| **Tetracyclines** | 13 (72.2) | 5 (27.8) | 12 (63.2) | 7 (36.8) | 16 (69.6) | 7 (30.4) | 8 (33.3) | 16 (66.7) |

***Antimicrobial agents included:*** **Pencillin –** pen, amox, **β-lactam comb.** – amox/clav **Cephems** –cefotaxime, ceftriaxone, cefepime, Cefaclor, cefuroxime, **Carbapenems** – Imi, mero, **Ansamycin** – rif, **Quinolones**-lev, spa, gat, mox, oflox, **Folate Path. Inhib.** – trim/sulf **Lincosamides** – clind, **Macrolides** – ery, azm, clar, **Oxaxolidinones** –lnz, **Glycopeptides**- van, **Phenicols**- chlor, **Tetracyclines** – tet, doxy

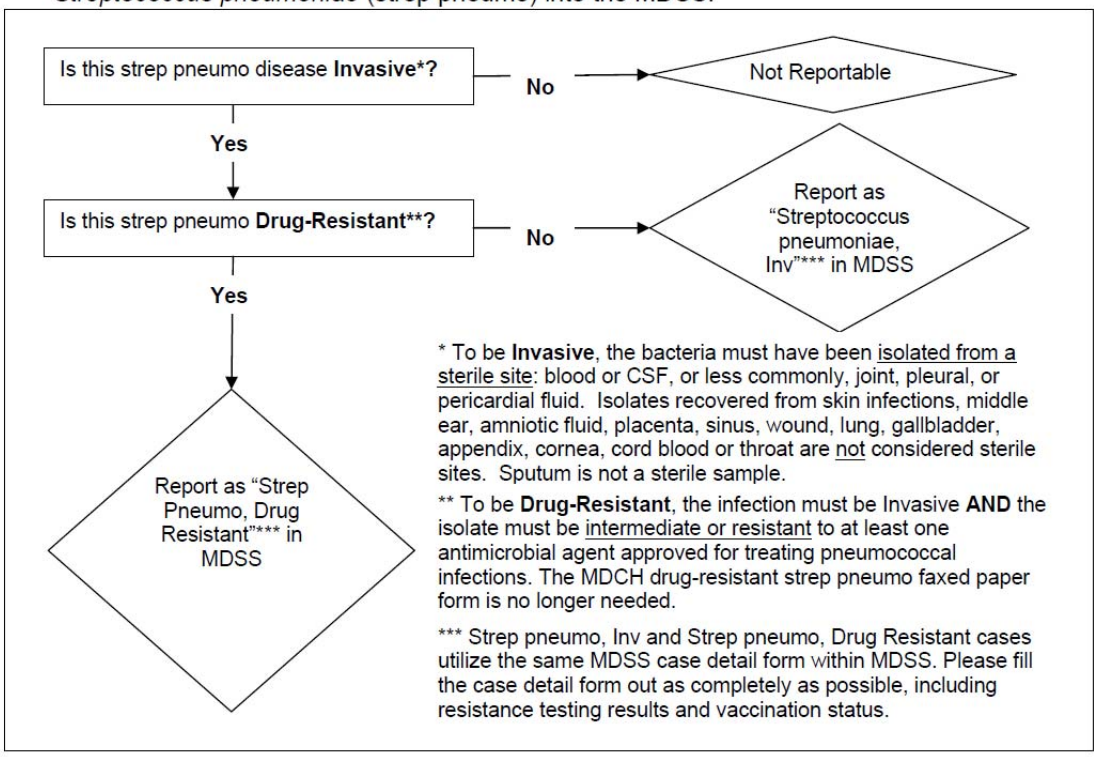
****Penicillin Minimum Inhibitory Concentration (MIC) breakpoint:*** Changed from (≤0.06= S) (0.12-1= I) ( ≥2= R) to (≤2 =S) (4= I) (8= R) for non-meningitis in year 2008, the meningitis breakpoint remains unchanged at (≤0.06= S) (0.12-1= I) ( ≥2= R) for isolates. Laboratories are encouraged to report susceptibility results using both MIC breakpoints to enable clinicians to treat according to the clinical aspects of the case.

**Key Points of *Streptococcus pneumoniae* reporting in Michigan**:

- Vaccination remains the most effective prevention tool against invasive *S. pneumoniae* infections.
- Use of an updated electronic form can improve Minimum Inhibitory Concentration (MIC) reporting as well as dissemination of analysis and summary reports, if regularly utilized.
- Interpretation of antibiogram is limited by missing MIC data for isolates, 93/333 (28%) of cases were lacking complete susceptibility information.
- Substantial changes in Penicillin resistance profile for *S. pneumoniae* reflects a change in MIC breakpoints for 2008.

**Update on Reporting of *Streptococcus pneumoniae* cases**
**March, 2010**

Following the 2010 update to the national case definition for "Streptococcus pneumoniae, Invasive" and clarification of the reporting requirements from the CDC, MDCH is requesting that the following algorithm be used when entering cases of *Streptococcus pneumoniae* (strep pneumo) into the MDSS.




Using this new algorithm, all invasive *S. pneumoniae* cases can be reported electronically on MDSS, which retires the use of the faxed supplemental reporting form. The two classifications for cases on MDSS use the same case reporting form, which has also been updated this year. The new form can be found on MDSS under the two reporting categories: "Strep Pneumo, Drug Resistant" and "Streptococcus pneumoniae, Inv". www.michigan.gov/mdss

The new form contains fields for vaccination status, underlying conditions, and drug susceptibility data. Please fill this new form with all the information that is available, including the MIC value for drug susceptibility whenever it is known. Reporting of drug susceptibility data for both drug resistant and susceptible cases will enable MDCH to gain a better understanding, statewide, of the overall susceptibility of this organism. Similarly, reporting of vaccination status allows MDCH to evaluate vaccine coverage and effectiveness. Thank you very much for all of your hard work.

Please direct any general questions you may have about *Streptococcus pneumoniae* and reporting to Shannon Andrews Johnson, SIDE Section, AndrewsSh@michigan.gov, 517.335.9597. Questions specific to the results of the surveillance evaluation may be directed to Kerrie VerLee, SIDE Section, VerLeeK@michigan.gov, 517.335.8199.

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