Haemophilus influenzae Surveillance Report 2010

Oregon Active Bacterial Core Surveillance (ABCs)

Office of Disease Prevention & Epidemiology
Oregon Health Authority

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Background

The Active Bacterial Core surveillance (ABCs) program is a core component of the Emerging Infections Program (EIP) Network sponsored by the Centers for Disease Control and Prevention (CDC). The purpose of the ABCs program is to determine the incidence and epidemiologic characteristics of invasive disease due to *Haemophilus influenzae*, *Neisseria meningitidis*, group A *Streptococcus* (GAS), group B *Streptococcus* (GBS), *Streptococcus pneumoniae*, and methicillin-resistant *Staphylococcus aureus* (MRSA). The entire EIP Network for invasive *H. influenzae* disease represents almost 42 million persons in 10 surveillance areas around the United States. More information on the EIP/ABCs Network is found at: http://www.cdc.gov/abcs/index.html.

In Oregon, the surveillance area for invasive *H. influenzae* disease comprises the entire state, with a 2010 estimated population of 3,844,195.* More information on the Oregon ABCs program is found at: http://public.health.oregon.gov/DiseasesConditions/CommunicableDisease/Pages/abc.aspx.

Methods

Invasive *H. influenzae* disease (IHiD) is defined as the isolation of *H. influenzae* from a normally sterile body site in a resident of Oregon. Since IHiD is reportable in Oregon, hospital laboratories submit sterile site *H. influenzae* microbiology isolates to the Oregon State Public Health Laboratory for serotyping. Additional cases are identified through regular laboratory record reviews. Isolates are forwarded to a CDC laboratory for confirmation of serotype. Health record reviews of each case provide standardized reports of demographic characteristics, clinical syndrome manifestations, underlying illnesses or conditions, and illness outcome.

Surveillance Results

Descriptive Epidemiology

In 2010, 69 cases of IHiD were reported in Oregon, corresponding to an incidence rate of 1.79/100,000 persons (Figure 1). This is 19 percent higher than the average annual incidence rate in Oregon during the previous five years (1.50/100,000) and 10 percent higher than the most recent national estimate of disease (1.62/100,000).[1] Over 92 percent of IHiD cases in 2010 were hospitalized, almost equivalent to the previous five-year average rate of hospitalization.

There were 12 IHiD deaths in 2010, for an annual mortality rate of 0.31/100,000, 48 percent higher than the previous five-year average in Oregon (0.21/100,000) and 41 percent higher than the national mortality rate projection for IHiD (0.22/100,000).[1]

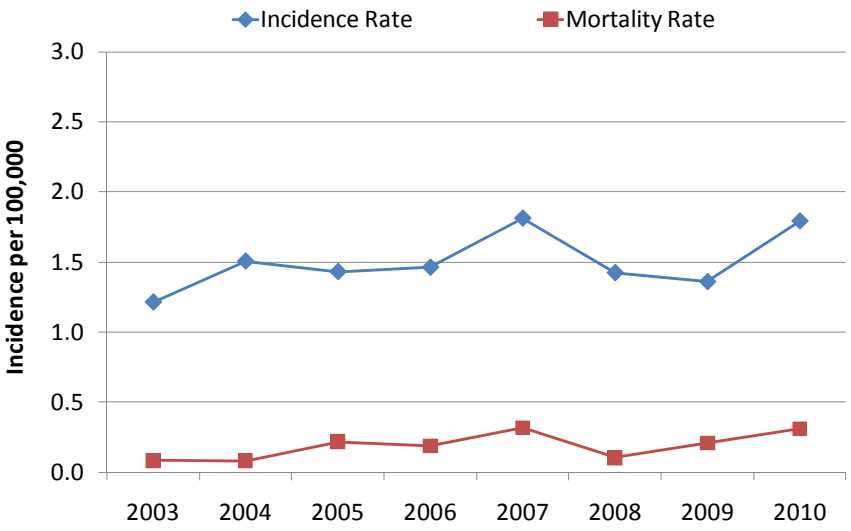
* Source: Portland State University Population Research Center (http://www.pdx.edu/prc/)

