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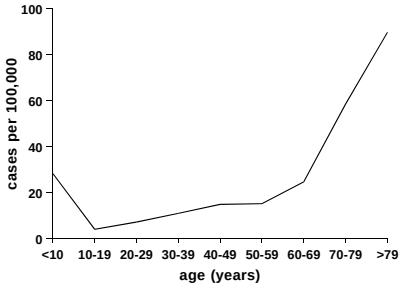
STREPTOCOCCUS PNEUMONIAE: SURVEILLANCE FOR INVASIVE DISEASE

OSLER DESCRIBED *Streptococcus pneumoniae* as "the old man's friend" in appreciation of its role in delivering the *coup de grâce* to many. Pneumococcal disease is by no means restricted to the elderly. Although a major infectious cause of sickness and death,[1] pneumococcal infections are not routinely reportable in Oregon or other states. Based on unspecified "surveys, research reports, and several community-based studies," the CDC guessed in 1984 that *S. pneumoniae* caused 2,600-6,200 cases of meningitis, 16,000-55,000 cases of bacteremia, 150,000-570,000 cases of pneumonia, and 11,000-41,000 deaths annually in the United States.[2] *S. pneumoniae* is also a common cause of otitis media, sinusitis, endocarditis, osteomyelitis, septic arthritis, peritonitis, and other bad things. In 1995, the Health Divison undertook a special surveillance program for invasive pneumococcal infections in the Portland area, including compilation of antibiotic resistance information. This study is part of part of a multi-site collaboration with CDC and health departments in California, Connecticut, and Minnesota.[3] In this article we summarize the first year of Oregon data and current vaccine recommendations.

The Portland area, chosen for logistical considerations, was defined as Multnomah, Clackamas, and Washington counties (pop. 1,305,100). As cases of invasive disease, we counted persons from whom *S. pneumoniae* was isolated from a normally sterile site (e.g., blood, pleural fluid, cerebrospinal fluid, peritoneal fluid, pericardial fluid, or synovial fluid and specimens collected during sterile procedures). Microbiologists from the 18 Portland-area hospitals identify potential cases, report them to the Health Division, and forward isolates to the Oregon State Public Health Laboratory (OSPHL). Patient records are reviewed for demographic and clinical information, and the isolates are tested for antimicrobial susceptibility.

Invasive Pneumococcal Disease Incidence by Age, Portland



PRELIMINARY RESULTS

In the year beginning July 1, 1995, 250 cases were reported, for an annual incidence of 19.2 per 100,000 population. The rate was higher in Multnomah County (25.3/100,000) than in Clackamas (13.3) and Washington (13.8) counties. The majority (57%) of cases were male. By age, the incidence was highest for children ≤4 years old and persons >70 (see graph). Primary diagnoses included pneumonia (with bacteremia) in 63%, primary bacteremia (22%) and meningitis (7%). Diagnoses varied by age; 52% of pneumonia cases were over 60; children ≤4 accounted for 54% of bacteremias and 35% of the meningitides. Almost one-quarter (59; 24%) of cases were treated as outpatients—half of these being children ≤3 years old. All patients treated as outpatients survived.

The overall Oregon incidence (19.2 / 100,000) recorded in the first year of this study is comparable to rates derived in a number of other U.S. studies. [4-11] The only "outlier" estimate (108/100,000) came from a study among Alaskan Natives.[12]

Twenty-three cases died (9% of the total), with diagnoses of pneumonia (17 cases), bacteremia (4), meningitis (1), and cellulitis with bacteremia (1). All were adults (26-96 years old). This case fatality rate is somewhat lower than the 15-19% seen in previous studies, but our numbers are small and long term follow-up of cases was not attempted. (Previous studies suggest that many of these individuals will die of other causes eventually.[13])

