

***Haemophilus influenzae* Surveillance Report 2012**

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 2012 estimated population of 3,883,735.* 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 2012, 68 cases of IHiD were reported in Oregon, corresponding to an incidence rate of 1.75/100,000 persons (Figure 1). This is 5 percent higher than the average annual incidence rate in Oregon during the previous five years (1.66/100,000) as well as the most recent national estimate of disease (1.66/100,000).¹ Almost 93 percent of IHiD cases in 2012 were hospitalized, slightly higher than the previous five-year average rate of hospitalization (92 percent).

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



There were 13 IHiD deaths in 2012, for an annual mortality rate of 0.24/100,000, 38 percent higher than the previous five-year average in Oregon (0.24/100,000) and 52 percent higher than the national mortality rate projection for IHiD (0.22/100,000).¹

The 2012 case fatality rate for IHiD in Oregon was 19 percent, which is 33 percent higher than the figure reported for Oregon from 2007-2011, and 42 percent higher than the national rate of 13 percent in 2012 based on national projections.¹

Forty-eight percent of cases were male; of 60 cases where race was known, 97 percent were white; and of 60 cases where ethnicity was known, eight percent were Hispanic or Latino.

Consistent with historical patterns, the burden of IHiD in 2012 was highest (.87/100,000) among those 65 years of age and older, followed by those 0–4 (2.52/100,000) and 35–64 (1.80/100,000)(Figure 2). Other age groups have remained largely stable over the last few years.

Mortality due to IHiD in 2012 was highest among those 65 years of age and older (1.39/100,000); 30 percent higher than the age-specific mortality rate in 2011 (1.27/100,000) and 20 percent higher than the age-specific previous 5-year average (1.15/100,000).

Clinical Manifestations

The top two clinical manifestations of IHiD reported in 2012 – bacteremic pneumonia (clinical pneumonia with a positive blood culture) and primary bacteremia – were reported among 66 percent and 16 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 2012 compared to their respective previous 5-year averages. From 2006-2012, clinical manifestation of IHiD was not significantly associated with fatal outcome.

