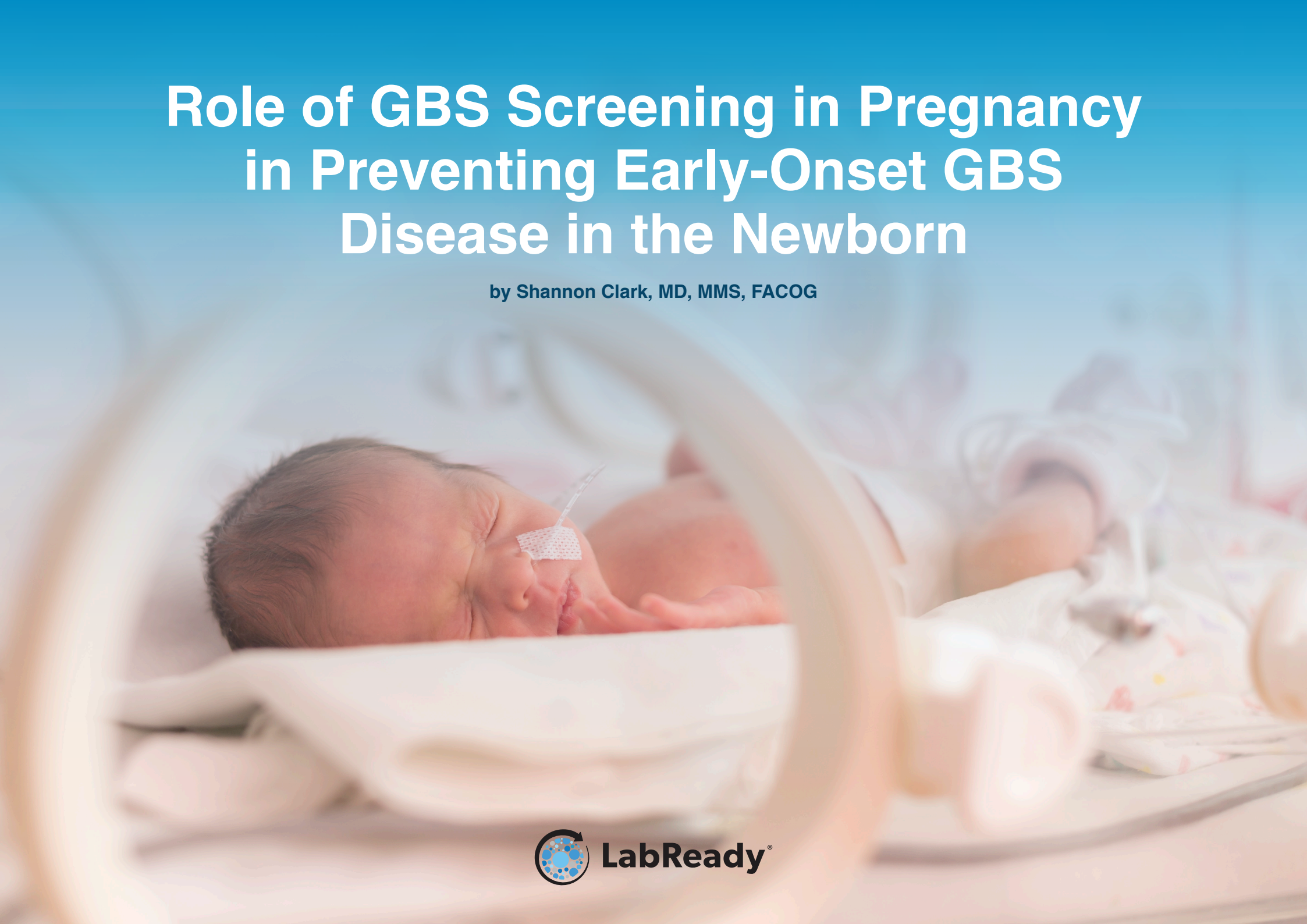
Role of GBS Screening in Pregnancy in Preventing Early-Onset GBS Disease in the Newborn

by Shannon Clark, MD, MMS, FACOG



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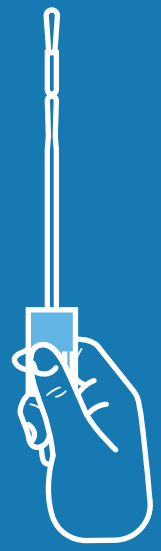
Executive Summary

Every expectant parent should educate themselves on illnesses that could affect their newborn. Early-Onset Group B Strep (GBS EOD) can cause significant life-long health problems for your baby. A GBS infection can make a newborn baby very ill resulting in seizures, meningitis, pneumonia, sepsis or even death.

