Streptococcal Invasive Disease - Group A, Group B and Unspecified

This segment is based upon review of hospital discharge data. Streptococcal invasive diseases A and B are the only reportable forms of streptococcal infection. They are Class C diseases and must be reported to the state within five business days.

Streptococcal infections are relatively prevalent in the general population, especially among children, college students and those over sixty-five years of age. These bacteria can be categorized into multiple groups, five of which cause specific diseases in humans, (serogroups A, B, C, D and G).

Streptococcal bacteria are often identified as causing common diseases such as strep throat and perinatal infections. However, streptococcal infections can also cause severe disease and even death in some individuals, especially when the infection becomes invasive. Hosts that are either young, old, or have an underlying medical condition such as diabetes or an immuno-compromising disease are at greater risk of streptococcal infections becoming invasive.

LaHIDD Data

All patient cases from 1999 to 2008 with a diagnosis code representing a Streptococcal infection were extracted from the Louisiana Hospital Inpatient Discharge Database (LaHIDD). This information was then sorted in Microsoft Access® and stratified by year of hospital admission and type of Streptococcal diagnosis (Group A, Group B, Other). The International Statistical Classification of Diseases and Related Health Problems, 9th revision (ICD-9) codes representing each type of streptococcal infection were used as the criteria for extracting the data.

Diagnoses of Group A strep, Group B strep and disease caused by other strep serogroups (Groups C, D and G) were identified through the extraction of LaHIDD data. Table 1 shows the number of hospital admission for each of these diagnoses from 1999-2008.

Table 1. Number of hospitalizations due Streptococcal infections - Louisiana, 1999-2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Streptococcal Pneumonia	**13**	**22**	**8**	**21**	**20**	**21**	**31**	**16**	**17**	**31**
Group A Streptococcus, Not Specified	176	234	212	198	188	233	164	158	173	194
Strep Group A	189	256	220	219	208	254	195	174	190	225
Strep Group B	4216	5408	3923	6680	6476	10248	8745	8823	9694	9483
Streptococcal Septicemia, Other	855	852	901	1008	982	1183	894	871	793	880
Streptococcal Menigitis, Other	49	51	60	39	43	53	45	77	55	56
Streptococcal Pneumonia, Other	239	175	125	232	207	183	207	197	153	216
Streptococcal Infection, Not Specified, Other	3129	3060	3667	3738	3344	3342	3096	2877	2519	2533

*Diagnoses of streptococcal sore throat, scarlet fever, erysipelas and rheumatic fever were not included due to inconsistencies in data

Group A Streptococcal Infections

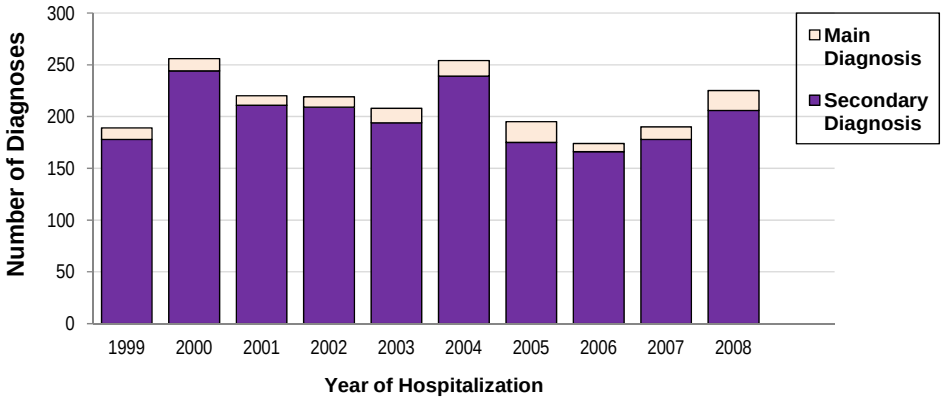
Group A streptococci bacteria are closely associated with the upper respiratory tract which is the usual portal of entry. The most common group A streptococcal infections in the general population are pharyngitis, tonsillitis, scarlet fever, impetigo, pyoderma and cellulitis.

Group A streptococcal infections included in the LaHIDD data extraction include:

- Pneumonia due to Streptococcus, Group A (ICD-9 code 482.31)
- Streptococcus Infection in Conditions Classified Elsewhere and of Unspecified Site, Group A (ICD-9 code 041.01).

