

***Haemophilus influenzae* Surveillance Report 2015**

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), and *Streptococcus pneumoniae*. The entire EIP Network for invasive *H. influenzae* disease represents almost 43 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 2015 estimated population of 4,013,845.* 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 as well as submitting demographic data electronically via Electronic Laboratory Reporting (ELR). 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 2015, 94 cases of IHiD were reported in Oregon, corresponding to an incidence rate of 2.34/100,000 persons (Figure 1). This is 24 percent higher than the average annual incidence rate in Oregon during the previous five years (1.88/100,000), and 41 percent higher than the most recent national estimate of disease (1.66/100,000).¹ Ninety-three percent of IHiD cases in 2015 were hospitalized.



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

There were 15 IHiD deaths in 2015, for an annual mortality rate of 0.45/100,000, 74 percent higher than the previous five-year average in Oregon (0.26/100,000) and 79 percent higher than the most recent national mortality rate projection for IHiD (0.25/100,000).¹

The 2015 case fatality rate for IHiD in Oregon was 19 percent, which is 38 percent higher than the figure reported for Oregon from 2010-2014, and 27 percent higher than the national rate of 15 percent based on national projections.¹

Forty-seven percent of cases were male; of 88 cases where race was known, 90 percent were white; and of 88 cases where ethnicity was known, two percent were Hispanic or Latino.

Consistent with historical patterns, the burden of IHiD in 2015 was highest (8.67/100,000) among those 65 years of age and older, followed by those 0-4 (1.65/100,000) 35-64 (1.71/100,000) (Figure 2). Other age groups have remained largely stable over the last few years.

Mortality due to IHiD in 2015 was highest among those 65 years of age and older (2.28/100,000); 140 percent higher than the age-specific mortality rate in 2014 (1.01/100,000) and 125 percent higher than the age-specific previous 5-year average (1.01/100,000).

Clinical Manifestations

The top two clinical manifestations of IHiD reported in 2015 – bacteremic pneumonia (clinical pneumonia with a positive blood culture) and primary bacteremia – were reported among 60 percent and 28 percent of cases, respectively (Table 1). No significant differences were detected between clinical syndromes in 2015 compared to their respective previous 5-year averages. From 2010-2015, bacteremia was significantly associated with a fatal outcome (OR 2.2, CI 1.3, 3.8). There were no differences in fatality between the other clinical syndromes.