If a mother is positive when cultured she will be given antibiotics. Treatment of patients with a positive GBS culture between 36 0/7–37 6/7 weeks' gestation with intravenous IAP has been shown to prevent GBS EOD in newborns; no other form or method of treatment has had the same results. The preferred antibiotic is penicillin, but there are recommended alternatives if the patient is penicillin allergic.

What is GBS?



The gastrointestinal tract harbors Streptococcus agalactiae, or Group B streptococcus (GBS); a bacteria that is considered to be a normal component of the intestinal microbiome. Due to the anatomical proximity of rectum to the vagina, rectal and vaginal colonization with GBS can occur in 10-30% of pregnant individuals.[1] Vaginal colonization can be temporary, intermittent, or persistent within the same pregnancy or between pregnancies. Although asymptomatic vaginal colonization is typical, GBS can cause asymptomatic bacteriuria and clinically symptomatic urinary tract infection, intraamniotic infection, and endometritis, Finally, GBS colonization has been associated with an increased risk of preterm labor and stillbirth.[1]

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What is GBS Early Onset Disease (EOD)?

First you need to understand the meaning of colonization. Colonization is the presence of bacteria on a body surface (in this case, in the rectum and/or the vagina) of the mother without causing disease in the person. However, the person (in this case, the mother) with the colonization can cause infection in her newborn.

Colonization with GBS of the genitourinary or gastrointestinal tracts is the primary risk factor for infection and clinical disease of the newborn after vaginal delivery, with meningitis, sepsis, and pneumonia the potential outcomes. Invasive GBS early-onset disease (EOD) of the newborn can occur due to vertical transmission during labor and delivery.

EOD typically presents within seven days of birth, but more commonly occurs within 12-48 hours of birth. In vertical transmission, the bacteria can ascend from the vagina to enter the amniotic fluid and enter the fetal lungs via fetal swallowing, or GBS can enter the skin and mucous membranes from the vaginal canal during labor and delivery. In most cases, the neonate gets colonized, but in others, the neonate gets clinically infected and GBS EOD develops.

If patients colonized with GBS at the time of delivery are not treated with intrapartum antibiotic prophylaxis (IAP), 50% of the newborns will get colonized and 1-2% will develop GBS EOD.[1] If a patient is treated with IAP during labor and delivery, the risk of the neonate developing GBS EOD drops by 80%.[2] Most cases of GBS EOD occur in term newborns (72%) with a mortality is 2-3%. However, if a preterm newborn (ie <=33 weeks' gestation) develops GBS EOD, the mortality is as high as 20-30%.[1,3]

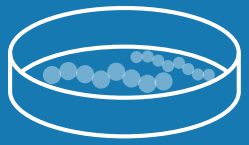
How is GBS EOD prevented?

Invasive GBS early-onset disease (EOD) of the newborn can occur due to vertical transmission during labor and delivery.

Screening all patients, including those with a planned cesarean birth, for GBS with a universal culture-based screening strategy via vaginal-rectal swab between 36 0/7 and 37 6/7 weeks of gestation (prior to the onset of labor) was demonstrated to be superior to risk-based screening protocols for the prevention of GBS EOD in the newborn.[1] Screening during this time frame allows for a 5-week window that includes births that occur up to at least 41 0/7 weeks' gestation, as well as a high degree of accuracy in predicting GBS colonization status at birth. If the swab collected in the recommended time period was negative and expires after five weeks, repeat screening is also recommended. If a patient had a negative GBS culture screen for another medical indication prior to 36 weeks' gestation and five weeks have lapsed, it should be repeated in the recommended time period in the third trimester. If at any time prior to 36 weeks' gestation a GBS culture screen is positive, or there is GBS bacteriuria or a history of a prior newborn with GBS EOD, screening is not indicated between 36 0/7 and 37 6/7 weeks, and the patient is considered GBS culture positive.

