

# ***Neisseria meningitidis* Surveillance Report 2008**

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 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 meningococcal disease represents over 38 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 *N. meningitidis* disease comprises the entire state of Oregon with a 2008 estimated population of 3,791,075. More information on the Oregon ABCs program is found at: <http://www.oregon.gov/DHS/ph/acd/abc.shtml>.

## **Methods**

Invasive meningococcal disease (IMD) is defined as the isolation of *N. meningitidis* from a normally sterile body site in a resident of Oregon. Since IMD is reportable in Oregon, hospital laboratories submit sterile-site *N. meningitidis* microbiology isolates to the Oregon State Public Health Laboratory for serogrouping. Additional cases are identified through regular laboratory record reviews. Isolates are then sent to a CDC laboratory for further testing, as needed. Health record reviews of each case provide standardized reports of demographic characteristics, clinical syndrome manifestations, underlying illnesses or conditions, and illness outcome.

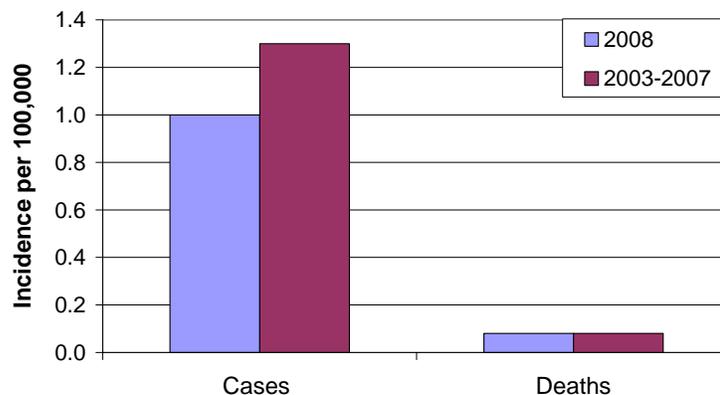
## **Surveillance Results**

### *Descriptive Epidemiology*

In 2008, 37 cases of IMD were reported in Oregon, corresponding to an incidence rate of 1.0 per 100,000 persons (Figure 1). This is lower than the average annual incidence rate in Oregon from 2003-2007 (1.3/100,000) and continues the general trend of decreasing incidence seen over recent years. However, IMD incidence in Oregon was still higher than the most recent national estimate (0.34/100,000) but comparable to the Healthy People 2010 goal for IMD (1.0/100,000).<sup>1</sup> Oregon's

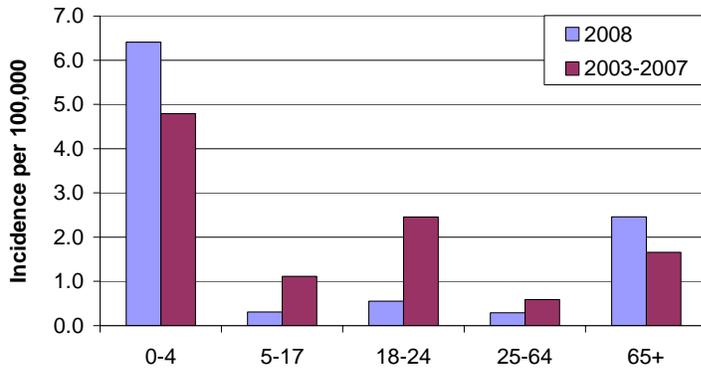
historically high rate of meningococcal disease was driven by a localized epidemic of serogroup B IMD that began in 1996 (3.4/100,000) and lasted for many years.<sup>2</sup>

**Figure 1: Incidence of IMD Cases and Deaths in Oregon, 2003-2008.**



There were three IMD deaths in 2008, for an annual mortality rate of 0.08/100,000 (Figure 1). This is equivalent to the average annual mortality rate in Oregon of 0.08/100,000 from 2003-2007, and similar to the national projections (0.04/100,000).<sup>1</sup> The 2008 case fatality rate for IMD in Oregon was 8 percent, similar to the 7 percent reported for Oregon from 2003-2007 and lower than national projections (12%).<sup>1</sup> Thirty-two percent of cases were male; of 35 cases for which race was known, 94 percent were white, 3 percent were black (n=1) and 3 percent were Asian/Pacific Islander (n=1); and of 28 cases where ethnicity was known, 11 percent were Hispanic or Latino.

**Figure 2: Incidence of IMD in Oregon by Age, 2003-2008.**



The burden of IMD is typically highest in the very young (those 0-4 years of age), with a second, lower peak in incidence in young adults, as seen in Oregon from 2003-2007 (Figure 2). However, in 2008, the incidence of IMD was highest among the 0-4 year olds followed by those over the age of 65. Only two cases were reported in those 18-24 years of age.