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

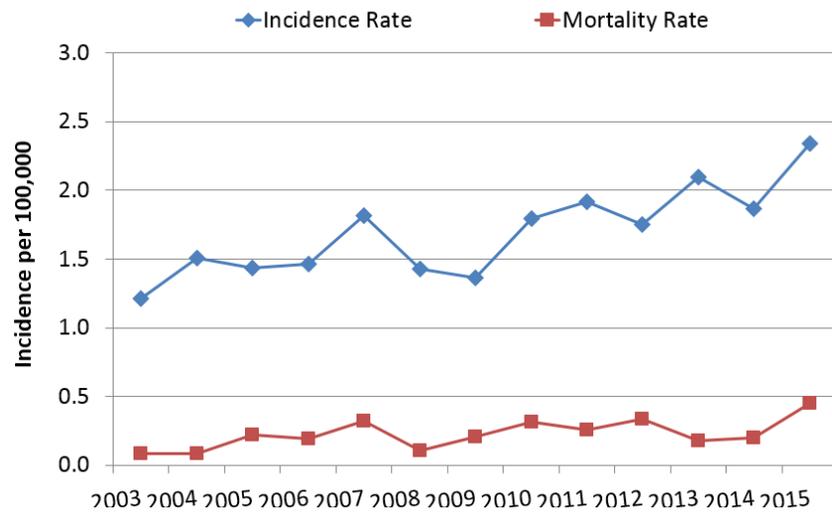


Figure 2: Incidence of IHiD Cases in Oregon by Age

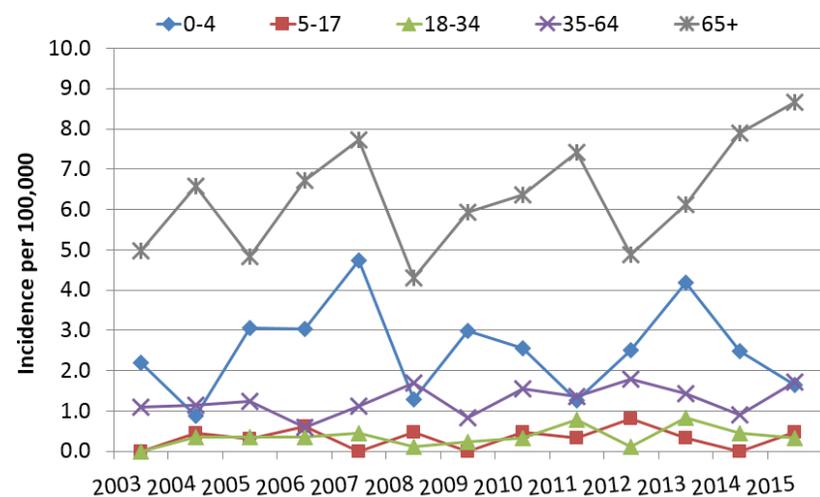


Table 1: Percent of IHiD Cases[†] Reporting Common Clinical Syndromes

Syndrome	2015	2010-2014
Bacteremic pneumonia	60	65
Primary bacteremia	28	23
Meningitis	7	6
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 2010-2015, 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 ($p < 0.001$).

Underlying Conditions

In 2015, the most commonly identified underlying conditions or risk behaviors among IHiD cases were cardiovascular disease (37%), chronic obstructive pulmonary disease (COPD) (21%), diabetes (19%), and asthma (17%). With the exception of smoking ($p = 0.004$), obesity ($p < 0.0001$) and alcohol ($p < 0.0001$), which were *less* prevalent among cases in 2015, this profile was not significantly different from the profile of underlying conditions seen for cases reported during the previous five years (Table 2).

Figure 3: Clinical Manifestation of IHiD in Oregon by Age 2010-2015 six-year average

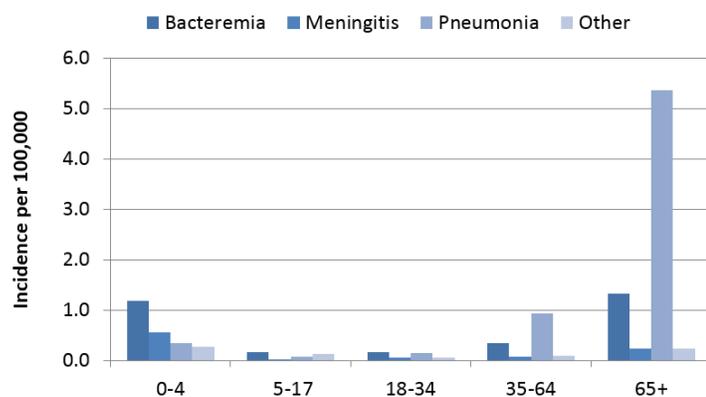


Table 2: Underlying Conditions Reported Among IHiD Cases

Underlying Condition	2015 only (n=94)	2010-2014 (n=367)
	N (%)	N (%)
Alcohol abuse	0 (0)	15 (4)
Asthma	16 (17)	37 (10)
Cancer	5 (7)	25 (7)
Cardiovascular disease	35 (37)	117 (32)
COPD	20 (21)	110 (30)
Diabetes	18 (19)	96 (26)
Immunosuppression	12 (13)	32 (9)
Obesity	3 (3)	53 (14)
Smoking	10 (11)	91 (25)
None	13 (14)	41 (11)

In 2015, asthma, COPD, diabetes, immunosuppression, and cardiovascular disease were reported most frequently among IHiD cases 65 years and over, while smoking was most common among IHiD cases 35–64 years of age.

