Haemophilus influenzae Surveillance Report 2014

Oregon Active Bacterial Core Surveillance (ABCs)

Center for Public Health Practice

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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 2013 estimated population of 3,919,019.* More information on the Oregon ABCs program is found at: http://public.health.oregon.gov/DiseasesConditions/CommunicableDisease/EmergingInfections/Pages/ActiveBacterialCoreSurveillance.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

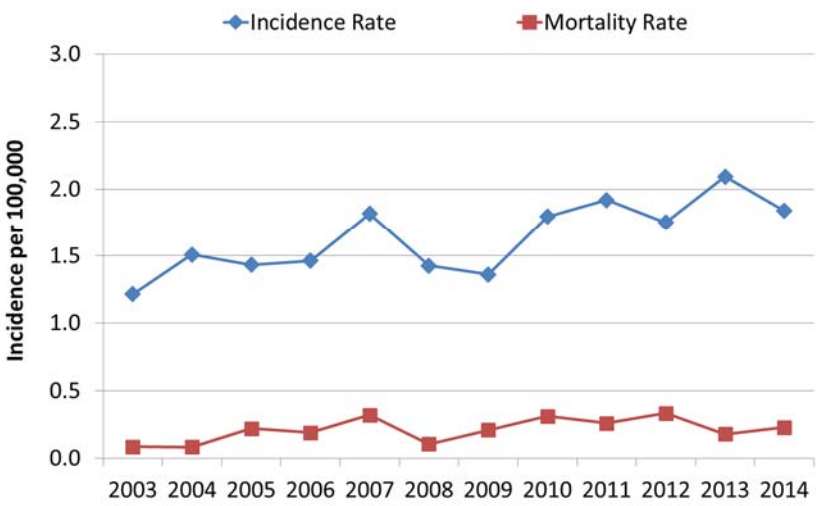
In 2014, 72 cases of IHiD were reported in Oregon, corresponding to an incidence rate of 1.84/100,000 persons (Figure 1). This is 3 percent higher than the average annual incidence rate in Oregon during the previous five years (1.78/100,000), and 4 percent higher than the most recent national estimate of disease (1.77/100,000).[1] All IHiD cases in 2014 were hospitalized; 7 percent higher than the previous five-year average rate of hospitalization (93 percent).

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

There were 9 IHiD deaths in 2014, for an annual mortality rate of 0.23/100,000, 11 percent lower than the previous five-year average in Oregon (0.26/100,000) and the same as the national mortality rate projection for IHiD (0.23/100,000).[1]

The 2014 case fatality rate for IHiD in Oregon was 12.5 percent, which is 15 percent lower than the figure reported for Oregon from 2009-2013, and 4 percent lower than the national rate of 13 percent in 2013 based on national projections.[1]

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

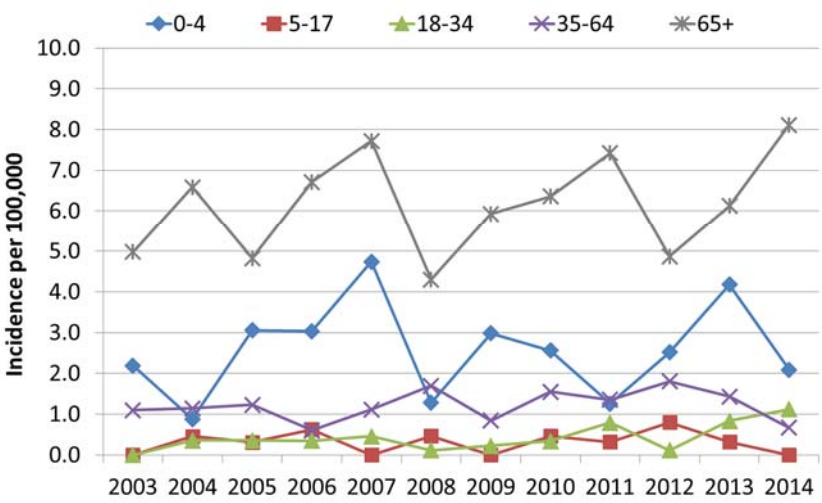


Sixty percent of cases were male; of 63 cases where race was known, 98 percent were white and 2 percent were black; and of 61 cases where ethnicity was known, three percent were Hispanic or Latino.

