Haemophilus influenzae Surveillance Report 2005

Oregon Active Bacterial Core Surveillance (ABCs)
Office of Disease Prevention & Epidemiology
Oregon Department of Human Services
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Background:

Active Bacterial Core Surveillance (ABCs) is a core component of the CDC Emerging Infections Program Network. 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 methicillin-resistant *Staphylococcus aureus* (MRSA). The entire EIP Network for invasive *H. influenzae* disease represents 39.0 million persons in 10 surveillance areas. More information on the EIP/ABCs Network is found at: http://www.cdc.gov/ncidod/dbmd/abcs.

In Oregon, the surveillance area for invasive *H. influenzae* disease comprises the entire state of Oregon with a 2005 estimated population of 3,631,440. More information on the Oregon ABCs program is found at: http://oregon.gov/DHS/ph/acd/abc.shtml.

Methodology:

Invasive *H. influenzae* disease (IHiD) is defined as the isolation of *H. influenzae* from a normally sterile body site in 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 then sent 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:

Burden of Disease

In 2005, 52 cases of IHiD were reported in Oregon, corresponding to an incidence rate of 1.4/100,000 persons (Figure 1). This is slightly higher than the average annual incidence rate in Oregon from 2000-2004 (1.2/100,000) and equivalent to the 2005 national projections of disease (1.4/100,000).[1] There were eight IHiD deaths in 2005, for an annual mortality rate of 0.2/100,000 (Figure 1). While similar to the national mortality rate projection for IHiD (0.2/100,000)[1], this is higher than the average annual 2000-2004 rate in Oregon of 0.1/100,000. The 2005 case fatality rate for IHiD in Oregon was 15%; higher than the 10% reported for Oregon from 2000-2004, yet similar to the 14%, based on national projections.[1] Of 51 cases where sex was known, 63% were female; of 44 cases where race was known, 91% were white, 5% were black, and 5% were other race; and of 36 cases where ethnicity was known, 3% were Hispanic or Latino.

Figure 1: Incidence of IHiD Cases and Deaths in Oregon, 2000-2005.

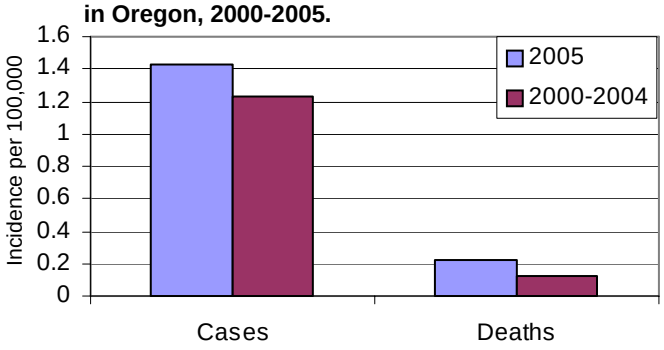
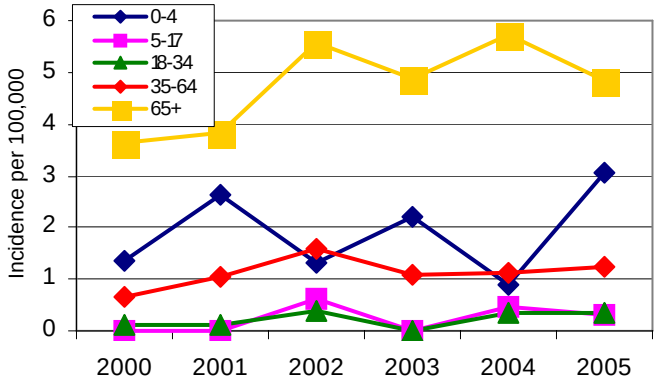


Figure 2: Incidence of IHiD Cases in Oregon by Age, 2000-2005.



The burden of IHiD in 2005 was highest (4.8/100,000) among those 65 years of age and older, followed by those from 0-4 years of age (3.1/100,000), consistent with historical patterns. (Figure 2) Since 2000, incidence rates of IHiD among all age groups have been stable outside of year-to-year fluctuation. The mortality and case fatality rates due to IHiD were also highest among those 65 years of age and older (1.1/100,000 and 23%, respectively), followed by those from 0-4 years of age (0.4/100,000 and 14%, respectively). This has also been stable since 2000, within annual variability. Logistic regression revealed that, despite the highest mortality rate in the oldest age group, there is no significant association between fatal outcome from IHiD and age.

Clinical Manifestations

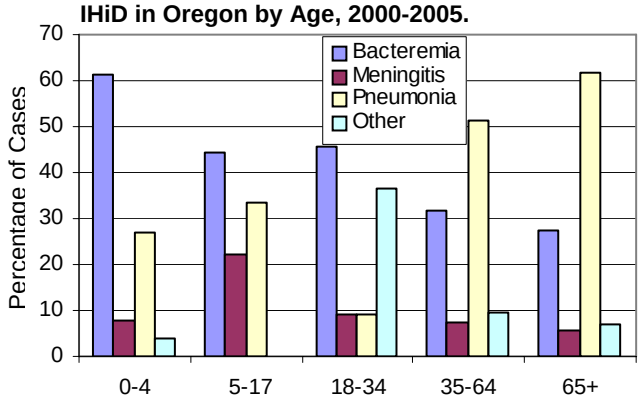
The top two clinical manifestations of IHiD reported in 2005 – pneumonia and primary bacteremia – were reported among 56% and 29% of cases, respectively (Table 1). Although there is no significant difference in the percentage of cases reporting bacteremia in 2005 versus the previous 5-year average, a slightly significant decreasing trend has been noted since 2000 (p=0.049). No additional significant trends in the clinical manifestation of IHiD were seen and no clinical manifestation was positively associated with an increased risk of a fatal outcome.

