Group B *Streptococcus* Surveillance Report 2009

Oregon Active Bacterial Core Surveillance (ABCs)

Office of Disease Prevention & Epidemiology
Oregon Health Authority

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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 GBS represents 32 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 (*Streptococcus agalactiae*) disease comprises the tri-county (Clackamas, Multnomah, and Washington) Portland metropolitan area, with a 2009 estimated population of 1,631,665.* More information on the Oregon ABCs program is found at:
http://public.health.oregon.gov/DiseasesConditions/CommunicableDisease/Pages/abc.aspx.

Methods

Invasive GBS disease (IGBS) 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 illnesses or conditions, and illness outcome. Early-onset disease is defined as invasive GBS disease occurring in infants less than seven days of age; late-onset disease is defined as invasive GBS disease occurring in infants from 7 to 89 days of age.

Surveillance Results

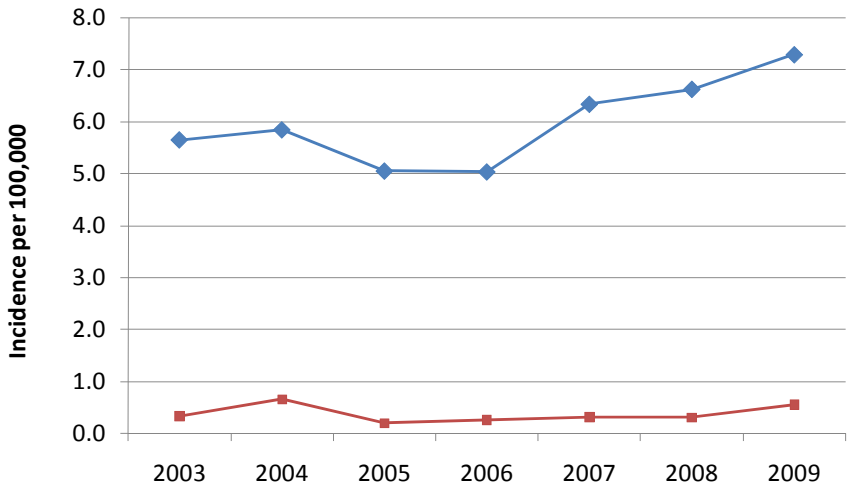
Descriptive Epidemiology

In 2009, 119 cases of invasive GBS disease were reported in the tri-county Portland area, corresponding to an incidence rate of 7.3/100,000 persons (Figure 1). This is 26 percent higher than the average annual incidence rate in the Portland area from 2004–2008 (5.8/100,000) and six percent higher than the 2009 national projection of invasive disease (6.9/100,000).[1] Of these cases, there were nine deaths, for an annual mortality rate due to invasive GBS disease of 0.55/100,000 (Figure 1). This rate is higher than the figures reported from 2004–2008 in the Portland area (0.35/100,000) and the 2009 national projections (0.52/100,000).[1]

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

The 2009 case fatality rate for invasive GBS disease in the Portland area was 8 percent, higher than the rate in the Portland area from 2004–2008 (6%), but similar to the rate in the entire ABCs network in 2009 (8%).[1] Of 119 cases where sex was known, 48 percent were male; of 61 cases where race was known, 85 percent were white, 7 percent were Asian/Pacific Islander, 7 percent were black, and 2 percent were American Indian/Alaskan Native; and of 47 cases where ethnicity was known, 92 percent were non-Hispanic or Latino.

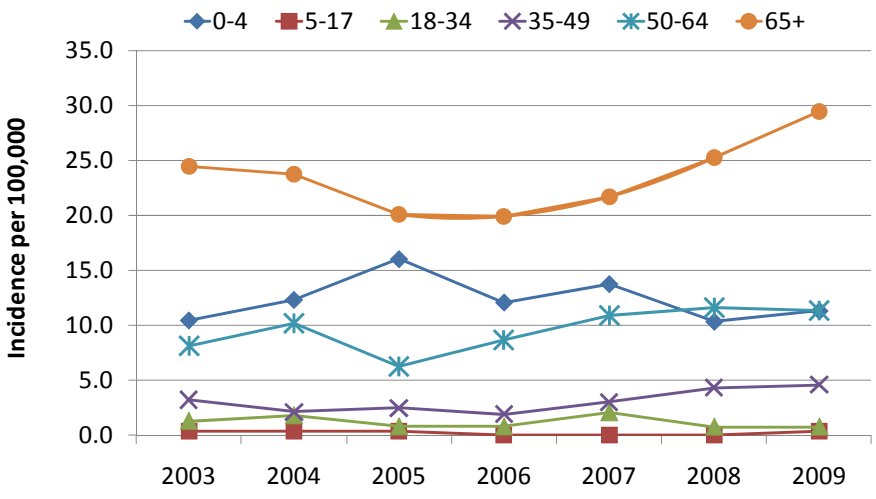
Figure 1: Incidence and Mortality Rates of IGBS Cases in Tri-county Area



The incidence rate of invasive GBS disease in Multnomah county in 2009 (10.9/100,000) was higher than those reported from Clackamas (3.9/100,000) and Washington (4.7/100,000) counties. The rates in Multnomah and Washington counties were slightly higher than the 2004-2008 average, while the rate in Clackamas county was slightly lower than the previous five-year average. In 2009, the mortality rate due to GBS was highest in Multnomah county (0.97/100,000), followed by Clackamas (0.26/100,000), and Washington (0.19/100,000) counties.