Consistent with historical patterns, the burden of IHiD in 2014 was highest (8.11/ 100,000) among those 65 years of age and older, followed by those 0–4 (2.09/100,000) and18-34(1.12/100,000)(Figure 2). Other age groups have remained largely stable over the last few years.

Mortality due to IHiD in 2014 was highest among those 65 years of age and older (1.16/100,000); 133 percent higher than the age-specific mortality rate in 2013 (0.50/100,000) and 9 percent higher than the age-specific previous 5-year average (1.06/100,000).

Figure 2: Incidence of IHiD Cases in Oregon by Age



Clinical Manifestations

The top two clinical manifestations of IHiD reported in 2014 – bacteremic pneumonia (clinical pneumonia with a positive blood culture) and primary bacteremia – were reported among 74 percent and 18 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 2014 compared to their respective previous 5-year averages. From 2009-2014, there were no differences in fatality between the different clinical syndromes.

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

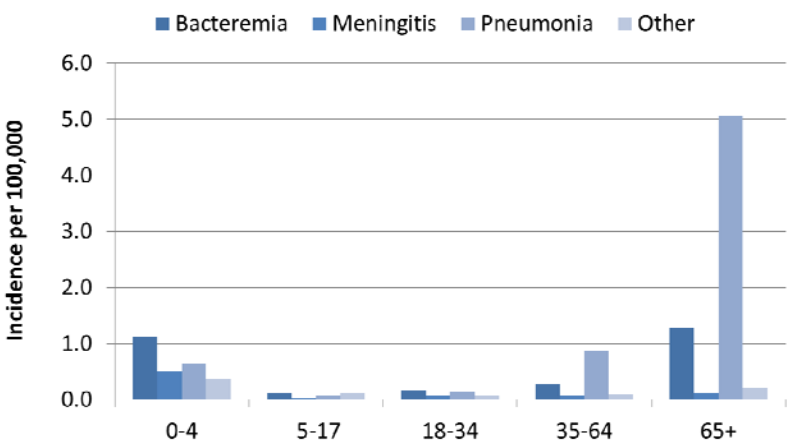
Syndrome	2014	2009-2013
Bacteremic pneumonia	74	63
Primary bacteremia	18	24
Meningitis	7	5
Other††	3	7

† Some cases report more than 1 syndrome.
†† Other syndrome includes cellulitis, endometritis, epiglottitis, peritonitis, septic abortion, septic arthritis, and sterile abscess.

From 2009-2014, bacteremia and bacteremic pneumonia were most common among those 65 years of age and older (Figure 3).

Bacteremia and meningitis decreased with increasing age (p=0.0001 and p<0.0001, respectively), while bacteremic pneumonia increased with age (p<0.001).

Figure 3: Clinical Manifestation of IHiD in Oregon by Age
2009-2014 six-year average



Underlying Conditions

In 2014, the most commonly identified underlying conditions or risk behaviors among IHiD cases were cardiovascular disease (42%), chronic obstructive pulmonary disease (COPD) (36%), diabetes (33%), and smoking (22%). With the exception of alcohol (P=0.041), which was *less* prevalent among cases in 2014, and cardiovascular disease (p=0.03), which was *more* prevalent among cases in 2014 than in earlier years, this profile was 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	2014 only (n=72) N (%)	2009-2013 (n=345) N (%)
Alcohol abuse	0 (0)	19 (6)
Asthma	10 (14)	32 (9)
Cancer	5 (7)	26 (7)
Cardiovascular disease	30 (42)	99 (29)
COPD	26 (36)	100 (29)
Diabetes	22 (31)	85 (25)
Immunosuppression	3 (4)	35 (10)
Obesity	8 (11)	46 (13)
Smoking	16 (22)	84 (24)
None	4 (6)	43 (12)

In 2014, asthma, COPD, and cardiovascular disease were reported most frequently among IHiD cases 65 years and over, while cancer, diabetes, and smoking were most common among IHiD cases 35–64 years of age.
No underlying risk factors were reported for six percent of cases, although this varied considerably by age. Sixty percent of cases less than five years of age had no underlying conditions, in contrast to only 7 percent of cases 35 – 64 years of age.
From 2009-2014, alcohol abuse was associated with a fatal outcome from IhiD (p=0.0009). COPD was a significant predictor of pneumonia (p=0.0035) and bacteremia (p=0.0144).

