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GROUP B STREPTOCOCCAL INFECTIONS

Revised 3/22/2009

Group B Streptococcal infections (GBS), are caused by *Streptococcus agalactiae* (also called Group B Streptococci), a gram-positive coccus that causes invasive disease primarily in newborns, pregnant women and adults with underlying medical conditions.

Epidemiology

Colonization: The gastrointestinal tract is the major human reservoir of GBS, with the genitourinary tract the most important site of secondary spread. Colonization rates may vary among ethnic groups, geographic locales and by age, but rates are similar for pregnant and non-pregnant women. Five percent to forty percent of all pregnant women are colonized with GBS in the vagina or rectal area. Of all infants born to colonized parturients, approximately one percent to two percent will develop early-onset invasive disease.

The isolation rate of GBS from clinical specimens depends on a variety of factors. Culturing specimens from both the anorectum and the vagina increases the likelihood of GBS isolation by five percent to twenty-seven percent over vaginal culture alone. The use of selective media, or broth containing antimicrobials to inhibit competing organisms, is particularly important because it can increase the yield of screening cultures by as much as fifty percent.

Incidence of Neonatal Disease: Before the widespread use of intrapartum antibiotics, the incidence of invasive neonatal GBS disease ranged from two to three cases per 1,000 live births. The Centers for Disease Control and Prevention (CDC) estimated that in 1990, there was an incidence of 1.8 per 1000 live births (about 150 cases in Louisiana), early-onset disease: 1.5 per 1,000; late-onset: 0.35 per 1,000, causing five deaths in Louisiana due to GBS disease among infants older than ninety days of age. Long term neurologic sequelae may result from meningitis or complications of severe sepsis. Coinciding with active prevention efforts over the last fifteen years, the incidence of early-onset disease declined by seventy percent to 0.3 cases per 1,000 live births in 2005.

The incidence of invasive GBS infections among pregnant women in the United States declined by twenty-one percent from 0.29 per 1,000 live births in 1993 to 0.23 in 1998, suggesting that increased use of intrapartum antibiotics also prevented some cases of maternal GBS amnionitis and endometritis. In contrast, the rate of late-onset disease in neonates remained fairly constant throughout the last decade. Although intrapartum chemoprophylaxis for women with heavy GBS colonization may prevent a portion of late-onset disease, the stable incidence of late-onset disease during a period when use of intrapartum antibiotics was increasing suggests that this intervention is not effective against late-onset disease.

Risk Factors: Deliveries in which premature onset of labor, prolonged rupture of membranes, intrapartum fever, or multiple gestation, occurrences are more likely to be complicated by GBS early-onset disease. The incidence of GBS disease also is higher among infants born to mothers who are older than twenty years, or who have a high inoculum of GBS in genital cultures, GBS bacteriuria during pregnancy, or low

levels of anti-GBS capsular antibody, or who previously delivered an infant with GBS disease. Risk factors identified for neonates include low birth weight and heavy surface colonization with GBS.

Determinants of late-onset GBS disease are not well documented. Some evidence suggests that late-onset disease may be acquired through either vertical or nosocomial transmission, although acquisition of disease in the community also is possible.

Clinical Description

In infants, GBS disease is characterized as:

- Early-onset (occurring in infants < 7 days old) usually characterized by respiratory distress, apnea, shock and pneumonia.
- Late-onset (occurring in infants \geq 7 days old) can be accompanied by meningitis or osteomyelitis.

Disease in infants most commonly occurs as bacteremia, pneumonia, or meningitis. Approximately twenty-five percent of neonatal GBS disease occurs in premature infants. 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.

The case-fatality rate for GBS disease is estimated as five percent to twenty percent for newborns and fifteen percent to thirty-two percent for adults.

