Health Leadership and Quality of Life. 2025; 4:592
doi: 10.56294/hl2025592

ORIGINAL

Group B Streptococcus in Pregnancy: Screening and Treatment

Estreptococo del grupo B en el embarazo: detección y tratamiento

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Cite as: Z R, Vamalatha B, Mazumder A, Minhas D, Pati BK, Dhawan A. Group B Streptococcus in Pregnancy: Screening and Treatment. Health Leadership and Quality of Life. 2025; 4:592. https://doi.org/10.56294/hl2025592

Submitted: 27-05-2024 **Revised:** 15-12-2024 **Accepted:** 22-05-2025 **Published:** 23-05-2025

Editor: PhD. Neela Satheesh

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ABSTRACT

Several healthy women frequently harbor the bacteria group B streptococcus (GBS) in their vaginal or rectal regions. Nevertheless, it can lead to life-threatening infections in new-born, especially in the initial couple of days after birth. The significance of identifying and treating GBS in pregnant women is discussed in this paper in preventing the bacteria from infecting unborn children. The effectiveness of recommendations was evaluated using a retrospective sample from Active Bacterial Core inspection, which tracks invasive GBS illness in various states. Data from Laboure and delivery files of births that were live and early-onset GBS cases in infants younger than 10 days old between the year 2017 and 2018 were analyzed. The results were contrasted with a used comparable methodology and examined screening procedures in the years 2012 and 2013. We looked at the birth information for 254 babies who had GBS illness and 9046 babies who didn't. During 2012-2013 and 2017-2018, testing before birth rose from 49,8 % to 88,4 %, and the use of antibiotics rose from 29,5 % to 34,2 %. Only 60 % of preterm women with uncertain condition underwent chemoprophylaxis, compared to 85 % of term women who tested positive for GBS. With 72,2 % of cases affecting term newborns, the total early-onset GBS sickness rate: 0,3 cases per 1000 live births. 13,4 % of instances among term moms included missed testing. All screening suggestions were quickly implemented. Early-onset GBS illness may not recur if preterm deliveries are managed better and culture findings are collected, processed, and reported better.

Keywords: Group B Streptococcus (GBS); Pregnancy; Live Birth; New-Born; Chemoprophylaxis.

RESUMEN

Varias mujeres sanas albergan con frecuencia la bacteria estreptococo del grupo B (SGB) en la vagina o el recto. Sin embargo, puede provocar infecciones potencialmente mortales en el recién nacido, especialmente en los primeros días después del parto. En este artículo se analiza la importancia de identificar y tratar el SGB en mujeres embarazadas para prevenir que la bacteria infecte al feto. La eficacia de las recomendaciones se evaluó utilizando una muestra retrospectiva de la inspección del Núcleo Bacteriano Activo, que rastrea la enfermedad invasiva por SGB en varios estados. Se analizaron datos de Laboure y de los registros de partos de nacimientos vivos y casos de SGB de inicio temprano en bebés menores de 10 días de vida entre los años 2017 y 2018.

Los resultados se compararon con una metodología comparable utilizada y se examinaron los procedimientos de cribado en los años 2012 y 2013. Se analizó la información de nacimientos de 254 bebés con enfermedad por SGB y 9046 bebés sin ella. Durante 2012-2013 y 2017-2018, las pruebas prenatales aumentaron del 49,8 % al 88,4 %, y el uso de antibióticos, del 29,5 % al 34,2 %. Solo el 60 % de las mujeres prematuras con diagnóstico incierto se sometieron a quimioprofilaxis, en comparación con el 85 % de las mujeres a término que dieron positivo en la prueba de SGB. Con un 72,2 % de casos en recién nacidos a término, la tasa total de enfermedad por SGB de inicio temprano fue de 0,3 casos por cada 1000 nacidos vivos. El 13,4 % de los casos entre madres a término incluyeron pruebas no realizadas. Todas las sugerencias de detección se implementaron rápidamente. La enfermedad por SGB de inicio temprano podría no reaparecer si se gestionan mejor los partos prematuros y se obtienen, procesan y notifican mejor los resultados de los cultivos.