An accurate culture specimen with an adequate yield is obtained by swabbing the lower third of the vagina first, followed by the rectum through the anal sphincter with the same swab.

How is maternal GBS colonization or infection managed?



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Because GBS bacteriuria is a risk factor for intrapartum vaginal colonization regardless of urinary concentration or colonization status at 36 0/7–37 6/7 weeks' gestation, microbiology laboratories should report GBS of any colony count in the urine of pregnant persons.[4] In these cases, IAP is indicated and a GBS culture swab in late gestation can be deferred. In addition, if the patient has a history of a prior newborn with GBS EOD, IAP is also indicated, and the GBS culture swab can be deferred.

If a patient presents in labor without a GBS culture result, they should receive IAP according to risk factors present, ie. < 37 weeks' gestation, rupture of membranes for > 18 hours, prelabor preterm rupture of membranes, intrapartum temperature >= 100.4°F (38.0°C), or GBS positive status in a prior pregnancy. If the patient presents at >37 weeks' gestation, an intrapartum GBS specimen can be obtained and evaluated using a nucleic acid amplification test (NAAT), and if positive, IAP is initiated. If the NAAT is negative, but in the course of labor the patient develops clinical risk factors, the negative NAAT is overridden and IAP should be given. IAP is not indicated for those patients who undergo a cesarean birth prior to rupture of membranes or onset of labor, even if the GBS culture screen was positive.

Implementation of IAP has resulted in a reduction in the incidence of GBS EOD of more than 80%, from 1.8 newborns per 1,000 live births in the 1990s to 0.23 newborns per 1,000 live births in 2015 and has resulted in a significant reduction neonatal death.[1] Ideally IAP should be started four hours before birth in order to reach therapeutic benefit, but obstetric interventions (ie administration of oxytocin, artificial rupture of membranes, or planned cesarean birth, with or without precesarean rupture of membranes) should not be delayed when necessary.[1]

Why is IAP being refused by some patients?

Implementation of IAP has resulted in a reduction in the incidence of GBS EOD of more than 80%.

There is a recent movement by social media influencers to advise their followers to refuse IAP if the GBS culture screen is positive. One argument is that IAP "wipes out the vaginal microbiome" of the patient, thus preventing the newborn from receiving the bacteria from the maternal vaginal microbiome during labor and delivery that sets up their gut microbiome and immune system. A study in 2017 compared vaginal microbial composition in the vaginal swabs of pregnant subjects experiencing preterm birth at ≤ 32 weeks' gestation collected before delivery who received intrapartum penicillin antibiotic prophylaxis to controls.[5] The vaginal microbiota was changed after penicillin IAP with an increase in microbial diversity. Overall, the vaginal communities of control subjects were dominated by Lactobacillus sp. and contained low microbial diversity, whereas GBS culture positive subjects receiving IAP had modified vaginal microbiota with low abundance of Lactobacillus but higher microbial diversity.[5] As with any antibiotic, the maternal vaginal flora may be temporarily affected with GBS IAP. The risk and benefits of GBS IAP should be discussed, including the risk of GBS EOD without GBS IAP in a patient who is GBS culture positive.