In LaHIDD data, multiple diagnoses commonly exist for each patient recorded in the database. Each patient is assigned one main diagnosis, the primary reason for the patient being admitted to the hospital, while the remaining conditions the patient may have are classified as secondary diagnoses. Strep group A is not commonly classified as a main diagnosis in hospital discharge data. From 2000 to 2008, having a main diagnosis of strep group A accounted for only 4.2% (2001) to 11.3 % (2005) of the total strep group A diagnoses represented in hospital discharge data (Figure 1).

Figure 1: Cumulative diagnosis of Streptococcal Group A Infections in hospital discharge data Louisiana, 2000-2008

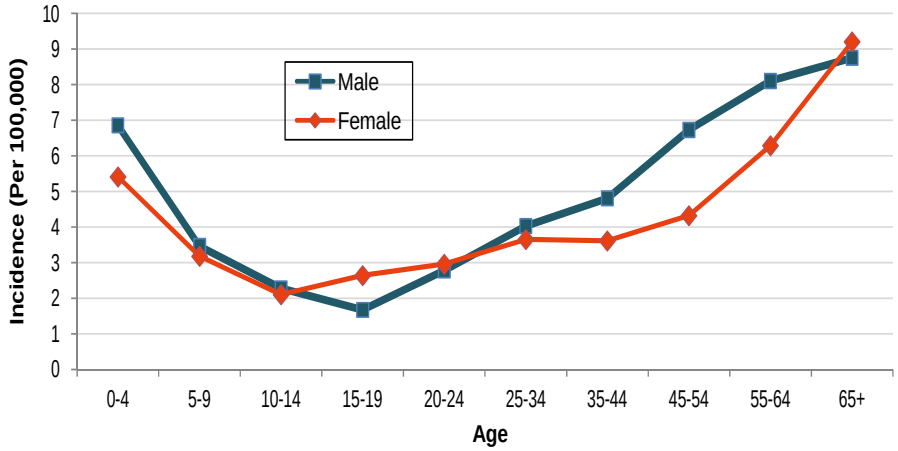


Group A streptococcal infection in conditions classified elsewhere, and of unspecified site(ICD-9 code 041.01) comprise the majority of strep, group A infections extracted from LaHIDD data. Because this diagnosis is commonly used as a secondary diagnosis, it is useful to examine the main diagnosis of such cases. In 2008, 91 different ICD-9 codes were used as the main diagnosis code where 041.01 was used as a secondary code. Of the 91 ICD-9 codes used as a main diagnosis in these particular cases, the following diagnoses accounted for approximately 41% of the main diagnoses.

- Cellulitis (31.44%)
- Bacteremia (5.64%)
- Pneumonia (3.61%)

The majority of group A streptococcal infections, for both males and females, occur in young children and adults over 65 years old. Strep group A rates for females are lower for all age groups except those aged 15 to 19 years and those older than 65 years (Figure 2).

Figure 2: Streptococcal Group A hospitalization incident rates by age and gender- Louisiana, 2000-2008 (average rates)



Streptococcus Group B

Streptococcus agalactiae is the only bacteria in the Group B Streptococcus (GBS) classification. GBS is associated with several diseases, most of which affect neonates and older adults. GBS is also extremely prevalent in the general population; 10% to 30% of pregnant women are colonized by GBS. (A colonized person carries the bacteria but does not suffer any ill effects from it.) Although antibiotic treatment against Streptococcus Group B bacteria is highly successful, each year these bacteria cause serious infections and even death.

GBS Colonization of Pregnant Women and Neonatal Disease

Group B streptococci are common inhabitants of the gastrointestinal and genitourinary tract. Less commonly, they colonize the pharynx. Recent literature estimates that between 15% and 40% of pregnant women are carriers of GBS. If a woman is carrying group B strep during pregnancy, she can transmit the bacteria to her child shortly before or during delivery. After delivery, person to person transmission can occur, resulting in early onset group B strep disease.