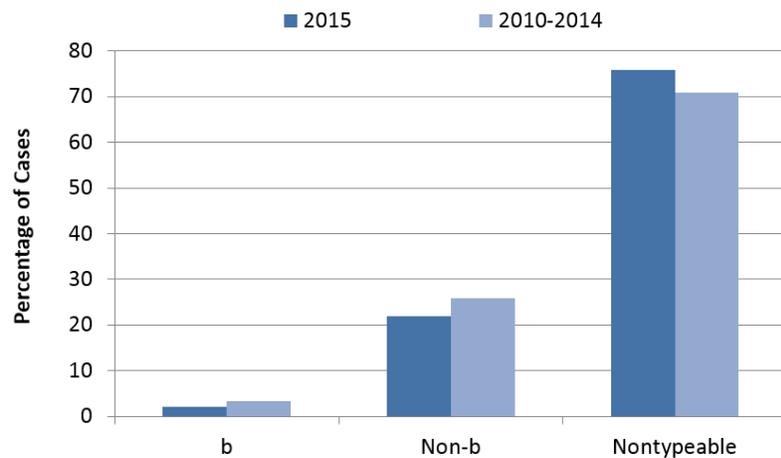
No underlying risk factors were reported for fourteen percent of cases, although this varied considerably by age. Fourteen percent of cases >65 years of age had no underlying conditions, in contrast to 30 percent of cases under the age of 35 years.

From 2010-2015, alcohol abuse was associated with a fatal outcome from IhiD ($p=0.0008$). COPD was a significant predictor of pneumonia ($p=0.0147$).

Serotype Analysis

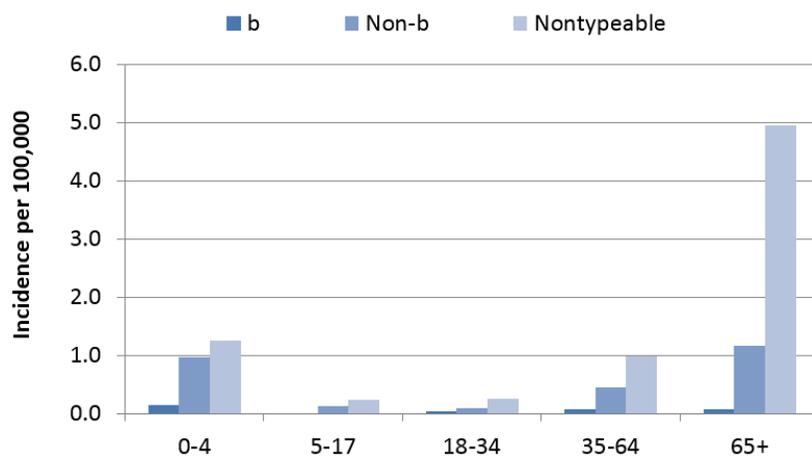
In 2014, serotyping was completed for 91 (97%) *H. influenzae* isolates causing invasive disease. Of these, there were two nonfatal cases of type b. Both were male, >45 years of age, and hospitalized for bacteremia. Since 1995, there have been 44 cases of serotype b infection, nine of which occurred in children less than five. From 2010-2015, the average number of Hib cases in those <5 years of age was 0.33 per year.

Figure 4: Serotype of IHiD Cases in Oregon



Of the remaining IHiD isolates, 69 (76%) were nontypeable and 20 (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. Among each age group, the most common serotype was nontypeable, followed by non-b and b serotypes (Figure 5).

Figure 5: Serotype of IHiD Cases in Oregon by Age 2010-2015 six-year average



None of the serotypes were significantly associated with fatal outcome. After controlling for age, non-typeable serotypes (OR 1.8; CI 1.1, 3.1) 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. The increase in rates in Oregon this past year, largely driven by increases in rates among persons > 65 years, bears watching; 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. 2014. Active Bacterial Core Surveillance Report, Emerging Infections Program Network, *Haemophilus influenzae*, 2014. Available via the Internet: <http://www.cdc.gov/abcs/reports-findings/survreports/hib14.pdf>. Accessed 16 August 2016.
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.