

Trends in Early and Late Onset Group B Streptococcus in New York State, 2000 - 2014

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Background

- Group B Streptococcus (GBS) is a gram-positive opportunistic pathogen that colonizes the gastrointestinal tract and genitourinary tracts of up to 50% of healthy adults¹. This pathogen can cause septicemia, meningitis and pneumonia in neonates, and is a leading cause of neonatal morbidity and mortality in the US^{1,2}.
- In infants, GBS is classified as either early onset (EO) (<7days of age) or late onset (LO) (7 – 89 days of age)^{1,2}.
- There are a number of well-established risk factors associated with EO GBS including^{2,3,8,9}:
 - maternal GBS bacteriuria
 - maternal infection in the peripartum period
 - intrapartum fever
 - premature and prolonged rupture of membranes
 - fetal tachycardia
 - longer hospital stays for infants following delivery
- Risk factors and routes of LO GBS transmission are poorly understood^{6,9}. Risk factors associated with LO GBS include⁹:
 - maternal GBS bacteriuria
 - premature birth (<37 weeks gestation)
 - low birth weight (<2500g)
 - maternal age <20years
 - non-white race
- Following the implementation of the 1996 CDC guidelines for the prevention of perinatal GBS, data showed a significant protective effect of culture-based relative to a risk-based screening approach.
- In 2002, CDC published a revised prevention strategy recommending universal culture-based prenatal screening for vaginal and rectal colonization of GBS in all pregnant women between 35 and 37 weeks' gestation³.

Methods

- Through the Emerging Infections Program (EIP) collaboration between CDC and ten state health departments, the NYS Active Bacterial Core Surveillance (ABCs) has conducted active population-based surveillance for GBS since 2000 in 15 counties in the Albany and Rochester regions (pop. 2.1 million).
- National rates were taken from CDC's national ABCs network. The national surveillance areas represent a population of 33.1 million people, and 434,908 live births.
- Standardized case report forms are completed for all EO and LO GBS cases through medical record reviews. EO and LO cases identified between 2000 and 2014 were analyzed using SAS version 9.4.
- NYS vital records data was used to calculate incidence rates per 1,000 live births in ABCs counties, stratified by race.

Results

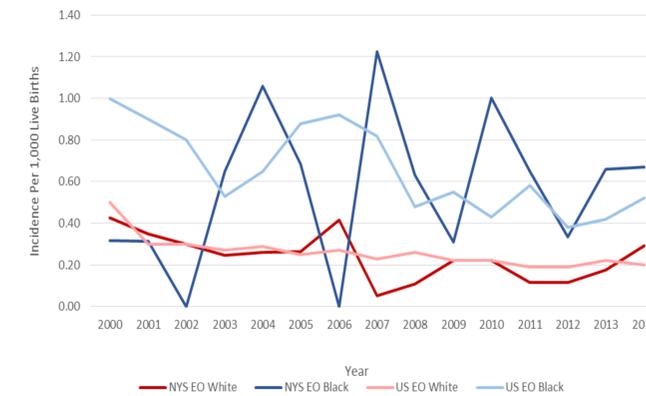
- There were 99 cases of EO, and 112 cases of LO GBS in ABCs counties in NYS between 2000 through 2014. Rates fluctuated between 0.40 EO cases and 0.36 LO cases per 1,000 live births in 2000, and 0.35 EO and 0.31 LO cases per 1,000 live births in 2014.
- As shown in Table 1, EO and LO GBS cases were comparable in terms of gender, maternal age, delivery type and likelihood of receiving prenatal care. A greater proportion of EO GBS cases resulted in death compared to LO cases (8.1% compared to 1.8%).