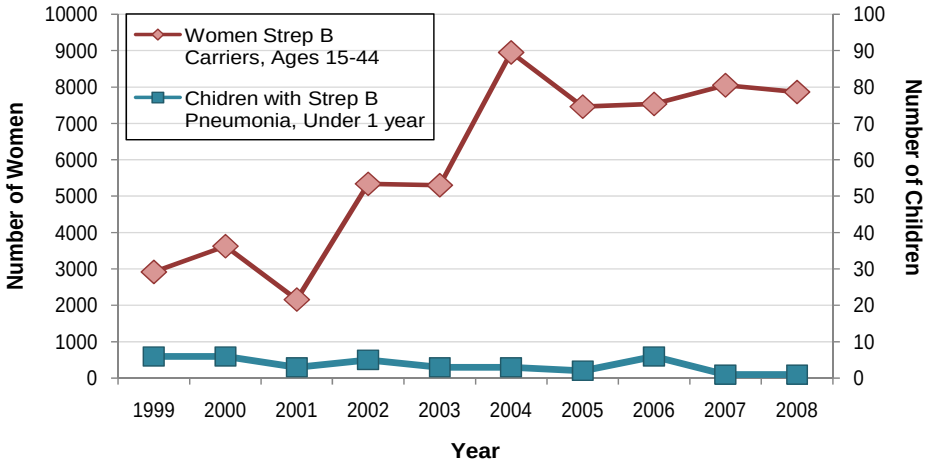
Less commonly, an infant can acquire GBS in the community from other colonized persons, resulting in late-onset disease. The incidence of GBS disease declines dramatically after three months of age, but up to 10% of pediatric cases occur beyond early infancy and many, but not all, of these are in infants who were born pre-term. In August 2002, the U.S. Centers for Disease Control and Prevention (CDC) updated recommendations on the prevention of the type of GBS infection that occurs in babies shortly after birth. These guidelines advise health care providers to use a screening-based approach to decide which women may benefit from getting an antibiotic (e.g. penicillin) through the vein during delivery.

GBS infections included in the LaHIDD data extraction:

- Group B streptococcal carrier (ICD-9 code V02.51)
- Pneumonia due to streptococcus, group B (ICD-9 code 482.32)
- Streptococcus infection in conditions classified elsewhere and of unspecified site, group B (ICD-9 code 041.02)

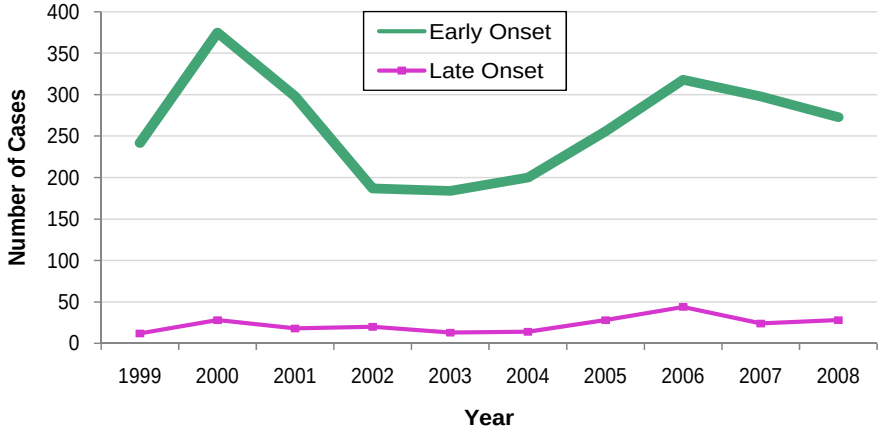
In the years since 2001, the number of children under the age of one diagnosed with pneumonia due to GBS has remained relatively low while the number of women of child bearing age diagnosed as carriers has increased. The dramatic increase in women diagnosed as a GBS carrier since 2001 is likely attributed to increased screening associated with CDC recommendations issued in 2002 (Figure 3).

Figure 3: Cumulative number of hospitalized women diagnosed as a GBS carrier and the number of hospitalized infants diagnosed with GBS pneumonia - Louisiana, 1999-2008



Early-onset neonatal GBS (occurring in infants < 7 days old) infections are usually characterized by respiratory distress, apnea, shock and pneumonia. Late-onset neonatal GBS (occurring in infants ≥ 7 days old) infections can be accompanied by meningitis or osteomyelitis. Approximately 25% of these infections occur in premature infants. While cumulative numbers for late onset GBS infections have remained relatively low, early onset GBS infections in Louisiana rose by 59% from 2004 to 2006. Cumulative early onset and late onset GBS infections decreased from 2006 to 2008 (Figure 4).

Figure 4: Cumulative diagnoses of GBS infections in hospitalized infants; stratified by early and late onset. Hospital discharge data- Louisiana, 2000-2008*