Among those 65 and older, 2008 IMD incidence (2.5/100,000) and mortality (0.61/100,000) were 47 percent and 74 percent higher than the respective

5-year averages (1.7/100,000 and 0.35/100,000), although this increase was not statistically significant. All three deaths in 2008 occurred in this age group. For cases reported since 2003, fatal outcome from IMD is significantly associated with age ( $p < 0.0001$ ).

### Clinical Manifestations

As is typical, the top two clinical manifestations of invasive meningococcal disease in 2008 were meningitis and primary bacteremia, noted among 49 percent and 27 percent of cases, respectively (Table 1). The clinical profile of IMD in 2008 was not significantly different compared to the previous 5-year average. Furthermore, since 2003, no significant increasing trend has been observed in these clinical syndromes. From 2003-2008, no clinical manifestation was associated with an increased risk of a fatal outcome.

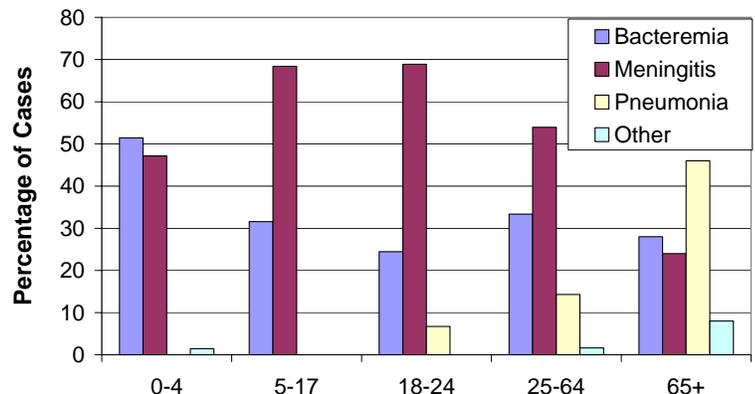
**Table 1: Percent of IMD Cases with Common Clinical Syndromes<sup>†</sup>.**

Syndrome	2008 (Percent)	2003-2007 (Percent)
Meningitis	49	52
Primary Bacteremia	27	37
Pneumonia	19	12
Other	5	2

<sup>†</sup> Some cases report >1 syndrome.

The clinical presentation of IMD varies according to age (Figure 3). From 2003-2008, bacteremia was most common among those less than five, meningitis was most common among those 5-64, and pneumonia was most common among those 65 and over. The association between age and clinical manifestation is statistically significant, with bacteremia and meningitis

**Figure 3: Clinical Manifestation of IMD in Oregon by Age, 2003-2008.**



decreasing with increasing age,  $p=0.0197$  and  $p=0.0012$ , respectively, and pneumonia increasing,  $p<0.0001$ .

### Underlying Conditions

Table 2 lists underlying conditions that are known risk factors for invasive meningococcal disease or were noted frequently among adult IMD cases in Oregon from 2003-2008. Over half (51%) of all cases had no underlying conditions noted in the medical record, although this is not uniform across the age spectrum: 74 percent of children less than 18 years of age had no underlying conditions versus 35 percent of adults ( $p<0.0001$ ). Only 26 percent of those 65 years and older fit this classification.

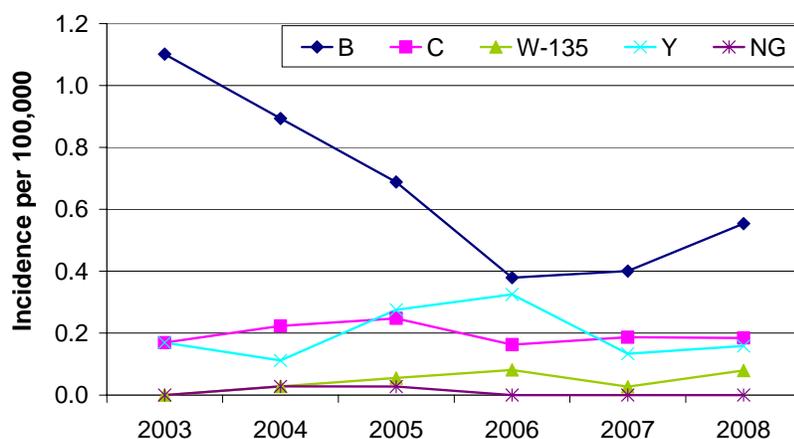
**Table 2: Adult IMD Cases with Underlying Conditions, 2003-2008.**

Underlying Conditions	Cases (Percent)
Smoking	24
Cardiovascular Disease	14
Diabetes	11
COPD	6
Immunosuppression	5
Asthma	4
Cancer	3
<b>None</b>	<b>35</b>

Underlying conditions were further analyzed with regard to fatal outcome and clinical manifestation of IMD. No conditions were associated with either a fatal outcome from IMD or bacteremia manifestations. While meningitis was significantly associated with COPD overall ( $p=0.0298$ ), it did not remain associated after controlling for age. Overall, pneumonia was significantly associated with asthma, cardiovascular disease, COPD, diabetes, and immunosuppression. However, only asthma and immunosuppression remained independently associated with pneumonia after controlling for age ( $p=0.0017$  and  $p=0.0447$ , respectively).