Active Bacterial Core surveillance

The 2010 case fatality rate for IHiD in Oregon was 17 percent, which is higher than both the 14 percent reported for Oregon from 2005-2009 and the national rate of 14 percent in 2010 based on national projections.[1]

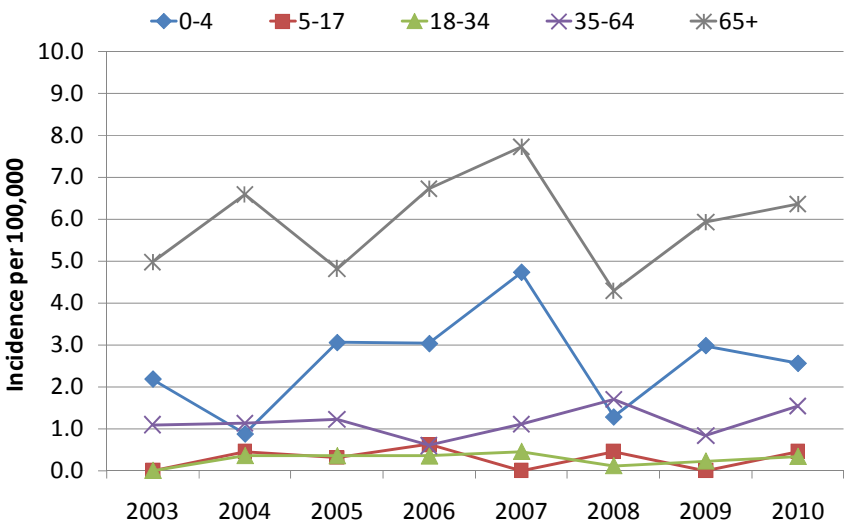
Of 69 cases where sex was known, 43 percent were male; of 52 cases where race was known, 94 percent were white; and of 50 cases where ethnicity was known, 6 percent were Hispanic or Latino.

Figure 1: Incidence and Mortality Rates of IHiD Cases in Oregon



Consistent with historical patterns, the burden of IHiD in 2010 was highest (6.36/100,000) among those 65 years of age and older, followed by those 0-4 (2.56/100,000) (Figure 2). Other age groups have remained largely stable over the last few years.

Figure 2: Incidence of IHiD Cases in Oregon by Age



Mortality due to IHiD in 2010 was highest among those 65 years of age and older (0.96/100,000), almost 19 percent lower than the age-specific mortality rate in 2009 (1.19/100,000) and 13 percent lower than the age-specific previous 5-year average (1.10/100,000).

Clinical Manifestations

The top two clinical manifestations of IHiD reported in 2010 – bacteremic pneumonia (clinical pneumonia with a positive blood culture) and primary bacteremia – were reported among 59 percent and 29 percent of cases, respectively (Table 1). The clinical syndrome profile of IHiD has been roughly stable over the six year period. No significant differences were detected between clinical syndromes in 2010 compared to their respective previous 5-year averages. From 2005-2010, clinical manifestation of IHiD was not significantly associated with fatal outcome.