Palabras clave: Estreptococo del Grupo B (SGB); Embarazo; Nacido Vivo; Recién Nacido; Quimioprofilaxis.

INTRODUCTION

Bacteria known as GBS are often detected in both men and women's genital tracts and digestive tracts and additionally called Streptococcus agalactiae. While GBS is often not harmful, it can lead to serious infections in some people, especially expectant mothers, infants and those with compromised immune systems. GBS can cause pneumonia, meningitis, and a bloodstream infection that can be fatal in neonates. GBS in pregnant women can result in premature labour, chorioamnionitis, and urinary tract infections. The main objective of the article was to assess the viability of a broader investigation.[1] Both groups' rates of GBS vaginal/rectal colonization between 36 to 38 weeks of gestation were evaluated. It has been suggested that taking probiotic supplements might help to lessen GBS colonization. Given the high rates of overuse, uncertain dangers associated with screening and preventive obstetric medical care, and dubious efficacy.[2] The prevalence rate, molecular characteristics of Streptococcus agalactiae, and antibiotic susceptibility profiles, which were extracted from pregnant patients who were at least 35 weeks along in their pregnancy was to examine.[3] The medications ampicillin, penicillin, and ceftriaxone which are commonly used for empirical therapy of GBS colonization showed 100 % antimicrobial susceptibility. Colonization can be intermittent, permanent, or fleeting. It is important to note that colonization is probably a typical constituent of the host microbiome and does not necessarily determine maternal or neonatal infection.[4,5,20] Evaluate how diagnostic screening procedures compare. Real-time PCR and culture (Strep B Carrot Brot and Strep B CHROMagar) techniques were used and compared to standard diagnostic screening. Some illnesses that have been related to GBS in mothers include pyelonephritis, sepsis, bacteremia, and both symptomatic and asymptomatic urinary tract infections evaluated.[6] In a Disease Control and Prevention (CDC) monitoring including 409 pregnant women, GBS pneumonia was less frequently found in 2 % of cases. There have been cases of meningitis brought on by GBS infection documented in the literature that occur during pregnancy or the postpartum phase. The condition was regarded to be uncommon. A straightforward 15-week pregnancy termination resulted in postpartum endocarditis of the tricuspid valve with GBS.[7,8] The efficacy of late-pregnancy enriched culture GBS screening against real-time polymerase chain reaction (RT-PCR) and assess the impact of extending the screening-to-labor interval. To lessen the impact of GBS illness, it was crucial to identify hosts, treat carefully with the most focused antimicrobials, and prevent invasive disease using vaccinations.[9] From 100 pregnant women, two low rectal and vaginal swabs were taken. RT-PCR and culture were used to identify GBS.[10,11] Furthermore, it was done to assess the diagnostic performance on a previous validating cohort and a prospective cohort of pregnant mothers.[16,19] To overcome the issues universal antenatal testing for GBS colonization and IAP are advised.[12,18] The created the GBS digital PCR (GBS-dPCR) technique to find signs of colonization with GBS. More accurate and quick colonization detection could lead to more GBS diagnoses and treatments closer to the delivery date. For detecting GBS colonization during pregnancy, DPCR was a promising technique.[13] The number of EOS instances reported at or above 35 weeks gestation was examined by the author. To further assess the effectiveness and safety of a certain technique, large cohorts of neonates were ideal.[14,17] The purpose of was to ascertain if maternal peripartum infection risk is enhanced by GBS colonization at delivery.[15] According to GBS colonization status, the percentage of women having maternal peripartum infection was the primary end measure.

To characterize the remaining burden of early-onset GBS and analyze missed chances for disease prevention, to recognize regions that could assistance from community-based health protection programs. It analyzes the usage of screening and chemoprophylaxis across numerous states.