### Serogroup Analysis

**Figure 4: Serogroup of *N. meningitidis* Causing Invasive Disease in Oregon, 2003-2008.**



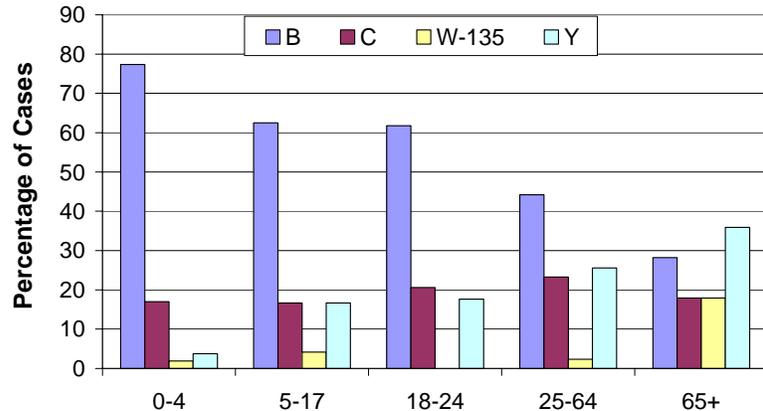
In 2008, the serogroups of *N. meningitidis* causing invasive disease were determined for all 37 cases. Of these, serogroup B comprised 57 percent; serogroup C, 19 percent; serogroup W-135, 8 percent; and serogroup Y, 16 percent. Historically in Oregon, serogroup B has been the predominant serogroup causing IMD.

While the serogroup profile of cases reported in 2008 was not significantly different than that for cases reported during the previous five years, a

statistically significant decreasing trend in the proportion of cases due to serogroup B ( $p<0.0032$ ) and an increasing trend in the proportion of cases due to serogroups W-135 and Y ( $p<0.0001$  and  $p=0.0125$ , respectively) have been noted. Changes in serogroup distribution since 2003 can be observed in Figure 4. Overall, the incidences of serogroups C and Y have remained relatively stable, while the incidence of cases due to serogroup B has decreased 50 percent from 2003 to 2008 and the incidence due to serogroup W-135 has increased from zero to 0.08 per 100,000 persons during the same time period.

During the five-year period from 2004-2008, serogroup B was the most commonly identified serogroup among those 0-4 years of age (77%), and serogroup W-135 was the least common (2%) (Figure 5). Among those 65 years of age and older, serogroup Y was the most commonly identified group (36%). Serogroup B was significantly more likely to be identified from those 0-4 years of age ( $p=0.0069$ ) and significantly less likely to be identified from those 65 years of age and older ( $p=0.0018$ ) than other serogroups.

**Figure 5: Serogroup of *N. meningitidis* Causing Invasive Disease in Oregon by Age Group, 2004-2008.**



None of the serogroups were significantly associated with a fatal outcome among cases of IMD. Among clinical manifestations, serogroup B was negatively associated with pneumonia ( $p=0.0004$ ). None of the other serogroups were significantly associated with a particular clinical syndrome.

### Discussion

In 2008, the rate of IMD in Oregon increased slightly from the historic low observed the previous year. At 1.0 cases per 100,000 in this state, the rate has declined 69 percent from the 3.2 cases per 100,000 seen in 1996. As mentioned earlier in this report, this peak was driven by a localized epidemic of serogroup B meningococcal disease that began in 1996 and lasted for several years.

As serogroup B disease continues to decrease, the epidemiological profile of IMD is becoming more similar to the national picture. For instance, the decrease in serogroup B disease correlates with a decrease in the percentage of cases with bacteremia; meningitis now comprises a majority of IMD cases; and IMD increasingly manifests as pneumonia due to serogroup Y in those 65 years of age and older. Lack of association between fatal outcome and either bacteremia or serogroup C disease – a previously reported finding – is likely due to the small number of IMD cases reported in Oregon.<sup>3</sup>

The changing epidemiology of *Neisseria meningitidis* in Oregon has major implications for the prevention of IMD. The Advisory Committee on Immunization Practices (ACIP) recommends the administration of the meningococcal conjugate vaccine (MCV) routinely for 11-12 year olds; at high-school entry for those who have not previously been vaccinated; or for those at a higher risk of IMD, such as college freshmen living in dormitories.<sup>4</sup> Although MCV is not effective at protecting against serogroup B disease, the importance of MCV vaccination may become more important in Oregon, in light of the continued decreasing trend in serogroup B disease among adolescents and young adults.

## References

1. Centers for Disease Control and Prevention. 2009. Active Bacterial Core Surveillance Report, Emerging Infections Program Network, *Neisseria meningitidis*, 2008. Available via the Internet: <http://www.cdc.gov/abcs/reports-findings/survreports/mening08.pdf>.
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