Laboratory Tests

Numerous studies have documented that the accuracy of prenatal screening cultures in identifying intrapartum colonization status can be enhanced by careful attention to the timing of cultures, the anatomical sites swabbed and the precise microbiologic methods used for culture and detection of organisms. Collection of cultures between thirty-five and thirty seven weeks gestation is recommended to improve the sensitivity and specificity of detection of women who remained colonized at the time of delivery. Swabbing both the vagina and the rectum increases the yield substantially compared with sampling the cervix or sampling the vagina without swabbing the rectum. Although swabbing both sites is recommended and use of two swabs can be justified, both swabs should be placed in a single broth culture medium because the site of isolation is not important for clinical management. Use of selective enrichment broth is recommended to maximize the isolation of GBS and avoid overgrowth of other organisms. When direct agar plating is used instead of selective enrichment broth, as many as fifty percent of women who are GBS carriers have false negative culture results. A standard culture swab may be used, but the sample should be identified for the laboratory as specifically for GBS culture; in this screening culture, there is no need for the laboratory to culture for other organisms. Appropriate selective broth media are commercially available.

Surveillance

Invasive streptococcal group B disease is a condition reportable within five business days of diagnosis.

Case Definition

Invasive group B streptococcal infections

Clinical description: Invasive group B streptococcal infections may manifest as any of several clinical syndromes, including lower respiratory tract infection, pneumonia, bacteremia, meningitis, peritonitis, osteomyelitis, septic arthritis, postpartum sepsis (i.e., puerperal fever), neonatal sepsis and non-focal bacteremia.

Laboratory criteria for diagnosis: Isolation of group B Streptococcus (*Streptococcus pyogenes*) by culture from a normally sterile site (e.g., blood or cerebrospinal fluid, or, less commonly, joint, pleural, or pericardial fluid).

Case classification: Confirmed: a case that is laboratory confirmed

Intervention

No case investigation is required by the local health unit unless an outbreak is reported (for example, a nursery outbreak in a hospital).

Prevention

1. Identification of Carriers:

Most of the studies of intrapartum chemoprophylaxis have evaluated its impact on subsets of women who had been identified as GBS carriers. Although the GBS carriage rate in pregnancy does not change with trimester, the duration of carriage is unpredictable and prenatal screening cultures will not correctly identify all women with intrapartum GBS carriage. The later in pregnancy that cultures are performed, the better the correlation with intrapartum culture results. However, scheduling routine cultures very late in pregnancy will miss women who deliver prematurely. Optimal identification of GBS carriers is dependent on technique. The correlation of prenatal culture results with intrapartum GBS carriage is likely to be substantially reduced when screening does not incorporate appropriate sites (rectum and vagina), timing (within 4 weeks of delivery or rupture of membranes), and culture medium (selective broth). Since cultures from the vagina and rectum are more sensitive than cervical cultures, pelvic examination or visualization of the cervix by speculum examination is not required for collection of screening cultures.

2. Risk Based approach:

If a woman has not had a culture within four weeks of delivery or rupture of membranes,
→ use a risk based approach to decide which women need intrapartum antibiotics.

If a woman has one or more of the following conditions, use intrapartum antibiotics:

- preterm labor (<37 weeks)
- preterm premature rupture of membranes (<37 weeks)
- prolonged rupture of membrane (>18 hours)
- previous child affected by symptomatic GBS infection, or
- maternal fever during labor

In the late 1990's, available evidence indicated a large protective effect of prenatal GBS screening compared with the risk-based approach and provided the foundation for a recommendation of universal prenatal GBS screening outlined in the August 16, 2002 *Morbidity and Mortality Weekly Report* (available at: <http://www.cdc.gov/MMWR/preview/mmwrhtml/rr5111a1.htm>).

3. Screening based approach: Intrapartum chemoprophylaxis for those women identified as GBS carriers through prenatal vaginal and rectal cultures.

Screen all pregnant women at 35 to 37 weeks gestation for anogenital GBS colonization. Screening earlier in pregnancy is not recommended because of poor correlation with intrapartum carriage. Any GBS culture more than four weeks old is considered inappropriate for use in determining intra-partum antibiotic administration. If a culture is not available or if more than four weeks old, a risk-based approach must be used to determine when to give intra-partum antibiotic. Information systems should be developed and monitored to assure that prenatal cultures results are available at the time and place of delivery.