METHOD

Study population

Data from a comparable analysis carried out at Active Bacterial Core (ABC) monitoring to evaluate delivery

was used, as well as the ABC monitoring system, a part of the Emerging Infections Programme Network, which is population-based surveillance for invasive GBS disease. Regular population-based monitoring helped to find cases of early-onset, invasive GBS illness, it is identified from a typically sterile location by the isolation of GBS in a live-born infant younger to ten days old. Each case of GBS illness occurred in the birth group included in the analysis. A random investigation of 9346 live births, stratified by birth hospital, birth year, surveillance region are chosen from birth records at all ABC surveillance sites to identify births in which GBS was absent. To account for non-response, or the lack of a chart to abstract from, this initial weight was changed.

Informed consent is not required for this investigation, according to the decision of the CDC institutional review board. Since it has seen as a program assessment and every participating location's local institutional review board has accepted the protocol.

Data collection

Trained abstractors gathered standardized data of mother's demographics, antenatal care, obstetrical features, Obstetric medicine usage, and testing GBS from labor and delivery records for each chosen birth. If feasible, regularly obtained ABC surveillance case-report data were utilized with fill up the gaps left by the absence of labor records for women, their babies have GBS illness. When information on race, ethnicity, and term status could not be retrieved from the medical records, information from the birth certificate was utilized.

Definitions of variables

A preterm birth is one that occurs prior to 37 weeks of pregnancy. The postpartum phase is the period of time following the start of labour or the rupture of the membranes and delivery. The time between being admitted for labor and cord clamping was referred to as the postpartum phase in the case of C-section birth. When the time of the administration was uncertain, medicines given as prophylaxis in connection with C-section birth were not categorized as postpartum. Any antenatal test during admission has completed two or more days before birth was considered to have been screened for GBS. The Kessner index was used to assess the quality of antenatal care, classifying it as acceptable, intermediate, or deficient depending on the time and quantity of antenatal care appointments.

Statistical Analysis

To take into consideration the stratified survey design, all analyses were performed using the SUDAAN program. To compare the distributions of categorical variables, Pearson chi-square tests were utilized, and $p<0,05$ are taken into account that shows statistical significance. Single variable models were used to assess the factors that contributed to not being screened, and multivariable logistic-regression models took into account all variables that had significance levels lower than 0,15 in the single variable analysis. A significance criterion of less than 0,05 was used to include main effects in the last one multivariate model. Evaluations were conducted on all interactions in both directions as well as the mutual dependence of the main effects; interactions P values of less than 0,05 were deemed statistically significant.

RESULTS

From a cohort of 929,436 births in surveillance areas in 2017 and 2018, we examined data for 10,346 live births shown in table 1. For 9046 out of 9346 live births, we abstracted the labor records. 0 births in which the infant did not have GBS and 298 deliveries where the child has early-onset GBS that was discovered through active surveillance, corresponding to an GBS cases overall were 0,3 per 1000 live births. In this analysis, all 298 newborns with GBS illness were taken into account. A total of 225 of the 298 newborns were delivered at term, including 89,0 % of all infants and 72,2 % of those with GBS illness.

Table 1. ABC surveillance sites group features (2017-2018)

Factors	**Group(N = 10,346)**
Maternal demographic features	
unknown	0,75 (0,6-0,9)
Black	22,4 (21,3-23,5)
White	69,0 (67,8-70,3)
Other	13,1 (12,2-14,0)
Race — % (95 % CI)	
Ethnic group — % (95 % CI)	
unknown	2,1 (1,4-2,9)