The burden of disease and death due to invasive GBS disease was highest in those ≥65 years of age (51 cases; incidence 29.5/100,000 and 3 deaths; mortality 1.7/100,000). Incidence was also high among those under five years of age (12 cases; incidence 11.3/100,000) and those between the ages of 50 and 64 (35 cases; incidence 11.3/100,000). However, no deaths were reported among those under five, while five deaths were reported among the 50-64 age group (mortality 1.6/100,000). For cases reported since 2003, fatal outcome from IGBS has not been associated with age.

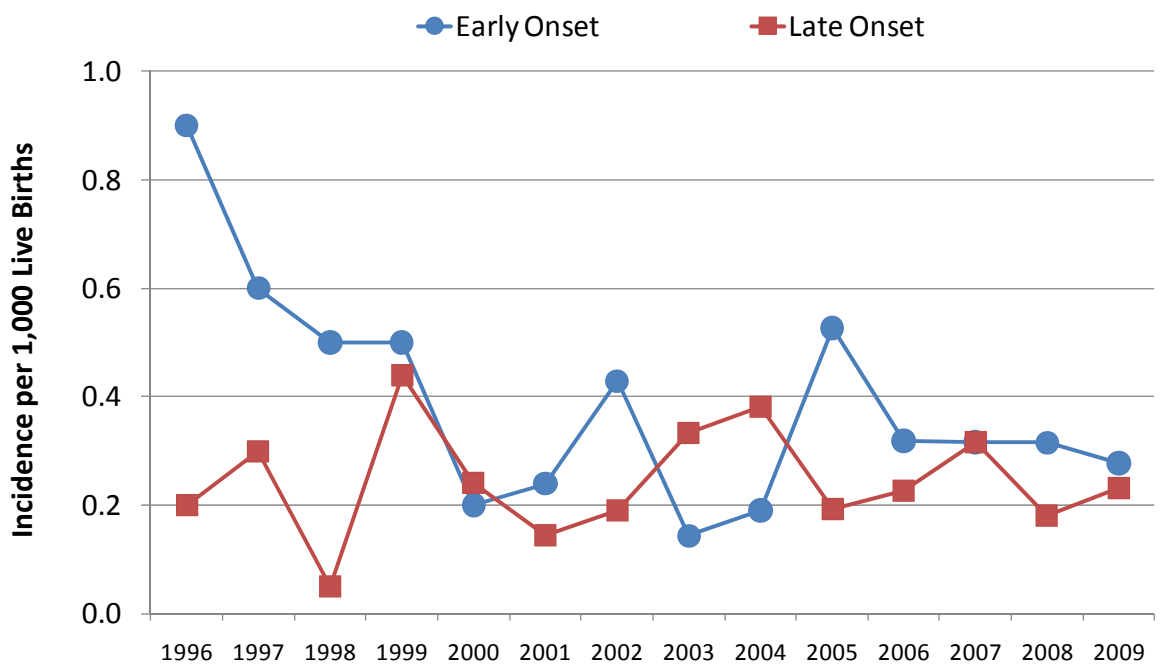
Figure 2: Incidence of IGBS Cases in Tri-county Area by Age



After a 78 percent decrease from 1996-2000, the incidence of early-onset GBS disease has stayed largely stable, outside of annual fluctuations (Figure 3). The incidence of late-onset disease has been relatively stable throughout the surveillance period.

In 2009, the incidence of early-onset disease – six cases; 0.28 per 1,000 live births – was slightly lower than the previous five-year average (0.33/1,000), and similar to the national estimate of disease (0.26/1,000).[1] The 2009 rate of late-onset disease – five cases; 0.23 per 1,000 live births – was lower than the previous five-year average (0.26/1,000) and 2009 national estimate (0.30/1,000).[1]

Figure 3: Incidence of Early- and Late-Onset IGBS Disease



Clinical Manifestations

The clinical manifestations of invasive GBS disease are listed in Table 1. The clinical manifestation profile of invasive GBS disease in 2009 was not statistically 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=0.0005 and p<0.0001, respectively), while bacteremia and meningitis were less common (p<0.0001 and p<0.0001, respectively). After adjusting for age, a fatal outcome was 2.4 times more likely among those presenting with bacteremia (95% confidence interval [CI] 1.2, 4.8) and 15 times less likely among those presenting with cellulitis (CI 2.1, 111.11). Among infants with early-onset GBS disease reported in 2009, the only clinical syndrome present was bacteremia. Among late-onset cases, three presented with bacteremia and two with meningitis.

