State of Alaska Epidemiology Bulletin

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Drug Resistant Streptococcus pneumoniae in Alaska

The incidence of Streptococcus pneumoniae resistant to penicillin and other commonly used antibiotics has been increasing in the US since the mid-1980's.[1,2,3] **Pneumococcal isolates have recently been recovered in Alaska that are either moderately or fully resistant to penicillin.** A 1992 nasopharyngeal carriage study of 185 children □6 years of age living in the Yukon Kuskokwim Delta found that 50% carried S. pneumoniae and that 29% of the isolates recovered were moderately resistant to penicillin.[4] Among 27 penicillin resistant isolates, 20 (74%) were also resistant to erythromycin and trimethoprim/sulfamethoxazole (TMP/SMX).[4] In the same region, 4 (26%) of 15 invasive isolates recovered in 1993 were moderately resistant to penicillin and fully resistant to erythromycin and TMP/SMX. None were resistant to extended spectrum cephalosporins or vancomycin.

In December 1993, a multiply resistant pneumococcal isolate was recovered from a Fairbanks infant hospitalized for bacteremia. The isolate was fully resistant to penicillin, erythromycin, TMP/SMX, cefaclor, ceftriaxone, and cefotaxime, but sensitive to tetracycline, chloramphenicol, vancomycin, and rifampin. The child was successfully treated with ceftriaxone and amoxicillin/clavulanate. Follow-up nasopharyngeal cultures of family members showed that the patient, a younger sibling, and the patient's mother continued to carry the organism even after all family members had been treated with rifampin. A carriage study of 54 other contacts and patients attending an outpatient clinic found 1 isolate with an identical resistance pattern, as well as another isolate which was additionally resistant to tetracycline and chloramphenicol.

The arrival of pneumococcal strains fully resistant to penicillin and to third generation cephalosporins is of concern because of the widespread empiric use of these antibiotics. Pneumococcal isolates associated with invasive disease should be routinely screened with a 1 μg oxacillin disk. The result of the oxacillin test also predicts the activity of ampicillin, ampicillin/sulbactam, amoxicillin, and amoxicillin/clavulanate. Isolates of S. pneumoniae with oxacillin zone sizes of□≥20 mm are susceptible to penicillin. Penicillin susceptible strains may also be considered susceptible to beta-lactams such as cefepime, cefotaxime, ceftriaxone, cefuroxime sodium (parenteral), cefuroxime axetil (oral), and imipenem. Isolates with zone sizes of□≤19 mm should be considered potentially resistant to penicillin. Such isolates should have minimal inhibitory concentrations (MICs) determined at a reference laboratory.

While the oxacillin test identifies all pneumococcal isolates that are resistant to penicillin, some isolates with a zone size of ≤19 mm may have an MIC indicating susceptibility to penicillin (□0.06 μg/ml). Isolates from patients without meningitis that have intermediate range MICs (0.12-1.0 μg/ml) may respond to therapy with a parenteral beta-lactam. Isolates from patients with meningitis that have an oxacillin disk test suggesting penicillin resistance should be routinely tested by MIC for susceptibility to a variety of clinically appropriate antibiotics used for treating meningitis including penicillin, extended spectrum cephalosporins, vancomycin, chloramphenicol, and imepenem.

Streptococcus pneumoniae isolates recovered from normally sterile sites should continue to be sent to the Arctic Investigations Program Laboratory in Anchorage for serotype and antibiotic susceptibility determination. This will allow the monitoring of antibiotic resistance and assist in the formulation of treatment recommendations. A strip diffusion test (E-test) is now commercially available that could be used to immediately screen pneumococcal isolates from patients with meningitis for susceptibility to penicillin and an extended spectrum cephalosporin.[5] Screening isolates from patients without meningitis with an oxacillin disk, followed by an E-test of isolates with a zone size of □≤19 mm may prove more cost effective.

The appearance of drug resistant pneumococci in Alaska underscores the need for adherence to the guidelines of the Alaska expanded pneumococcal vaccine program.[6] Pneumococcal vaccination, and a booster dose every 6 years, is recommended for persons □≥2 years of age with medical conditions placing them at increased risk and all persons □≥55 years of age. No vaccine is licensed for children <2 years of age. Pneumococcal conjugate vaccines for use in children <2 years of age, covering serotypes commonly resistant to antibiotics, are currently under development.

References:

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