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

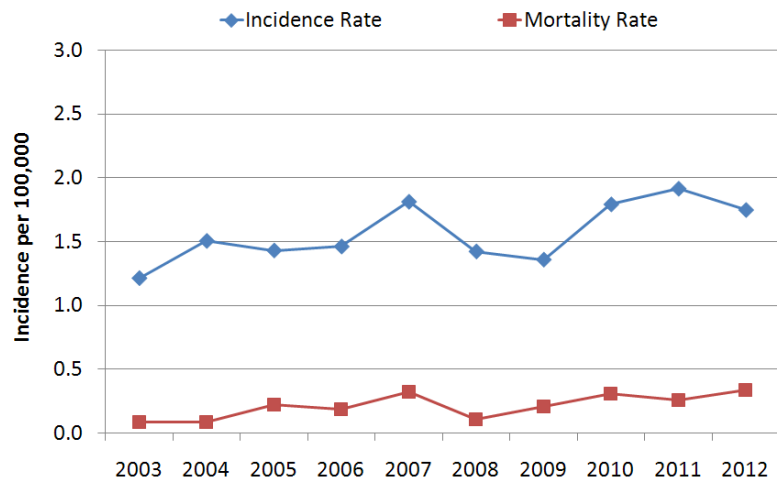


Figure 2: Incidence of IHiD Cases in Oregon by Age

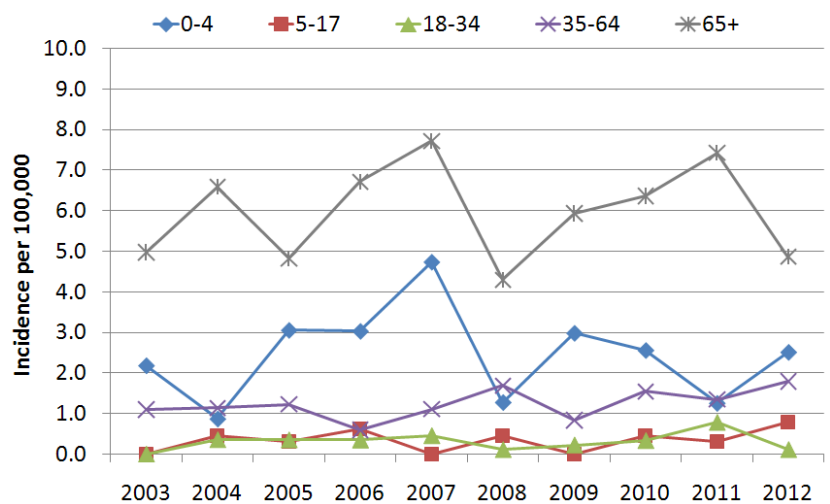


Table 1: Percent of IHiD Cases† Reporting Common Clinical Syndromes

Syndrome	2012	2007-2011
Bacteremic pneumonia	66	64
Primary bacteremia	16	25
Meningitis	10	5
Other††	7	7

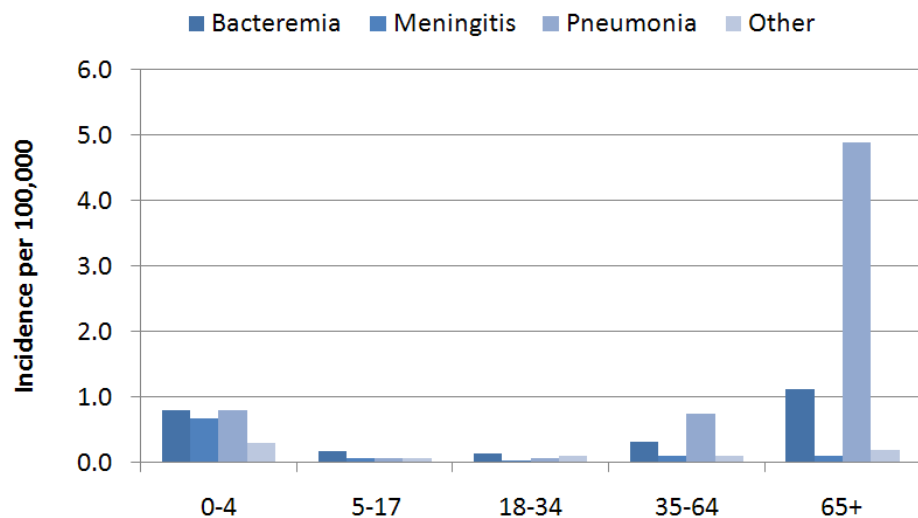
† Some cases report more than 1 syndrome.

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

From 2006-2012, bacteremia was the most common presentation among those 5–34 years of age, while bacteremic pneumonia was most common among all other age groups (Figure 3).

Bacteremia and meningitis decreased with increasing age ($p=0.0002$ and $p<0.001$, respectively), while bacteremic pneumonia increased with age ($p<0.001$).

Figure 3: Clinical Manifestation of IHiD in Oregon by Age 2006-2012 seven-year average



Underlying Conditions

In 2012, the most commonly identified underlying conditions or risk behaviors among IHiD cases were chronic obstructive pulmonary disease (COPD) (35%), diabetes (31%), and cardiovascular disease. With the exception of cancer ($p=0.0397$) which was *less* prevalent among cases in 2012 and obesity ($p=0.04$) which was *more* prevalent among cases in 2012 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	2012 only (n=68)	2007-2011 (n=317)
	N (%)	N (%)
Alcohol abuse	5 (7)	22 (7)
Asthma	7 (10)	31 (10)
Cancer	3 (4)	42 (13)
Cardiovascular disease	17 (25)	98 (31)

COPD	24 (35)	78 (25)
Diabetes	21 (31)	71 (22)
Immunosuppression	7 (10)	37 (12)
Obesity	14 (21)	36 (11)
Smoking	15 (22)	66 (21)
None	9 (13)	41 (13)

In 2012, cancer, cardiovascular disease, and diabetes were reported most frequently among IHiD cases 65 years and over, while COPD, alcohol abuse, asthma, and smoking were greatest among IHiD cases 35–64 years of age.

