Group B *Streptococcus* 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 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 GBS disease comprises the tri-county (Clackamas, Multnomah, and Washington) Portland metropolitan area with a 2008 estimated population of 1,614,465. More information on the Oregon ABCs program is found at: http://oregon.gov/DHS/ph/acd/abc.shtml.

Methods

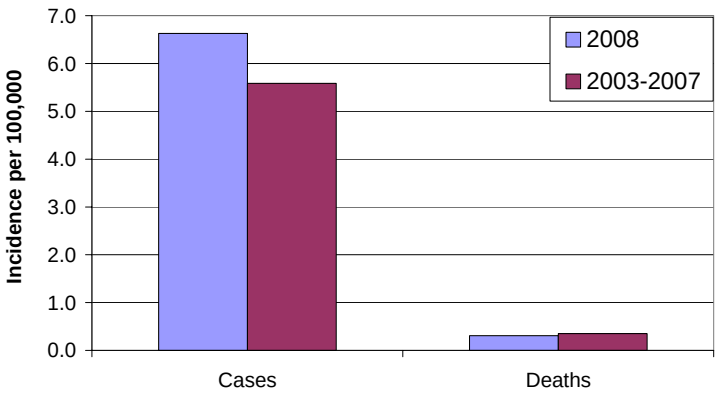
Invasive disease is defined as the isolation of GBS from a normally sterile body site in a tri-county resident. Tri-county hospital laboratories submit GBS isolates to the Oregon State Public Health Laboratory, which forwards them to CDC for serotyping and susceptibility testing. Additional cases are identified through regular laboratory record reviews. Health record reviews of each case allow standardized reports of demographic characteristics, clinical syndrome manifestations, underlying conditions, and illness outcome. Early-onset disease is defined as invasive GBS disease occurring in infants less than seven (<7) days of age; late-onset disease is defined as invasive GBS disease occurring in infants from 7 to 89 days of age.

Surveillance Results

Descriptive Epidemiology

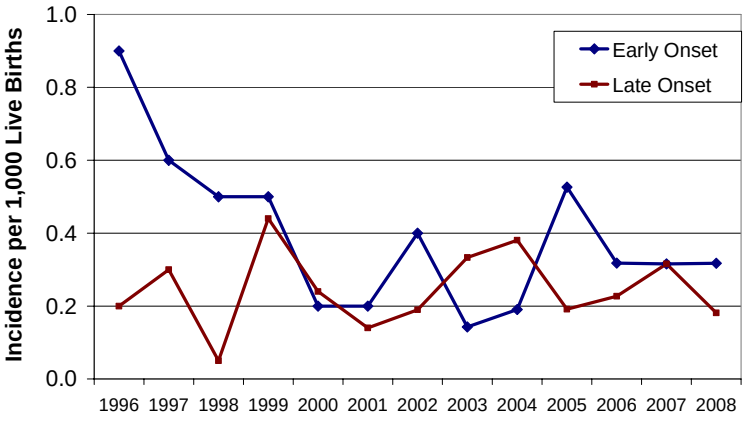
In 2008, 107 cases of invasive GBS disease were reported in the tri-county Portland area, corresponding to an incidence rate of 6.6/100,000 persons (Figure 1). This is 18 percent higher than the average annual incidence rate in the Portland area from 2003–2007 (5.6/100,000) and equivalent to the 2008 national projection of invasive disease (6.6/100,000).[1] Of these cases, there were five deaths, for an annual mortality rate due to invasive GBS disease of 0.31/100,000 (Figure 1). This rate is less than the figures reported from 2003–2007 in the Portland area (0.35/100,000) and the 2008 national projections (0.45/100,000).[1] The 2008 case fatality rate for invasive GBS disease in the Portland area was 5 percent, lower than the rate in the Portland area from 2003–2007 (6%) and the entire ABCs

Figure 1: Incidence of Invasive GBS Cases and Deaths in the Portland Area, 2003-2008.



network in 2008 (7%).[1] Of 107 cases where sex was known, 52 percent were male; of 51 cases where race was known, 90 percent were white, 6 percent were black, and 4 percent were Asian/Pacific Islander; and of 28 cases where ethnicity was known, 96 percent were non-Hispanic or Latino.