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

Syndrome	2009 (n=119)	2004-2008 (n=454)
Primary bacteremia	40	44
Cellulitis	31	24
Pneumonia	13	12
Meningitis	3	3
Other††	14	19

† Some cases report more than 1 syndrome.

†† Other syndrome includes abscess (not skin), endometritis, HUS (hemolytic uremic syndrome), osteomyelitis, pericarditis, peritonitis, septic arthritis.

Underlying Conditions

Overall, 95 percent of adults with IGBS 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. Twenty percent of early- and late-onset cases were associated with premature delivery.

Table 2: Percentage of Underlying Conditions Reported Among Adult IGBS Cases, 2004-2009

Underlying Condition	18-64 (n=263)	65+ (n=226)	Total (n=489)	p-value
Alcohol Abuse	**10**	**2**	**6**	**0.0005**
Cancer	**13**	**23**	**17**	**0.0034**
Cardiovascular Disease	**18**	**50**	**33**	**<0.0001**
COPD	**7**	**15**	**11**	**0.0034**
Cirrhosis	**13**	**4**	**9**	**<0.0001**
Diabetes	40	40	40	0.94
Dialysis	6	4	5	0.42
Immunosuppression	14	9	12	0.13
Smoking	**24**	**8**	**16**	**<0.0001**
None	5	6	5	0.69

Serotype Analysis

For all isolates submitted since 2004, serotype IA was the most common cause of all cases (27%) followed by serotype V (23%) (Table 3). Significant associations include:

- Serotype IA was positively associated with bacteremia (OR 2.0; CI 1.3, 3.1).
- Serotype III was positively associated with late-onset cases (OR 10.8; CI 3.7, 31.4).
- Serotype IA and III were both negatively associated with cellulitis (OR 0.6; CI 0.4, 1.0 and OR 0.4; CI 0.2, 0.8).

Table 3: Serotype Distribution of Isolates Tested by IGBS Disease Type, 2004-2009

Serotype	Total (n=505) N (%)	Early-onset (n=37) N (%)	Late-onset (n=30) N (%)	Other (n=438) N (%)
IA	**136 (27)**	**10 (27)**	9 (30)	**117 (27)**
IB	48 (10)	3 (8)	1 (3)	44 (10)
II	69 (14)	5 (14)	0 (0)	64 (15)
III	66 (13)	8 (22)	**14 (47)**	44 (10)
IV	26 (5)	0 (0)	1 (3)	25 (6)
V	117 (23)	5 (14)	4 (13)	108 (25)
VI	5 (1)	3 (8)	0 (0)	2 (1)
VII	1 (0)	0 (0)	0 (0)	1 (0)
Nontypeable	37 (7)	3 (8)	1 (3)	33 (8)

Antibiotic Susceptibility

Of 503 invasive GBS isolates tested for susceptibility to common antibiotics since 2004, 100 percent were susceptible to ampicillin, cefotaxime, penicillin and vancomycin. Intermediate and full resistance to erythromycin were found among 6 (1%) and 180 (36%) isolates, respectively, and intermediate and full resistance to clindamycin were found among 7 (1%) and 106 (21%) isolates, respectively. Of the early-onset IGBS cases since 2004 (n=42), 24 percent were resistant to erythromycin and 17 percent were resistant to clindamycin.

Serotype IA was more likely to be susceptible to clindamycin (OR 6.4; CI 2.7, 15.4) than other serotypes, while serotype V was twice as likely to be resistant to clindamycin (CI 1.2, 3.1) and 3.4 times more likely to be resistant to erythromycin (CI 2.1, 5.5) than other or nontypeable strains. For cases reported since 2004, erythromycin and clindamycin resistance were not statistically significantly associated with age.

Early-Onset Invasive GBS Prevention Indicators

In 2009, all of the six women with infants having EO IGBS had received prenatal care, were screened for GBS prior to admission, and did not have a positive culture. None of the women had bacteruria during pregnancy, a previous infant with IGBS, or a previous pregnancy with GBS colonization. One woman (17%) received intrapartum antibiotics, although she did not have a positive GBS screening culture or an intrapartum fever. She received cefoxitin even though she did not have 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 67 percent decrease in EO IGBS cases since 1996. Given that all six 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]

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] In Oregon, alcohol abuse, cirrhosis, and smoking were significantly associated with cases among younger adults, while cancer, cardiovascular disease and 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 monitor trends in antibiotic resistance, describe the characteristics of increases in invasive GBS occurrence, and better characterize the disease among a population at an increased risk.

References

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