Serotype Analysis

In 2014, serotyping was completed for 64 (99%) *H. influenzae* isolates causing invasive disease. Of these, there were four nonfatal cases of type b. Two were female and three were >50 years of age. All four were hospitalized for pneumonia. Since 1995, there have been 42 cases of serotype b infection, nine of which occurred in children less than five. From 2009-2014, the average number of Hib cases in those <5 years of age was 0.4 per year.

Figure 4: Serotype of IHiD Cases in Oregon

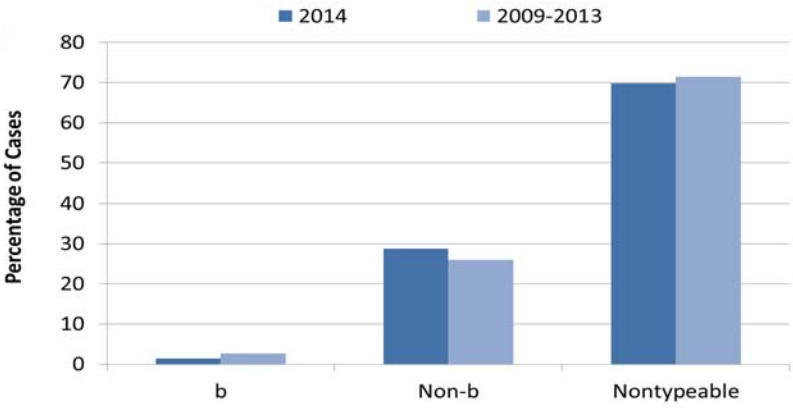
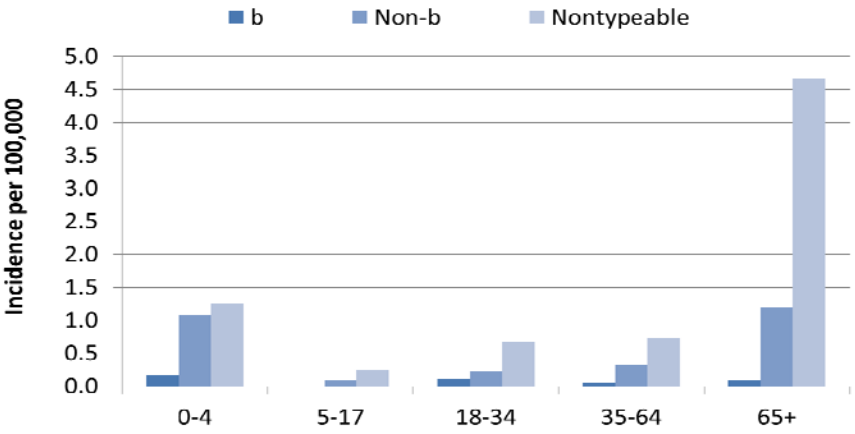


Figure 5: Serotype of IHiD Cases in Oregon by Age
2010-2014 five-year average



Of the remaining IHiD isolates, 48 (68%) were nontypeable and 19 (27%) 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. Among each age group, the most common serotype was nontypeable, followed by non-b and b serotypes (Figure 5).

None of the serotypes were significantly associated with fatal outcome. After controlling for age, non-typeable serotypes (OR 2.2; CI 1.3, 3.9) were significantly associated with bacteremia.

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 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. 2012. Active Bacterial Core Surveillance Report, Emerging Infections Program Network, *Haemophilus influenzae*, 2013. Available via the Internet: http://www.cdc.gov/abcs/reports-findings/survreports/hib13.pdf. Accessed 10 August 2015.
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.