Table 1: Percent of IHiD cases reporting common clinical syndromes[†].

Syndrome	2005	2000-2004
Pneumonia	56	50
Primary Bacteremia	29	35
Meningitis	4	8
Other	12	8

[†] Some cases report >1 syndrome.

Figure 3: Clinical Manifestation of IHiD in Oregon by Age, 2000-2005.



The clinical manifestation of IHiD does vary according to age. (Figure 3) From 2000-2005, bacteremia was the most common presentation in the youngest age group, decreasing with age (p=0.0002). Conversely, pneumonia due to *H. influenzae* increased with age (p<0.0001) to peak in those 65 years of age and older.

Underlying Conditions

The percentage of cases reporting underlying conditions varies according to age, with the majority reported among adults. From 2000-2005, 4% of cases in 0-4 year olds were reported with asthma – the only underlying condition noted in this age group. Among 5-17 year olds, immunosuppression was reported in 22% of cases, while asthma and cancer were reported in 11% of cases, each. Table 2 lists underlying conditions that were identified in greater than 5% of adult IHiD cases. Smoking and asthma were significantly associated with cases among

younger adults, while cardiovascular disease, chronic obstructive pulmonary disease (COPD) and cancer were significantly associated with cases among older adults.

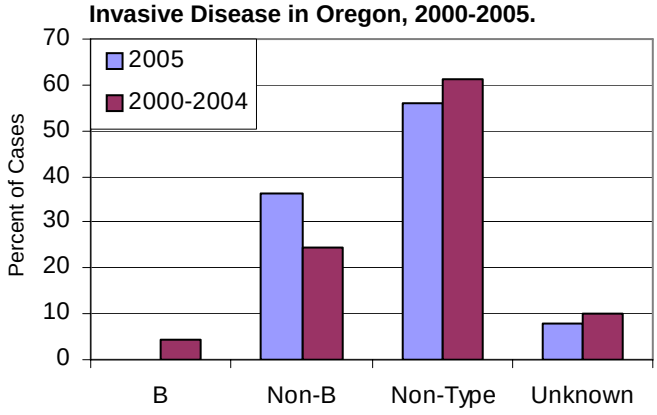
No underlying conditions were associated with a fatal outcome from IHiD. Cardiovascular disease was 1.9 times more likely (95% confidence interval [CI] 1.1, 3.5), and COPD 3.0 times more likely (95% CI 1.5, 6.0) among patients with pneumonia. However, after adjusting for age in a logistic regression model, only COPD remained as an independent predictor of pneumonia (adjusted odds ratio = 2.7, 95% CI 1.3, 5.4).

Table 2: IHiD Cases with Reported Underlying Conditions.

	18-64	65+	p-value
Cardiovascular Disease	**14**	**41**	**<0.0001**
COPD	**15**	**27**	**0.0022**
Cancer	**12**	**23**	**0.0099**
Diabetes	17	18	0.6714
Smoking	**25**	**8**	**0.0003**
Asthma	**18**	**7**	**0.0111**
Immunosuppression	10	10	0.2747
Alcohol Abuse	10	4	0.1553

Serotype Analysis

Figure 4: Serogroup of *H. influenzae* Causing Invasive Disease in Oregon, 2000-2005.



In 2005, of the 48 cases (92%) for which the serotyping of *H. influenzae* causing invasive disease was completed, 60% were non-typable and 40% were of a type other than type B. (Figure 4) Zero cases of type B were reported in 2005. No statistically significant difference in the serotype profile was seen between 2005 and the previous 5-year average.

Compared to cases of other or unknown serotype, non-typable isolates were more common among isolates causing pneumonia (p=0.043) and less common among isolates causing bacteremia (p=0.0059). No other associations were seen between isolate serotype and clinical manifestation or fatal outcome of IHiD.

Discussion:

Prior to vaccine licensure, *H. influenzae* serogroup B (Hib) was the leading cause of bacterial meningitis and retardation among infants. However, the development of a polysaccharide-protein conjugate vaccine (specifically targetting serogroup B) and recommendations for vaccination of infants as young as 2 months of age has virtually eliminated Hib disease.[2] With zero cases of Hib reported in 2005, Oregon has reached the Healthy People 2010 goal of decreasing Hib disease to zero cases per 100,000 persons less than five years of age.[1] The primary focus of IHiD surveillance will continue to be the identification and characterization of Hib disease, for which effective prevention measures exist, to identify such failures.

References:

1. Centers for Disease Control and Prevention. 2006. Active Bacterial Core Surveillance Report, Emerging Infections Program Network, *Haemophilus influenzae*, 2005. Available via the Internet: http://www.cdc.gov/ncidod/dbmd/abcs/survreports/hib05.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.