Table 1. Characteristics of Infants with Early- and Late-Onset Group B Streptococcus in NYS ABCs Counties, 2000 – 2014

	Early Onset n (%) (N = 99)	Late Onset n (%) (N = 112)
Black	26 (27.7)	41 (38.0)
White	68 (72.4)	67 (62.0)
	Missing	5
Female	42 (42.4)	51 (45.5)
Male	57 (57.6)	61 (54.5)
	Missing	0
Alive	91 (91.9)	109 (97.3)
Deceased	8 (8.1)	1 (1.8)
	Missing	0
Premature (<37 weeks gestational age)	23 (23.5)	44 (47.8)
Full term (≥37 weeks gestational age)	75 (76.5)	48 (52.2)
	Missing	1
Birthweight <2500g	18 (18.2)	40 (43.5)
Birthweight ≥2500g	81 (81.8)	52 (56.5)
	Missing	0
Maternal age <15	0	1 (1.2)
Maternal age 15 - 19	16 (21.9)	15 (18.3)
Maternal age 20 - 24	24 (32.9)	20 (24.4)
Maternal age 25 - 29	10 (13.7)	27 (32.9)
Maternal age 30 - 34	16 (21.9)	11 (13.4)
Maternal age 35 - 39	7 (9.6)	7 (8.5)
Maternal age 40 +	0	1 (1.2)
	Missing	26
Received Prenatal Care	83 (97.7)	78 (98.7)
Did not Receive Prenatal Care	2 (2.4)	1 (1.27)
	Missing	14
Screened Before Delivery	63 (75.0)	50 (64.1)
Not Screened Before Delivery	25 (25.0)	28 (35.9)
	Missing	15
GBS Bacteriuria (Current Pregnancy)	3 (4.1)	6 (9.1)
No GBS Bacteriuria (Current Pregnancy)	70 (95.9)	60 (90.9)
	Missing / Unknown	26
Intrapartum Antibiotics Given	27 (32.1)	43 (51.8)
No Intrapartum Antibiotics Given	57 (67.9)	40 (48.2)
	Missing / Unknown	15
Vaginal Delivery	56 (65.9)	49 (59.8)
C-Section	29 (34.1)	33 (40.2)
	Missing / Unknown	14

- Table 1 shows that, compared to EO GBS cases, infants with LO GBS were more likely to be black (38.0% vs. 27.7%), born premature (47.8% vs. 23.5%), weigh less than 2500g at birth (43.5% vs 18.2%), and less likely to have been screened for GBS prior to delivery (75.0% vs. 64.1%).

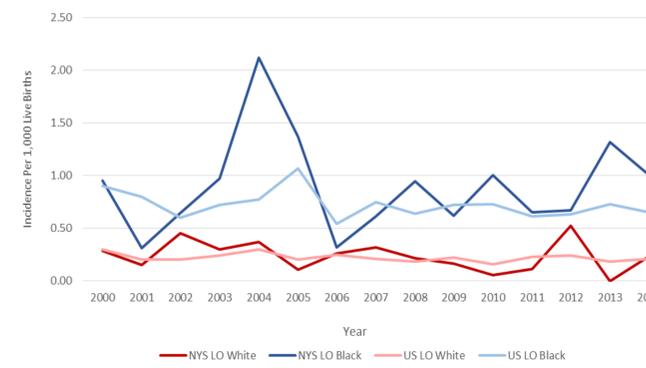
Figure 1. Early Onset GBS Incidence in NYS ABCs Counties and US by Race, 2000 – 2014



Fluctuations in the incidence of EO and LO GBS in NYS are likely due to the low number of cases. Overall, Figures 1 and 2 show that NYS rates have a similar trajectory to those seen in the ABCs surveillance sites.

Since the implementation of the universal culture-based screening guidelines in 2002, rates of EO GBS have decreased from 0.40 to 0.24 cases per 1,000 live births in ABCs surveillance areas nationally. Despite some improvements, a disparity between black and white infants remains (0.67 vs. 0.29 per 1,000 live births in 2014)

