Group B *Streptococcus* Surveillance Report 2010

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 almost 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 2010 estimated population of 1,644,536.* 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.

Surveillance Results

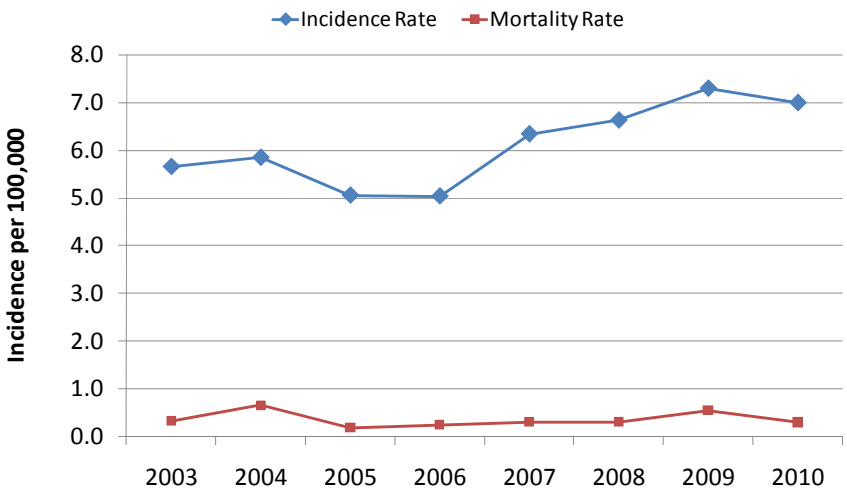
Descriptive Epidemiology

In 2010, 116 cases of invasive GBS disease were reported in the tri-county Portland area, corresponding to an incidence rate of 7.0/100,000 persons (Figure 1). This is 20 percent higher than the average annual incidence rate in the Portland area from 2005–2009 (6.1/100,000) and almost equivalent to the most recent national projection of invasive disease (6.9/100,000).[1] Of these cases, there were five deaths, for an annual mortality rate due to invasive GBS disease of 0.30/100,000 (Figure 1). This rate is equivalent to the figure reported from 2005–2009 in the Portland area (0.32/100,000) and 42 percent lower than the most recent national projections (0.52/100,000).[1]

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

The 2010 case fatality rate for invasive GBS disease in the Portland area was 4 percent, similar to the rate in the Portland area from 2005–2009 (5%), but lower than the rate in the entire ABCs network in 2009 (8%).[1]

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

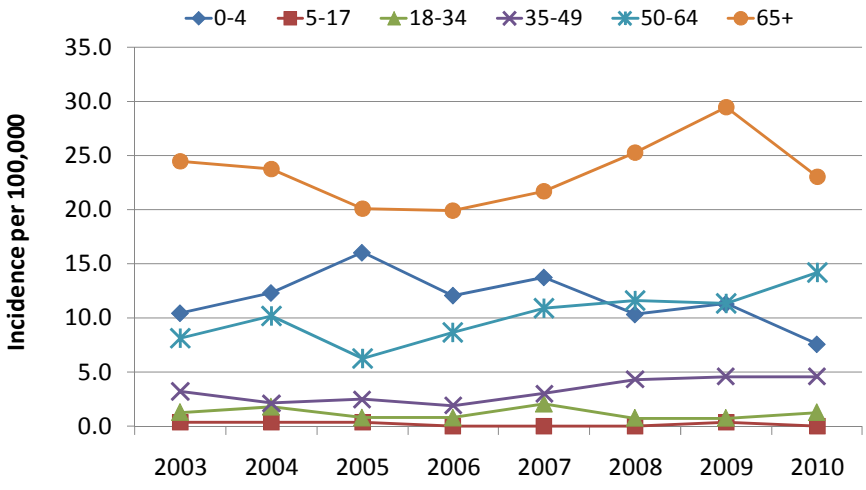


Of 116 cases where sex was known, 54 percent were male; of 60 cases where race was known, 90 percent were white, 7 percent were black, and 3 percent were Asian/Pacific Islander; and of 39 cases where ethnicity was known, 11 percent were Hispanic or Latino.

The incidence rate of invasive GBS disease in Multnomah county in 2010 (9.0/100,000) was higher than those reported from Clackamas (6.3/100,000) and Washington (4.9/100,000) counties. The rates in Clackamas and Washington counties were slightly higher than their respective 2005-2009 averages, while the rate in Multnomah county was comparable to the previous five-year average. In 2010, all five deaths due to GBS occurred in Multnomah county (0.69/100,000).