Table 1: Percent of IHiD Cases† Reporting Common Clinical Syndromes

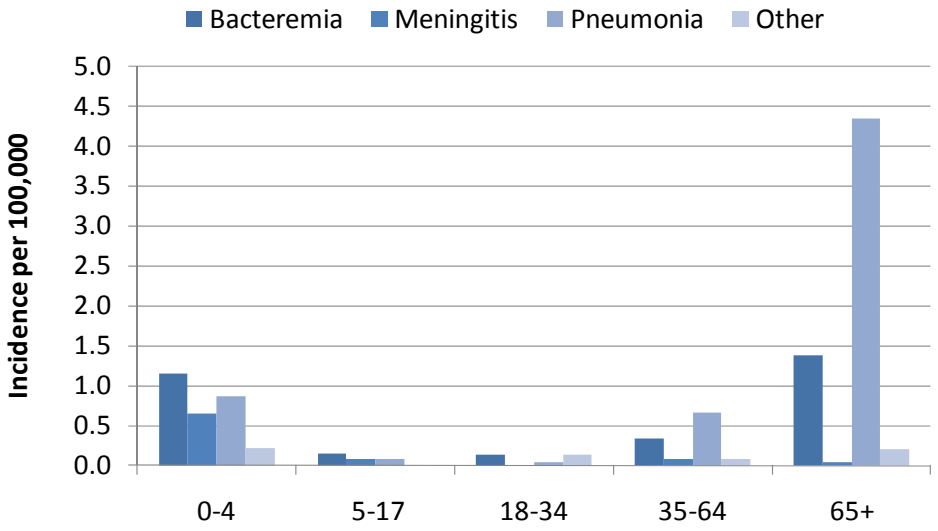
Syndrome	2010	2005-2009
Bacteremic pneumonia	59	58
Primary bacteremia	29	29
Meningitis	4	7
Other††	7	6

† Some cases report more than 1 syndrome.

†† Other syndrome includes cellulitis, endometritis, epiglottitis, peritonitis, septic abortion, septic arthritis, and sterile abscess.

From 2005-2010, bacteremia was the most common presentation among all persons less than 35 years of age (Figure 3). Meningitis was most common among those under 5 years of age, while bacteremic pneumonia was most common among the elderly population over 65 years of age.

Figure 3: Clinical Manifestation of IHiD in Oregon by Age
2005-2010 six-year average



Bacteremia and meningitis decreased with increasing age ($p=0.0007$ and $p<0.0001$, respectively), while bacteremic pneumonia increased with age ($p<0.0001$).

Underlying Conditions

In 2010, the most commonly identified underlying conditions or risk behaviors among IHiD cases were smoking (30%), cardiovascular disease (28%), and chronic obstructive pulmonary disease (COPD) (25%). With the exception of smoking (p=0.0219), which was more prevalent among cases in 2010 than previously, this profile is not significantly different from the profile of underlying conditions seen for cases reported during the previous five years (Table 2).

Table 2: Underlying Conditions Reported Among IHiD Cases

Underlying Condition	2010 only (n=69) N (%)	2005-2009 (n=280) N (%)
Alcohol abuse	4 (6)	17 (6)
Asthma	7 (10)	31 (11)
Cancer	9 (13)	47 (17)
Cardiovascular disease	19 (28)	82 (29)
COPD	17 (25)	68 (24)
Diabetes	10 (15)	56 (20)
Immunosuppression	9 (13)	30 (11)
Smoking	**21 (30)**	**46 (16)**
None	12 (17)	38 (14)

The frequencies of cardiovascular disease, COPD, and diabetes increased with age among those with IHiD, while the remaining underlying conditions (alcohol abuse, asthma, cancer, immunosuppression, and smoking) were reported most frequently among IHiD cases 35-64 years of age.

No underlying risk factors were reported from 17 percent of cases, although this varied considerably by age. Sixty-seven percent of cases less than five years of age had no underlying conditions, in contrast to only 12 percent of cases 65 and over.

Cardiovascular disease was the only condition associated with a fatal outcome from IHiD (p=0.0025). While bivariate analyses revealed several significant associations between underlying conditions and clinical syndrome manifestation, no conditions were significant predictors of any clinical manifestation after controlling for age.

Serotype Analysis

In 2010, serotyping was completed for 68 (99%) *H. influenzae* isolates causing invasive disease. Of these, there were three nonfatal cases of type b. The first case presented as bacteremia in a 56-year old female with no underlying conditions, hospitalized for two days. The second case presented as osteomyelitis in a 66-year old female with no underlying conditions, hospitalized for 18 days. The third case presented as pneumonia in a child less than five years of age. (Since 1995, there have been 33 cases of serotype b infection, eight of which occurred in children less than five. Until 2010, there had been no cases in this young age group since 2004.)