No underlying risk factors were reported for 13 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 7 percent of cases 65 and over.

After controlling for age, alcohol abuse was associated with a fatal outcome from IHiD ($p=0.0380$) and obesity was the only condition to be a significant predictor of clinical manifestation, specifically meningitis ($p=0.0059$).

Serotype Analysis

In 2012, serotyping was completed for 64 (94%) *H. influenzae* isolates causing invasive disease. Of these, there was one nonfatal case of type b in a 67-year old female with multiple underlying conditions (diabetes, COPD, smoker, and cardiovascular disease), hospitalized for three days. Since 1995, there have been 35 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.

Of the remaining IHiD isolates, 42 (66%) were nontypeable and 21 (33%) 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

Figure 4: Serotype of IHiD Cases in Oregon

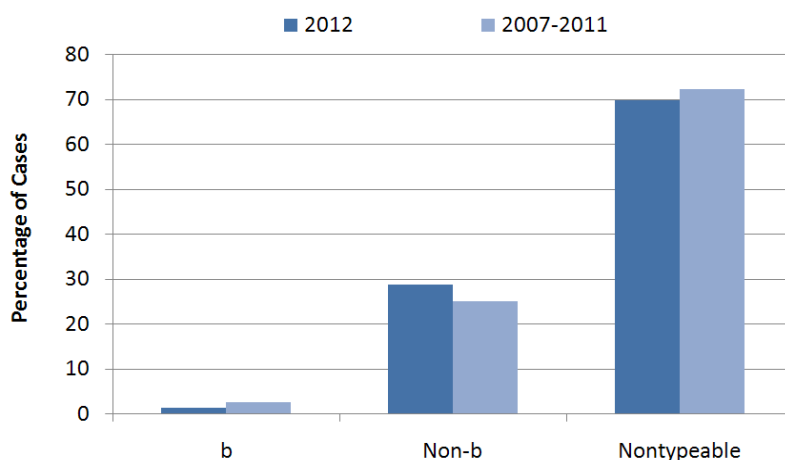
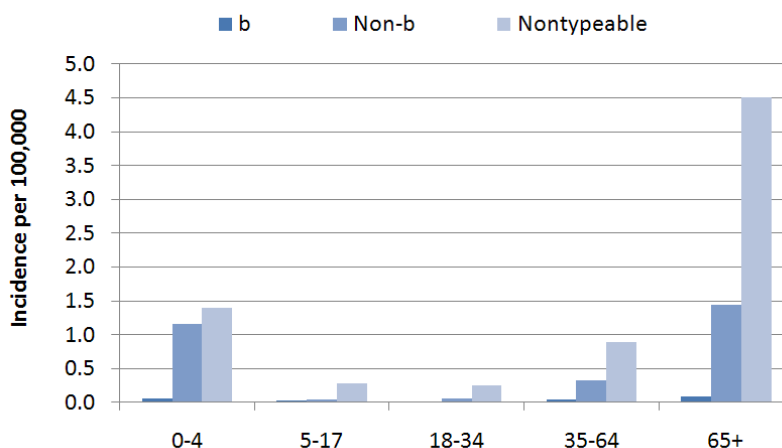


Figure 5: Serotype of IHiD Cases in Oregon by Age
2006-2012 seven-year average



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-b serotypes were significantly associated with bacteremia. Non-b cases were positively associated with bacteremia (OR 2.0; [CI] 1.1, 3.6).

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*, 2010. Available via the Internet: <http://www.cdc.gov/abcs/reports-findings/surv-reports.html>. Accessed 1 July 2014.
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.