4. Chemoprophylaxis:

Administering antimicrobials to pregnant women before the onset of labor or rupture of membranes is not likely to prevent neonatal GBS disease. In one study asymptomatic pregnant women colonized with GBS were given oral antimicrobials in the third trimester; over 30% of those treated were still colonized at delivery and there was no significant difference in carriage of the organism at delivery between treated and untreated groups.

Post natal chemoprophylaxis with intramuscular penicillin given to infants just after birth also has been studied. In studies there were no differences between treated and untreated groups in the incidence of early- or late-onset GBS disease or in mortality. Since the majority of neonatal infections are acquired in utero, antimicrobials given to neonates, while useful for treatment, are unlikely to prevent GBS disease.

Intrapartum chemoprophylaxis (i.e., administration of antimicrobials after onset of labor or membrane rupture but before delivery). Several studies have shown that intrapartum chemoprophylaxis decreases neonatal colonization and early-onset invasive disease when given to unselected pregnant women colonized with GBS. Postpartum maternal febrile illness was also significantly reduced in the treatment group.

- Do not use oral antimicrobials to treat women who are found to be colonized with GBS during prenatal screening. Such treatment is not effective in eliminating carriage or preventing neonatal disease.
- Give intrapartum chemoprophylaxis to women:
 1. with a history of previously giving birth to an infant with invasive GBS disease; (prenatal screening is not necessary for these women)
 2. to women with a history of bacteriuria due to Group B strep during the current pregnancy.
 3. to pregnant women identified as GBS carriers during the current pregnancy and culture no more than four weeks old
 4. to unscreened women who meet at least one of the following criteria:
 - Intrapartum fever ($\geq 37^{\circ}\text{C}$) not clearly attributable to an extrauterine source;
 - Onset of labor or membrane rupture before thirty-seven weeks gestation; or
 - Rupture of membranes longer than eighteen hours.

Screening cultures for GBS colonization may be performed upon admission to the hospital for delivery; intrapartum antimicrobials may be stopped if cultures are complete and are negative for GBS.

Intrapartum antibiotic is not necessary if a C-section is done prior to rupture of membranes, no matter the GBS status or risk factors.

- Use intravenous penicillin G (5 million units every 6 hours) or ampicillin (2 grams IV initially followed by 1 gram every 4-6 hours) until delivery for intrapartum chemoprophylaxis. GBS is sensitive to penicillin.

For women allergic to penicillin:

- at low risk of anaphylaxis, cefazolin 2g IV initial dose followed by 1g IV every 8 hours until delivery
 - at high risk of anaphylaxis: Clindamycin 900 mg IV every 8 hours until delivery or erythromycin 500mg IV every 6 hours until delivery
 - For resistance to clindamycin or erythromycin, vancomycin 1g IV every 12 hours until delivery.
- IV antibiotics need a full four hours to reach therapeutic levels. Avoid rupture of membranes if possible until four hours after the first dose of antibiotics has been given.
 - Treat women found to have symptomatic or asymptomatic GBS bacteriuria during pregnancy at the time of diagnosis. Although data related to this issue are limited, intrapartum chemoprophylaxis is indicated for women with a history of GBS bacteriuria during the pregnancy, even if other risk factors are absent.

- Infants born to GBS positive mothers should not receive prophylactic antibiotics. However, any infant who has signs and symptoms of sepsis should receive a full diagnostic evaluation and empiric therapy.
- Infants born at less than thirty-five weeks or were born less than four hours after the first dose of intra-partum antibiotics should receive a limited evaluation (CBC and blood cultures), and be observed for a full forty-eight hours before discharge.
- Infants born at thirty-five weeks or greater and had at least four hours between intra-partum antibiotics and delivery need only routine observation for forty-eight hours or more. No evaluation is necessary unless sepsis is suspected.

Hospital precaution and isolation: Standard precautions.