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**Emergence of Antimicrobial-Resistant Serotype 19A *Streptococcus pneumoniae* - Massachusetts, 2001-2006, MMWR, October 19, 2007 / 56(41);1077-1080

*Streptococcus pneumoniae* (pneumococcus) is a leading cause of otitis, sinusitis, pneumonia, and meningitis worldwide. Treatment of the most serious type of pneumococcal infection, invasive pneumococcal disease (IPD), is complicated by antimicrobial resistance. Widespread introduction in 2000 of heptavalent pneumococcal conjugate vaccine (PCV7) against serotypes 4, 6B, 9V, 14, 18C, 19F, and 23F resulted in a decline in antimicrobial-nonsusceptible IPD in the United States, including in Massachusetts. However, development of antimicrobial resistance in serotypes not covered by PCV7 is a growing concern. In Massachusetts during 2001-2006, IPD surveillance identified an increased number of cases in children caused by pneumococcal serotypes (most notably 19A) not covered by PCV7 and an associated increase in antimicrobial resistance among these isolates. The findings in this report indicate that, despite increases in incidence of antimicrobial-nonsusceptible IPD, overall rates of IPD remained stable during 2001-2006. In addition, persons with IPD caused by antimicrobial-nonsusceptible *S. pneumoniae* had clinical outcomes comparable to persons with IPD caused by antimicrobial-susceptible serotypes. Although PCV7 is effective in preventing IPD, these results confirm that antimicrobial resistance among serotypes not covered by PCV7 remains a concern.

On October 1, 2001, the Massachusetts Department of Public Health and the Section of Pediatric Infectious Diseases at Boston University Medical Center initiated statewide laboratory- and population-based surveillance for IPD among children. For this report, cases of IPD were defined by isolation of pneumococcus from a normally sterile body site (e.g., blood or cerebrospinal, pleural, or joint fluid) in a Massachusetts resident aged <18 years during October 1, 2001-September 30, 2006. Demographic and clinical data were obtained from telephone interviews with primary-care providers or adult caregivers. PCV7 vaccination rates were estimated using CDC's National Immunization Survey.

During October 2001-September 2006, surveillance identified 467 cases of IPD in Massachusetts residents aged <18 years. Throughout this period, annual IPD incidence rates were stable, ranging from 15.9 to 18.6 per 100,000 children aged <5 years; rates were approximately 70% lower than the pre-PCV7 annual IPD incidence of 56.9 per 100,000 children aged <5 years documented in surveillance during 1990-1991. A total of 353 isolates (76%) from 467 cases were available for serotyping. During 2001-2006, a total of 94 (27%) isolates were serotype 19A. During that period, the number and percentage of IPD cases caused by serotype 19A increased from six (10% of all cases) during 2001-2002 to 33 (41%) during 2005-2006 (p<0.01). No significant changes
were noted in the proportions of IPD caused by other PCV7 or PCV7-related serotypes or by non-PCV7 serogroups.

Because 19A was the most common serotype isolated during 2005-2006, the antimicrobial susceptibility of 19A isolates was examined further. The majority of 19A isolates were nonsusceptible to penicillin. During 2001-2006, significant increases were noted in the proportion of 19A isolates that were nonsusceptible to amoxicillin (minimum inhibitory concentration [MIC] >2 µg/mL), ceftriaxone (MIC >0.5 µg/mL), or three or more classes of antimicrobials. Fourteen (15%) of 94 isolates of 19A were highly resistant to ceftriaxone (MIC ≥2 µg/ml), a first-line antimicrobial used for empiric bacterial meningitis treatment. No significant trends in the antimicrobial resistance of non-19A isolates were noted.

To describe the clinical features of and identify risk factors for infection with ceftriaxone-nonsusceptible serotype 19A, demographic and clinical characteristics of the 14 patients with highly ceftriaxone-resistant 19A IPD were compared with those of 73 patients with ceftriaxone-susceptible 19A IPD and 237 patients with ceftriaxone-susceptible non-19A IPD. The results indicated that patients with highly ceftriaxone-resistant 19A disease did not differ from the other groups with regard to established risk factors for antimicrobial-nonsusceptible pneumococcal disease, including age, sex, race/ethnicity, geographic region, degree of household crowding, or day care exposure. Underlying medical conditions that might predispose to IPD (e.g., sickle cell disease or congenital or acquired immune deficiencies) were not significantly more common among patients with highly ceftriaxone-resistant 19A IPD (three of 14 [21%]) than among patients in the ceftriaxone-susceptible 19A group (nine of 73 [12%]) or the non-19A group (33 of 237 [14%]). In addition, no significant differences among the three groups were detected in the proportion of patients with meningitis, pneumonia, or bacteremia without focus, case-fatality ratios, rates of hospitalization (79% versus 68% and 59%, respectively), or longer hospital stay (64% with ≥4 days versus 40% and 51%, respectively).

The emergence of antimicrobial-nonsusceptible non-PCV7-type IPD is of concern. Continued surveillance for IPD in Massachusetts will provide data on the clinical impact of antimicrobial-nonsusceptible 19A infection and will be useful in development and monitoring of new pneumococcal vaccines.

The findings in this report support the continued empiric use of combination therapy with vancomycin and cefotaxime or ceftriaxone (the antimicrobials of choice to treat nonsusceptible pneumococci) and for critically ill children with nonmeningal IPD. Antimicrobial-resistance data obtained through surveillance will continue to guide empiric treatment regimens for IPD in Massachusetts and provide data that can be used to tailor treatment recommendations to state-specific resistance patterns. State-based surveillance also will help detect trends in the emergence of nonsusceptible non-PCV7 IPD. For the complete report you can go to:
http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5641a2.htm?s_cid=mm5641a2_e%0d%0a

Influenza Update: Since September 29, 2007, a total of 329 specimens have been collected and received at AFIOH (Air Force Institute for Operational Health). Of those with completed results, 4.0% (n=5) were positive for influenza, and 96.1% (n=122) were positive for adenovirus.

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