The burden of disease and death due to invasive GBS disease was highest in those ≥65 years of age (41 cases; incidence 23.0/100,000 and 2 deaths; mortality 1.1/100,000) (Figure 2). Incidence was also high among those between the ages of 50 and 64 (45 cases; incidence 14.2/100,000) and under five years of age (8 cases; incidence 7.6/100,000). Three deaths were reported among the 50-64 year age group (mortality 0.95/100,000), while no deaths were reported among those under five. For cases reported since 2003, fatal outcome from IGBS has not been associated with age.

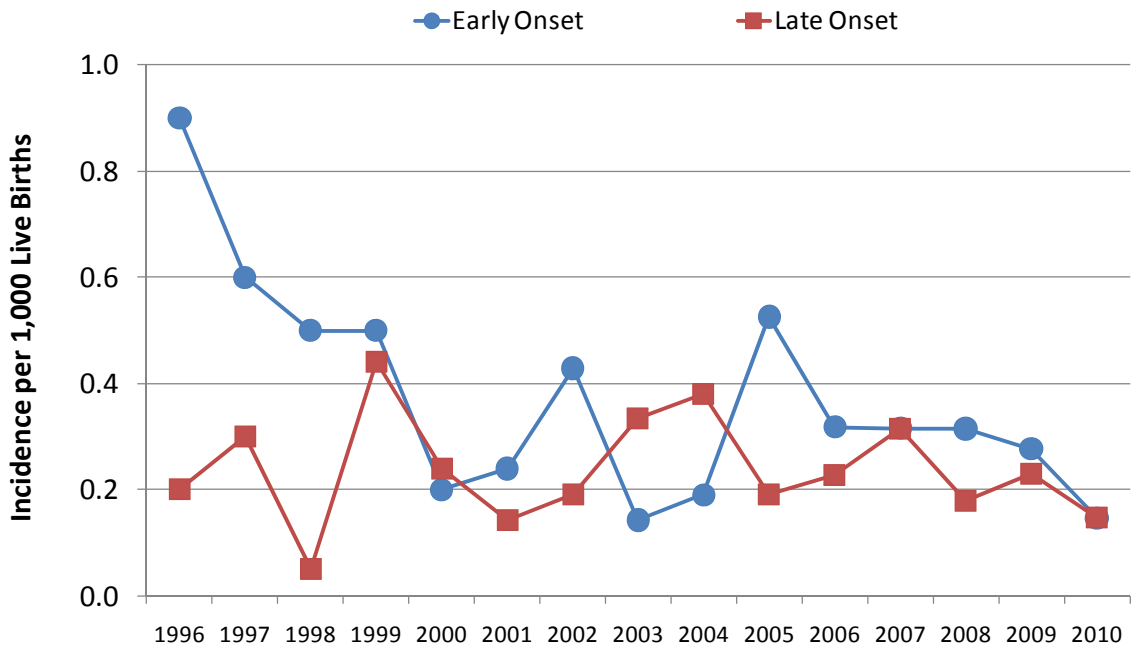
Figure 2: Incidence of IGBS Cases in Tri-county Area by Age



Among infants, there are two main types of GBS disease. 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.

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 2010, the incidence of early-onset disease – three cases; 0.15 per 1,000 live births – was 57 percent lower than the previous five-year average (0.35/1,000), and 42 percent lower than the national estimate of disease (0.26/1,000).[1] The 2010 rate of late-onset disease – three cases; 0.15 per 1,000 live births – was lower than both the previous five-year average (0.23/1,000) and most recent 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 2010 was not statistically significantly different than that seen from cases reported during the previous five years.

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

Syndrome	2010 (n=116)	2005-2009 (n=484)
Primary bacteremia	40	43
Cellulitis	26	25
Pneumonia	13	11
Meningitis	1	3
Other††	19	19

† Some cases report more than 1 syndrome.

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

For cases reported since 2005, pneumonia and cellulitis were more common with increasing age ($p=0.0096$ 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 2.9 times more likely among those presenting with bacteremia (95% confidence interval [CI] 1.3, 6.1) and 4 times less likely among those presenting with cellulitis (CI 1.2, 13.9). Among three infants with early-onset GBS disease reported in 2010, the only clinical syndrome present was bacteremia. Among three late-onset cases, one presented with bacteremia, one with meningitis and cellulitis, and the other with osteomyelitis and septic arthritis.