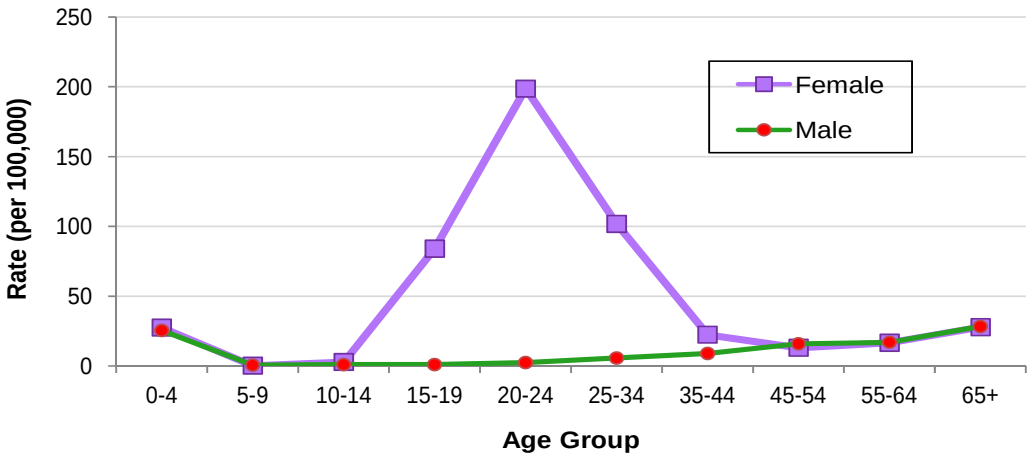


*Analysis includes ICD-9 Codes representing Strep B Pneumonia (482.32) and Strep B, Unspecified Site (041.02)

GBS infection in pregnant women includes urinary tract infection, chorioamnionitis, endometritis and wound infection; stillbirths and premature delivery have also been attributed to GBS. In nonpregnant adults, skin or soft tissue infection, bacteremia, genitourinary infection and pneumonia are the most common manifestations of disease.

Hospital discharge data was used to compare the incidence rates of streptococcal GBS in men and women. Average GBS rates for women of child bearing age (15-44) were significantly higher than those of men in the same age groups. Females in the 20-24 age group have the highest average rates with 199 (per 100,000 population) per year. Rates for children and adults over 45 do not differ with respect to gender.

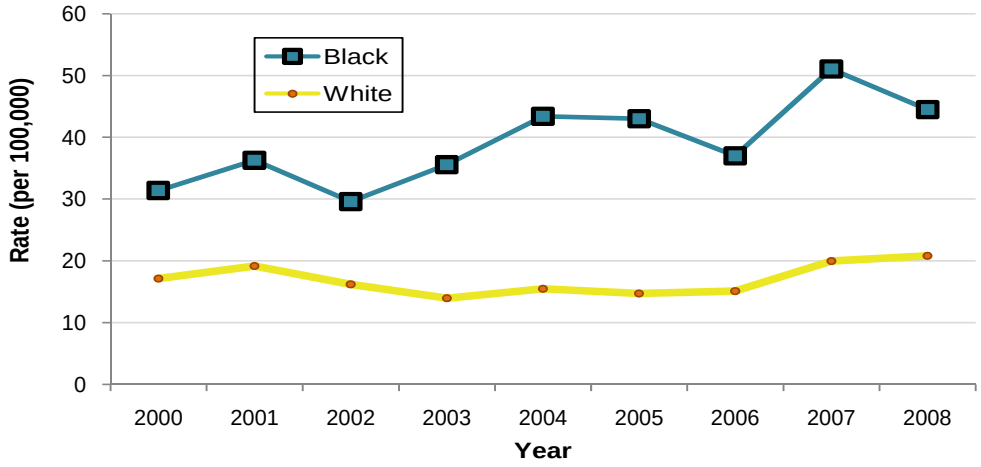
Figure 5: Average GBS incidence rates by gender and age group- Louisiana, 2004-2008*



*Carriers of Group B Strep excluded from analysis

The race distribution shows a large discrepancy by race, with GBS rates in Black hospitalized individuals being twice as high, or greater, as incident rates for hospitalized, White individuals. For the entire period (2000-2008), the average GBS rate for Whites is 17 per 100,000 population while the average GBS rate for Blacks is 39 per 100,000 population (Figure 6).

Figure 6: GBS hospitalization incidence rates by race - Louisiana, 2000-2008.*



*Analysis includes ICD-9 Codes representing Strep B Pneumonia (482.32) and Strep B, Unspecified Site (041.02)

Mortality

Data provided by death certificates issued in Louisiana between 1999 and 2008 provide evidence that mortality resulting from invasive group A and group B streptococcal infections has been slightly decreasing in Louisiana. IDES will continue monitoring the causes of death attributable to streptococcal infections in order to detect changes (Table 2).

Table 2: Number of deaths due to streptococcal infections – Louisiana, 1999-2006*

Cause of Death	1999	2000	2001	2002	2003	2004	2005	2006
Streptococcus Group A	2	1	1	0	0	0	1	2
Streptococcus Group B	2	3	1	2	0	0	1	0

*Complete death certificate data for 2007-2008 was not available at the time of report