Figure 2: Incidence of Early- and Late-Onset Invasive GBS Disease, 1996-2008.

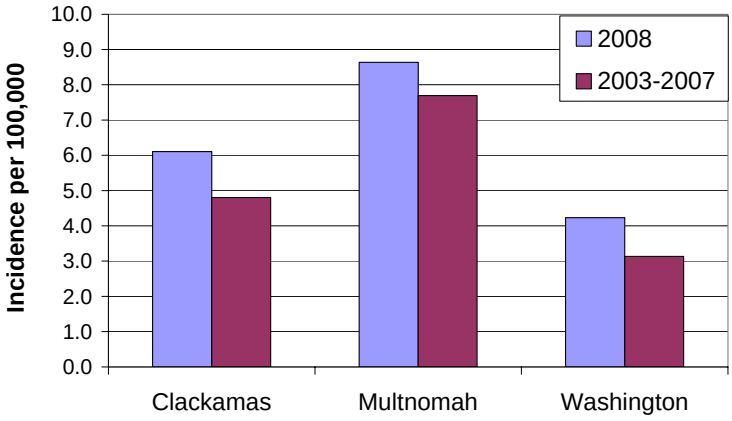


Note: Live birth data from 2008 are preliminary.

After a 78 percent decrease from 1996-2000, the incidence of early-onset GBS disease has stayed largely stable, outside of annual fluctuations (Figure 2). The incidence of late-onset disease has been relatively stable throughout the surveillance period. In 2008, the incidence of early-onset disease – seven cases; 0.32 per 1,000 live births – was equal to the previous five-year average, but slightly higher than the national estimate of disease (0.28/1,000).[1] The 2008 rate of late-onset disease – four cases; 0.18 per 1,000 live births - was lower than the previous five-year average (0.29/1,000) and 2008 national estimates (0.25/1,000).[1]

The incidence rate of invasive GBS disease in Multnomah county in 2008 (8.6/100,000) was higher than those reported from Clackamas (6.1/100,000) and Washington (4.2/100,000) counties (Figure 3). While this is similar to the historical pattern, the rates in all three counties were higher than the 2003-2007 averages, with the largest increase (35%) seen in Washington county. In 2008, the mortality rate due to GBS was highest in Multnomah county (0.42/100,000), followed by Clackamas (0.27/100,000), and Washington (0.19/100,000) counties.

Figure 3: Incidence of Invasive GBS Disease by County, 2003-2008.



The burden of disease and death due to invasive GBS disease was highest in those ≥65 years of age (42 cases; incidence 25.3/100,000 persons and 3 deaths; mortality 1.8/100,000). Incidence was also high among those under five years of age (11 cases; incidence 10.4/100,000) and those between the ages of 50 and 64 (35 cases; incidence 11.6/100,000). However, no deaths were reported among those under five and only one death was reported among the 50-64 age group (mortality 0.3/100,000). For cases reported since 2003, fatal outcome from IGBS is not associated with age.

Clinical Manifestations

The clinical manifestations of invasive GBS disease are listed in Table 1. The clinical manifestation profile of invasive GBS disease in 2008 was not significantly different than that seen from cases reported during the previous five years. For cases reported since 2003, pneumonia and cellulitis were more common with increasing age (p=0.0016 and p<0.0001, respectively), while bacteremia and meningitis were less common (p=0.0003 and p=0.0003, respectively). After adjusting for age, a fatal outcome was 2.4 times more likely among those presenting with bacteremia (95% confidence interval [CI] 1.1, 5.0) and 12 times less likely among those presenting with cellulitis (CI 1.6, 90.9).