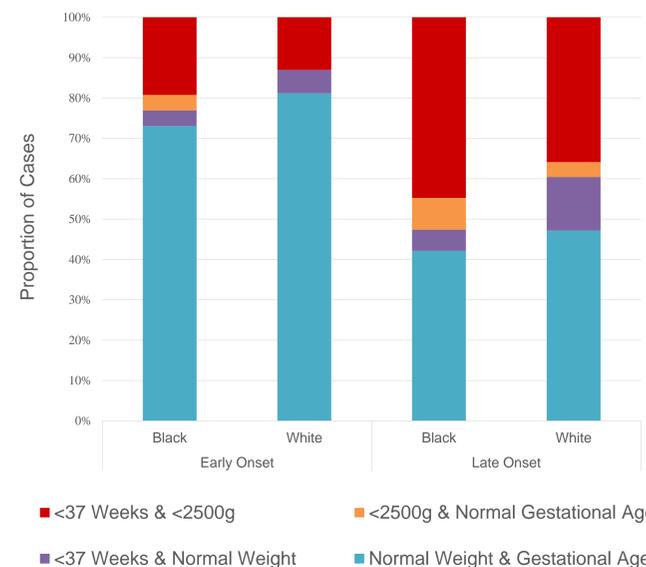
Figure 2. Late Onset GBS Incidence in NYS ABCs Counties and US by Race, 2000 - 2014



The incidence rate of LO GBS has showed little change over the 15-year period, including the disparity seen between black and white infants.

Black infants continue to experience disproportionately high rates of LO GBS compared to white infants (1.0 vs 0.23 per 1,000 live births in 2014).

Figure 3. Proportion of Low Birth Weight and Premature GBS Cases by Race and Onset, NYS ABCs Counties, 2000 - 2014

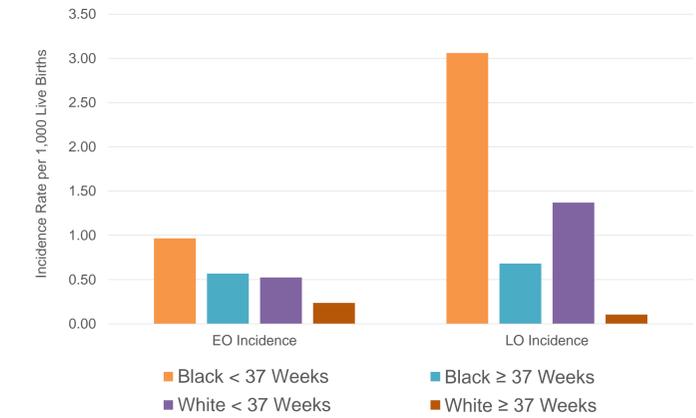


The proportion of LO GBS cases that were low birthweight and/or premature was considerably higher than that of EO cases in both black and white infants, with over 58% of black, and 53% of white LO cases being either low birthweight and/or premature. In comparison, 27% of black, and 19% of white EO cases were low birthweight and/or premature (Figure 3).

Eighteen (16.1%) of the 112 LO GBS cases contracted GBS during hospitalization. All 18 cases were low birthweight and/or premature.

The mean number of days between the infant's birth and GBS culture date was similar for LO cases who were discharged from their birth hospital compared to those who remained in hospital, 36.0 days and 37.5 days, respectively.

Figure 4. Incidence Rate of Early and Late Onset GBS in NYS ABCs Counties by Race and Gestational Age, 2000 - 2014



- After stratifying by race and gestational age, rates of EO and LO GBS were higher in premature infants compared to those born full-term in both white and black infants. As shown in Figure 4, this was most striking in LO GBS cases, with incidence rates 4.4 times higher in black infants, and 12.5 times higher in white infants who were born premature, compared with those born full term.

Conclusions

- Improvements seen in the incidence in EO GBS following CDC's 2002 revised screening guidelines have plateaued over the past decade, particularly among white infants. Similarly, there has been virtually no change in the incidence of LO GBS over the 15-year period.
- Although the low number of cases of EO and LO GBS in NYS makes it difficult to assess true trends, the disparity in incidence by race, has not diminished even after adjusting for gestational age.
- NYS data is consistent with literature suggesting that race, gestational age and birthweight are significant risk factors in the development of LO GBS^{6,9}. Given that black infants experience higher rates of both low birth weight and premature birth, further research should seek to understand the interaction and extent of the impact of these risk factors on EO and LO GBS.
- In order to address the plateau in incidence rates seen over the past decade, future research should focus on understanding additional risk factors and mechanisms of infection.

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