Figure 4: Serotype of IHiD Cases in Oregon

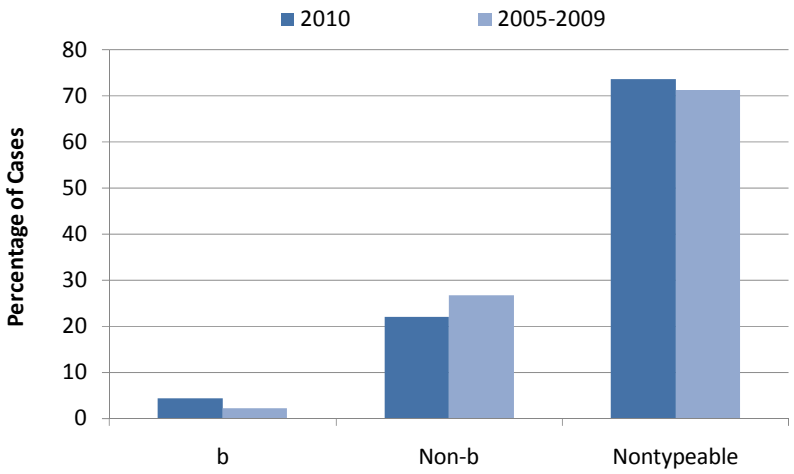
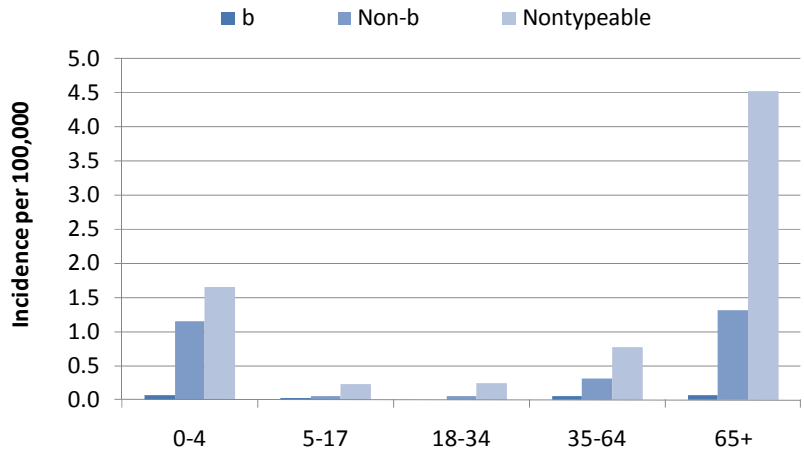


Figure 5: Serotype of IHiD Cases in Oregon by Age 2005-2010 six-year average



Of the remaining IHiD isolates, 50 (72%) were nontypeable and 15 (22%) were of a type other than serotype b (Figure 4). This was not significantly different from the serotype profile of cases reported during the previous five years. Also, this serotype distribution did not vary by age (Figure 5). Among each age group, the most common serotype was nontypeable, followed by non-b and b serotypes.

None of the serotypes were significantly associated with clinical syndromes or fatal outcome.

Discussion

H. influenzae serotype b (Hib) was once the leading cause of bacterial meningitis and a common cause of invasive bacterial disease among children less than 5 years of age in the United States. With the introduction of Hib vaccines during the mid to late 1980s, the incidence of invasive Hib disease in children less than 5 has decreased significantly leading to a notable change in the overall epidemiology of IHiD.[2] There has been increased recognition of non-serotype b and nontypeable cases in persons over 5 years of age, especially among those 65 years of age or older. In Oregon, our surveillance data confirm this overall trend. We are currently participating in an extensive retrospective chart review of IHiD cases 65 years of age or older to better understand the burden of disease within this age group. We will continue to monitor these trends and work with other ABCs sites to better characterize the changing epidemiology of IHiD.

References

1. Centers for Disease Control and Prevention. 2010. Active Bacterial Core Surveillance Report, Emerging Infections Program Network, *Haemophilus influenzae*, 2009. Available via the Internet: http://www.cdc.gov/abcs/reports-findings/survreports/hib09.pdf.
2. Centers for Disease Control and Prevention. Achievements in Public Health, 1990-1999 Impact of Vaccines Universally Recommended for Children – United States, 1990-1999. MMWR 1999; 48(12):243-8.