For decades *S. pneumoniae* was uniformly sensitive to penicillin, but resistance has spread alarmingly in the 29 years since it was first documented.[14] By 1994, pneumococcal isolates from 7% of Atlanta patients with invasive disease were highly resistant to penicillin (MIC >2 μg/ml); another 18% showed intermediate resistance (MIC 0.12-1.2 μg/ml). In the Portland study, only 80% of the first 100 isolates were fully susceptible. Resistant organisms were associated with 12 pneumonias, 5 primary bacteremias, and single cases of meningitis, mastoiditis and sinusitis. Because high serum concentrations of penicillin are readily achievable, treatment of pneumonia and bacteremia may not be greatly affected by such resistance.[15] Treating meningitis caused by resistant organisms is another story, however.[14,16]

PREVENTION

The increasing prevalence of resistant organisms underscores the importance of primary prevention. Immunity to *S. pneumoniae* derives from antibodies to the polysaccharide capsule of the bacterium. Although pneumococcal capsules come in 81 flavors, the 23 serotypes available in the current vaccine are associated with more than 88% of pneumococcal bacteremias in the United States, and they induce antibodies that cross-react with an additional 8% of isolates.[17] The vaccine has an efficacy of ~57% against the serotypes contained

Antibiotic Susceptibilities for Pneumococcal Isolates

Antibiotic	*S*	*I*	*R*
Amoxicillin	94%	5%	1%
Cefotaxime	93	6	1
Chloramphenicol	95	0	5
Clindamycin	98	0	2
Erythromycin	96	0	4
Ofloxacin	99	1	0
Penicillin	**80**	**12**	**8**
Rifampin	99	1	0
Tetracycline	95	0	5
TMP/SMX	73	9	18
Vancomycin	100	0	0

S, susceptible; I, intermediate resistance; R, resistant

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within the vaccine, and is especially valuable for those at increased risk of invasive disease, including those with diabetes, coronary vascular disease, chronic pulmonary disease and de facto asplenia.[18]

Although most of the people for whom pneumococcal vaccine is indicated (see box) see a physician at least once a year (and often much more frequently), vaccine coverage is far from universal. Too many physicians are apparently willing to "let someone else worry about it." According to the 1991 National Health Interview Survey, 36% of persons 50-64 years of age had cardiovascular conditions with an indication for pneumococcal vaccination, yet only 9% of these individuals had been vaccinated.[3] Vaccination is indicated for everyone ≥65 years old, yet 1996 BRFS survey data indicate that only 55% of Oregonians in that category have been immunized. Outbreaks in long-term care populations are only one demonstration of the large numbers of susceptible individuals in our aging society.[19]

CANDIDATES FOR PNEUMOCOCCAL VACCINE

- **Persons ≧ 65 years old**
- **Persons with Chronic Illness:**
  - Cardiovascular disease
  - Pulmonary disease
  - Diabetes mellitus
  - Alcoholism
  - Cirrhosis
  - Cerebrospinal fluid leaks
- **Immunocompromised persons (≥2 years old):**
  - Splenic dysfunction or asplenia
  - Generalized malignancies, including leukemia
  - Hodgkin's disease
  - Lymphoma
  - Multiple myeloma
  - Chronic renal failure
  - Nephrotic syndrome
  - Organ transplantation
  - Other conditions associated with immunosuppression
  - HIV infection

Revaccination at 5-year intervals is recommended for all adults with immunocompromising conditions (see table).[20] It should also be considered at 3-year intervals for children with nephrotic syndrome, asplenia, or sickle cell anemia. Prior to the development of the current 23-valent pneumococcal vaccine, a 14-valent preparation was in widespread use (primarily 1977-1983). Absent evidence of compromised immune status, revaccination with the newer preparation is not routinely indicated for those who got this earlier vaccine.

WITH FRIENDS LIKE THIS, WHO NEEDS ENEMIES?

Pneumococcal disease is a common, sometimes lethal, and often preventable illness that can strike young and old alike. Take the time to consider your patients' risk, and what you can do about it. What are the immunization protocols in your practice? Are you part of the problem, or part of the solution? If you are unable to give injections, do you refer your eligible patients to other providers with surer aim? If it matters, Medicare has reimbursed for the cost of vaccine and its administration since 1981. Happy Holidays.

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