Table 1: Percent of Invasive GBS Cases with Common Clinical Syndromes, 2003-2008.[†]

Syndrome	2008 (n=107)	2003-2007 (n=432)
Primary Bacteremia	39	46
Cellulitis	25	23
Pneumonia	9	13
Meningitis	2	3
Other Syndrome[‡]	24	16

[†] Some cases report >1 syndrome; not all syndromes shown.
‡ Includes abscess (not skin), peritonitis, HUS, pericarditis, septic arthritis, osteomyelitis, and endometritis.

Among infants with early-onset GBS disease reported in 2008, 57 percent presented with bacteremia, 29 percent with pneumonia and the remaining case with meningitis. Among late-onset cases, only bacteremia was present. This distribution was not significantly different than the presentations of early- and late-onset cases reported since 2003.

Underlying Conditions

Table 2 lists underlying conditions and known risks for adult invasive GBS disease from 2003–2008. Overall, 93 percent of cases reported at least one underlying condition or behavioral risk factor for GBS disease. Alcohol abuse, cirrhosis, and smoking were significantly associated with cases among younger adults, while cancer, cardiovascular disease and chronic obstructive pulmonary disease (COPD) were significantly associated with cases among older adults. Among all cases occurring in those less than 18 years of age, no underlying conditions were reported. However, 26 percent of early- and late-onset cases were associated with premature delivery.

Table 2: Percent of Adult Invasive GBS Cases with Underlying Conditions, 2003-2008.

Condition	18-64 (n=243)	65+ (n=213)	Total (n=456)	p-value
Alcohol Abuse	**10**	**3**	**7**	**0.0024**
Cancer	**17**	**28**	**22**	**0.0038**
Cardiovascular Disease	**18**	**51**	**33**	**<0.0001**
COPD	**6**	**15**	**10**	**0.0030**
Cirrhosis	**16**	**4**	**10**	**<0.0001**
Diabetes	40	39	39	0.83
Dialysis	7	4	5	0.27
Immunosuppression	12	12	12	0.94
Smoking	**23**	**7**	**15**	**<0.0001**
None	6	8	7	0.35

Among adults, fatal outcome was positively associated with cirrhosis (odds ratio [OR] 3.1; CI 1.1, 8.4) and smoking (odds ratio [OR] 3.1; CI 1.2, 7.9) after adjusting for age. Bacteremia was positively associated with dialysis (OR 2.3; CI 1.0, 5.2) and cellulitis was positively associated with diabetes (OR 1.6; CI 1.1, 2.5).

Serotype Analysis

The profile of the 94 isolates from 2008 for which serotype information is available is similar to that for isolates submitted from 2003-2007. For all isolates submitted since 2003, serotype IA was the most common cause of all cases (27%) followed by serotype V (25%) (Table 3). Serotype V was positively associated with pneumonia (OR 2.0; CI 1.0, 4.1) and serotype 1A was positively associated with bacteremia (OR 1.8; CI 1.1, 2.7). Serotype III was negatively associated with cellulitis (OR 0.4; CI 0.2, 0.9).

Table 3: Serotype Distribution of Isolates Tested, by Invasive GBS Disease Type, 2003-2008.

Serotype	Total N (%)	Early-Onset N (%)	Late-Onset N (%)	Other N (%)
IA	122 (27)	10 (29)	10 (32)	102 (26)
IB	42 (9)	3 (9)	1 (3)	38 (10)
III	65 (14)	7 (21)	15 (48)	43 (11)
V	112 (25)	5 (15)	3 (10)	104 (27)
Other‡	89 (19)	7 (21)	1 (3)	81 (21)
NT	27 (6)	2 (6)	1 (3)	24 (6)

