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Prevalence of Penicillin-Resistant Streptococcus pneumoniae -- Connecticut, 1992-1993

Streptococcus pneumoniae is an important cause of community-acquired bacterial pneumonia, meningitis, acute otitis media, and other infections (1). Infants, young children, and the elderly are most severely affected by pneumococcal disease (2). Although S. pneumoniae was once considered to be routinely susceptible to penicillin, since the mid-1980s the incidence of resistance of this organism to penicillin and other antimicrobial agents has been increasing in the United States (1-4). National surveillance for drug-resistant S. pneumoniae (DRSP) is limited to testing invasive isolates from sentinel hospitals in 13 states. To determine the extent of antimicrobial susceptibility testing of S. pneumoniae and the prevalence of penicillin resistance among pneumococcal isolates from July 1992 through June 1993, in August 1993 the Connecticut Department of Public Health and Addiction Services (DPHAS) surveyed all 44 hospitals with clinical microbiology laboratories in Connecticut. This report summarizes the results of that survey.

Hospital laboratories were asked whether pneumococcal isolates were tested for resistance to penicillin, which isolates were tested, which tests were used, the number of isolates tested from different body sites from July 1992 through June 1993, and the minimal inhibitory concentrations (MICs) for any resistant isolates. Forty-three (98%) of 44 hospital laboratories responded.

Of the 43 hospital laboratories, 33 reported performing antimicrobial susceptibility tests on pneumococcal isolates, nine sent pneumococcal isolates to other laboratories for testing, and one neither performed such tests on pneumococcal isolates nor sent isolates to other laboratories for testing.

In 15 of the 33 laboratories, penicillin susceptibility testing was limited to qualitative disk diffusion (using an oxacillin disk). Nine laboratories screened pneumococcal isolates by disk diffusion, then confirmed penicillin resistance by determination of a quantitative MIC. Nine laboratories determined the penicillin MIC for all pneumococcal isolates.

MIC data were provided by 14 of the 18 laboratories that performed such tests for pneumococcal isolates. MICs were reported for 846 isolates collected during July 1992-June 1993. Penicillin resistance was defined as MIC greater than or equal to 0.1 ug/mL, and high-level resistance was defined as MIC greater than or equal to 2.0 ug/mL (5). Penicillin-resistant isolates were reported from four of 14 hospitals. Eighteen isolates (2.1%) from any body site were penicillin resistant, including five (1.3%) of 400 isolates from usually sterile sites. Overall, three isolates (one each from blood, sputum, and nasal fluid) were highly resistant. Two of these isolates had penicillin MICs greater than or equal to 4.0 ug/mL.

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Editorial Note

Editorial Note: The spread of DRSP strains may increase the public health impact of S. pneumoniae infections because of increased morbidity and reductions in the effectiveness of antimicrobial treatment for pneumococcal disease. Of special concern is resistance to extended-spectrum cephalosporins, which are often used as empiric therapy for meningitis (3).

During 1979-1987, only one (0.02%) of 4585 pneumococcal sterile-site isolates submitted to CDC's sentinel hospital surveillance system were highly resistant to penicillin; in comparison, during 1992, seven (1.3%) of 544 such isolates were highly resistant (4,6). In some pediatric populations, up to 30% of pneumococcal isolates are penicillin resistant at some level, with a substantial proportion of strains resistant to multiple drugs (3). Although information regarding resistance to other antimicrobial drugs was unavailable in the Connecticut survey, the overall prevalence of penicillin-resistant strains in Connecticut was low through June 1993. However, resistant pneumococcal strains can spread rapidly in communities (7,8), and DPHAS is conducting surveillance for antimicrobial resistance.

Because penicillin susceptibility cannot be assumed, pneumococcal isolates associated with disease should be screened routinely for penicillin resistance by disk diffusion using a 1-ug oxacillin disk (9), which is highly sensitive -- although not 100% specific -- for penicillin resistance. Screening cannot reliably quantify the degree of penicillin resistance; therefore, pneumococcal isolates with oxacillin zone sizes less than or equal to 19 mm should be further tested by determination of MICs for penicillin (9), as well as for other drugs likely to be used in treatment. Some pneumococci with either intermediate or high-level penicillin resistance also may be resistant to extended-spectrum cephalosporins; therefore, penicillin-resistant isolates should be tested by MIC for susceptibility to either ceftriaxone or cefotaxime (3,5).

To optimize empiric regimens and initial therapy for pneumococcal infections, clinical health-care providers must be informed about the prevalence and patterns of drug resistance among isolates in their communities. Statewide surveillance for DRSP as a notifiable condition has been initiated in Colorado, Connecticut, and New Jersey. CDC, in collaboration with the Council of State and Territorial Epidemiologists and the Association of State and Territorial Public Health Laboratory Directors, is developing strategies for collecting information on pneumococcal drug resistance in other states and for preventing morbidity and death associated with infection with resistant strains (3). Because antimicrobial susceptibility testing should be conducted routinely on invasive pneumococcal isolates, emphasis must be placed on developing methods to compile and analyze results, alerting health-care providers in communities in which resistant pneumococcal strains are prevalent, and identifying areas requiring more intensive epidemiologic assessment.

In areas where pneumococci resistant to extended-spectrum cephalosporins are prevalent, empiric therapy with vancomycin and an extended-spectrum cephalosporin should be considered for cases of life-threatening infection (e.g., meningitis) potentially caused by S. pneumoniae until results of culture and susceptibility testing are known. The emergence of drug-resistant pneumococcal infections underscores the need for adherence to recommendations of the Advisory Committee on Immunization Practices that persons aged greater than or equal to 2 years with medical conditions placing them at increased risk for serious pneumococcal infection and all persons aged greater than or equal to 65 years should receive 23-valent pneumococcal capsular polysaccharide vaccine (10); no pneumococcal vaccine is licensed for children aged less than 2 years.

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