Another argument made is that since the first microbial population that a neonate is exposed to comes from the maternal vaginal and gastrointestinal microbiota, the use of IAP could also alter the newborn and infant gut microbiome. It is known that the newborn gut microbiome is affected by vaginal versus cesarean birth, gestational age at delivery, antibiotic use, and breast versus bottle feeding.[6] These potential alterations in the newborn gut microbiome could affect vital metabolic and immunologic processes, thus potentially have long-term consequences on the child. It has also been documented that immediate vertical transmission of lactobacilli within hours of birth is reduced in neonates exposed to IAP, and there is a reduction of fecal Bifidobacteria counts in IAP-exposed neonates at 1 week of age.[7]

A 2016 study looked at the fecal microbiota composition of breastfed and mixed fed infants born to patients receiving IAP with ampicillin compared to control infants at days 7 and 30 of life.[6] Antibiotic prophylaxis caused the most noticeable changes in the microbiota of breastfed infants at day 7 with a lower bacterial diversity compared to mixed-fed infants and controls. The study demonstrated short term consequences of maternal IAP on the infant fecal microbial population, particularly in that of breastfed infants, that partially recovered by 30 days of life.[6] A 2017 prospective cohort study examined the impact of IAP on the infant gut microbiome composition during the first 12 weeks of life.[8] In this study, IAP during a vaginal birth affected the neonatal gut microbiome, but the effects effectively disappeared by 12 weeks of age in most infants.

While the gut flora of the newborn and infant may be affected by IAP for GBS, like the maternal vaginal microbiome, it is likely temporary. As previously stated, The risk and benefits of GBS IAP should be discussed, including the risk of GBS EOD without GBS IAP in a patient who is GBS culture positive.

Why are patients trying to "trick" the GBS test?

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There is another movement on social media to try and "trick" the GBS test or decrease one's risk of being GBS culture positive at 36 0/7 and 37 6/7 weeks' gestation by taking a daily probiotic.

A 2006 study assessed the ability of four vaginal Lactobacillus strains to inhibit the attachment of GBS to vaginal epithelial cells (VEC). The study showed that Lactobacillus acidophillus CRL 1259 and Lactobacillus paracasei CRL 1289 inhibited the attachment of GBS to VEC. The authors concluded that this finding supported the probiotic potential of these Lactobacillus strains by decreasing the pH of the vagina, thus inhibiting growth of GBS. However, this study was in vitro (in the lab) and not in vivo (in human subjects).[9] A study in 2019 assessed the efficacy of L. salivarius CECT 9145 to eradicate GBS from intestinal and vaginal tracts of GBS culture positive pregnant subjects in a pilot study of 57 subjects. After consuming L. salivarius CECT 9145 daily from week 26 to week 38, 72% and 68% of the subjects were GBS-negative in the rectal and vaginal samples, respectively. They concluded that L. salivarius CECT 9145 could be an efficient method to reduce the number of GBS culture positive patients during pregnancy, thus decreasing the number of patients needing IAP.[10] Finally, a 2016 randomized controlled trial examined the effect of Lactobacillus rhamnosus GR-1 and Lactobacillus reuteri RC-14 taken orally before bedtime GBS positive pregnant subjects. The GBS colonization results changed from positive to negative in 21 subjects in the probiotic group (42.9%) and in nine subjects in the placebo group (18.0%). They concluded that oral probiotic containing L. rhamnosus GR-1 and L. reuteri RC-14 could reduce the vaginal and rectal GBS colonization rate in pregnant patients.[11]

More recently, a 2020 study evaluated the potential of oral probiotics to eradicate vaginal GBS colonization during the third trimester of pregnancy. Subjects who tested GBS culture positive were randomized to receiving a dietary probiotic supplement of four viable strains of Lactobacillus twice-daily for 14 days or to the placebo group. The findings did not support the hypothesis that oral probiotics can eradicate GBS colonization during pregnancy, although there was a trend toward reduced GBS persistence.[12] A 2020 review looked at whether the use of probiotics prevent GBS colonization prior to delivery when compared with placebo, and whether the use of probiotics reduces the risk of GBS colonization prior to delivery in GBS culture positive subjects when compared with standard treatment. They concluded that there is limited evidence to recommend the regular use of probiotics to minimize the risk of GBS colonization.[13]

Overall, the studies in favor of probiotic use different probiotics, in different protocols, with a smaller number of subjects and with varying study designs. As a result, there is no recommendation that can be given to patients regarding what probiotic to take, when to take it, in what amount, or for how long. Although taking a probiotic in pregnancy is unlikely to cause harm, it is recommended that patients have a discussion with their obstetrical care provider first.

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