Underlying Conditions

Overall, 94 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 (Table 2). After adjusting for age, smoking and immunosuppression were significantly associated with fatal outcome among adults ($p=0.0217$ and $p=0.0372$, respectively).

Table 2: Percentage of Underlying Conditions Reported Among Adult IGBS Cases, 2005-2010

Underlying Condition	18-64 (n=292)	65+ (n=230)	Total (n=522)	p-value
Alcohol Abuse	**9**	**2**	**6**	**0.0019**
Cancer	**9**	**18**	**13**	**0.0010**
Cardiovascular Disease	**18**	**51**	**33**	**<0.0001**
COPD	**8**	**15**	**11**	**0.0122**
Cirrhosis	**13**	**3**	**9**	**0.0002**
Diabetes	41	43	42	0.64
Dialysis	6	3	5	0.10
Immunosuppression	13	10	11	0.22
Smoking	**24**	**7**	**16**	**<0.0001**
None	4	7	6	0.21

Serotype Analysis

For all isolates tested (90%) since 2005, serotype IA was the most common cause of all cases (26%) followed by serotype V (22%) (Table 3). Significant associations include:

- Serotype IA was positively associated with bacteremia (OR 1.9; CI 1.2, 2.9).
- Serotype III was positively associated with late-onset cases (OR 7.7; CI 2.6, 23.1).

Table 3: Serotype Distribution of Isolates Tested by IGBS Disease Type, 2005-2010

Serotype	Total (n=543) N (%)	Early-onset (n=37) N (%)	Late-onset (n=26) N (%)	Other (n=480) N (%)
IA	**139 (26)**	**10 (27)**	9 (35)	**121 (25)**
IB	58 (11)	3 (8)	1 (4)	54 (11)
II	70 (13)	5 (14)	0 (0)	65 (14)
III	70 (13)	8 (22)	**11 (42)**	51 (11)
IV	27 (5)	0 (0)	1 (4)	26 (5)
V	120 (22)	6 (16)	2 (8)	112 (23)
VI	5 (1)	2 (5)	0 (0)	3 (1)
VII	1 (0)	0 (0)	0 (0)	1 (0)
Nontypeable	52 (10)	3 (8)	2 (8)	47 (10)

Antibiotic Susceptibility

Of 538 invasive GBS isolates tested (90%) for susceptibility to common antibiotics since 2005, 100 percent were susceptible to ampicillin, cefotaxime, penicillin and vancomycin. Intermediate and full resistance to erythromycin were found among 7 (1%) and 198 (37%) isolates, respectively, and intermediate and full resistance to clindamycin were found among 8 (1%) and 115 (21%) isolates, respectively. Two isolates were found to be fully resistant to levofloxacin. Of the early-onset IGBS cases since 2005 (n=41), 24 percent were resistant to erythromycin and 15 percent were resistant to clindamycin.

Serotype IA and serotype III were more likely to be susceptible to clindamycin (OR 6.8; CI 2.8, 16.4) than other serotypes, while serotype V was twice as likely to be resistant to clindamycin (CI 1.2, 3.1) and 3.5 times more likely to be resistant to erythromycin (CI 2.2, 5.7) than other strains. For cases reported since 2005, clindamycin and erythromycin resistance were not statistically significantly associated with age. Fatal outcome was also not associated with clindamycin and erythromycin resistance.

Early-Onset Invasive GBS Prevention Indicators

In 2010, all of the three women with infants having EO IGBS had received prenatal care and were screened for GBS prior to admission. Only one case had a positive culture and thus received intrapartum antibiotics. None of the women had bacteruria during pregnancy, a previous infant with IGBS, or a previous pregnancy with GBS colonization.

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 an 83 percent decrease in EO IGBS cases since 1996. Given that all three cases occurred in women who 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 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.[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 this population.

References

1. Centers for Disease Control and Prevention. 2010. Active Bacterial Core Surveillance Report, Emerging Infections Program Network, Group B *Streptococcus*, 2009. Available at http://www.cdc.gov/abcs/reports-findings/survreports/gbs09.pdf. Accessed 17 Aug 2011.
2. Centers for Disease Control and Prevention. Prevention of Perinatal Group B Streptococcal Disease – Revised Guidelines from CDC. *MMWR Recomm Rep*. 2002; 51(RR-11)1-22.
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4. Farley MM. Group B Streptococcal Disease in Nonpregnant Adults. *Clin Infect Dis*. 2001; 33:556-61.