‡Includes serotypes II, IV, VI, and VII

Antibiotic Susceptibility

Of 445 invasive GBS isolates tested for susceptibility to common antibiotics since 2003, 100 percent were susceptible to penicillin, ampicillin, cefotaxime, and vancomycin. Intermediate and full resistance to erythromycin were found among 3 (1%) and 153 (34%) isolates, respectively, and intermediate and full resistance to clindamycin were found among 4 (1%) and 89 (20%) isolates, respectively. Serotype IA was more likely to be susceptible to clindamycin (OR 5.6; CI 2.1, 14.5) than other serotypes, while serotype V was twice as likely to be resistant to clindamycin (CI 1.2, 3.4) and 3.5 times more likely to be resistant to erythromycin (CI 2.2, 5.8) than other or non-typable strains.

Early-Onset Invasive GBS Prevention Indicators

In 2008, two of the seven infants (29%) with early-onset IGBS disease (EO) were born at <37 weeks gestation. All of the women with infants having EO IGBS had received prenatal care, although only five (71%) were screened for GBS prior to admission. Of the five, one (20%) was GBS culture-positive but did not receive antibiotics. None of the women had bacteruria during pregnancy, a previous infant with IGBS, or a previous pregnancy with GBS colonization. Two women (29%) received intrapartum antibiotics, although neither had a positive GBS screening culture or an intrapartum fever. Both women were given cefazolin even though only one had a recorded penicillin allergy.

Guidelines for prophylaxis recommend penicillin or ampicillin, given that GBS is still fully susceptible to both. For women with documented penicillin allergies who are at low risk for anaphylaxis, cefazolin is recommended; if the risk of anaphylaxis is high, then either clindamycin or erythromycin are recommended unless the strain is known to be resistant. In the latter case, vancomycin is preferred.[2]

Discussion

A major focus of surveillance for invasive GBS disease has been the epidemiologic characterization of early-onset disease to assess the impact of screening and treatment guidelines for pregnant women. The screening guidelines for prevention of IGBS, first released in 1996 and revised in 2002, have led to national declines in early-onset GBS disease.[3] While complete adherence to the guidelines would not prevent all cases of EO IGBS disease, occurrence would undoubtedly be higher without prenatal screening and appropriate administration of intrapartum antibiotics. In Oregon, comprehensive screening practices have led to a 64 percent decrease in EO IGBS cases since 1996. Given that 4 cases occurred in women who screened negative and had no other risk factors for EO GBS, research into the

development of more sensitive screening practices might lead to development of better interventions and further reductions in disease. Finally, continued vigilance in surveillance and intervention are required to encourage high adherence to the screening guidelines and to maintain the incidence of early-onset disease below the Healthy People 2010 target rate of 0.5/1,000 live births, which has been seen in Oregon throughout the surveillance period.[1] In 2008, two of 7 EO GBS cases occurred in women who were not screened, and one woman who screened positive was not given antibiotic prophylaxis.

The epidemiologic profile of invasive GBS disease in adults in Oregon is consistent with national data and previous studies.[4] Invasive GBS in nonpregnant adults is increasing, particularly in elderly persons and those with significant underlying diseases.[4] While diabetes is most frequent, other conditions or risk factors include cancer, cirrhosis, cardiovascular disease, and smoking. In Oregon, alcohol abuse, cirrhosis, and smoking were significantly associated with cases among younger adults, while cancer, cardiovascular disease and chronic obstructive pulmonary disease (COPD) were significantly associated with cases among older adults. Increasing resistance to erythromycin and clindamycin has also been reported nationally.[4] So far in Oregon, however, this increasing resistance does not seem to have translated into broad treatment failures leading to GBS mortality. Continued surveillance of invasive GBS disease among adults will be needed to identify the emergence of additional antibiotic resistance, describe the characteristics of increases in invasive GBS occurrence, and better characterize the disease among a population at an increasing risk.

References

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4. Farley MM. Group B Streptococcal Disease in Nonpregnant Adults. *Clin Infect Dis*. 2001; 33:556-61.