Non-Hispanic	82,0 (80,5-83,5)
Hispanic	20,0 (19,0-20,9)
Medicaid pays % (95 % CI) of the labour and delivery expenses	24,7 (23,6-25,8)
Women's age <20 yr — % (95 % CI)	9,3(8,8-9,8)
Antenatal care and past medical history	
Insufficient antenatal care	20,2(19,7-20,8)
Some antenatal care	98,6 (99,4-97,8)
A history of drug using that is documented	4,1 (3,5-4,7)
Antenatal record in chart	99,25 (98,7-99,8)
A minimum of one prior live birth	58,2 (57,5-58,9)
Invasive GBS illness in a previous baby — % (95 % CI)	1,95 (1,5-2,4)
Pregnancy-related GBS bacteriuria: % (95 % CI)	6,6 (5,8-7,4)
Allergy to penicillin	
Features of pregnancy	
Intrapartum temperature	3,7 (3,5-3,9)
Membrane rupture	7,35 (6,9-7,8)
Delivery by C- section	26,6 (25,4-27,8)
Between-admissions and delivery time	25,1(24,7-25,6)
Suspected chorioamnionitis	3,4 (2,9-3,9)
Preterm delivery	12,15(11,1-13,2)
Threatened preterm delivery	5,65(4,9-6,4)
GBS Screening	
Screened before delivery	85,1(84,4-85,8)
under 35 weeks of gestation	14,4 (13,3-15,5)
larger than or equivalent to 35 weeks of gestation	49,7 (48,5-51,4)
GBS test results showing positive	24,5 (23,3-25,7)
Screened at admission only	3,05(2,5-3,6)
Screened at unknown date	36,1(34,8-37,4)
Women who were checked for gestational age at <35 weeks'	
Interquartile range	31,1-35,2
Average	34,2

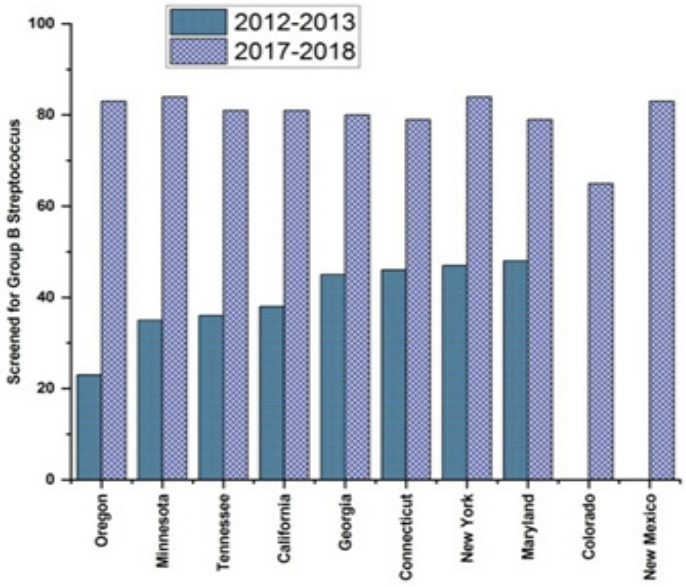

Figure 1. Before and after the publication of 2017 revised guidelines

Before giving birth, more women were examined for GBS than ever before, rising from 49,8 % in 2012-2013 to 88,4 % in 2017-2018. In all surveillance regions, the proportion of women who underwent screening rise, and the range in 2017–2018 was narrower than the range in 2012–2013 Shown in figure 1.

Screening and Chemoprophylaxis Recommendations Implementation

At 35 weeks or later, only 50 % of the women had actually been screened, and 2,8 % of them were only tested after they were admitted in table 1. 35,7 % had an unclear testing date, and 14,9 % were tested sooner than is advised. A recorded result was obtained from 98,4 % of the women who were checked before to delivery, and GBS positivity was detected in 24,2 % of them 99,5 % of pregnant women who had antenatal tests and whose medical records listed the test type had those tests done using cultures. For the remaining 0,5 %, less than 10 women were tested in each of the following categories: 0,2 % by quick polymerase chain reaction, 0,1 % by rapid antigen, and 0,2 % by another sort of test. Mothers who took obstetric medicines rose from 29,5 % in 2012-2013 to 34,2 % in 2017-2018, In 2012-2013, 73,8 % of women with an indication for obstetric medicines got chemoprophylaxis; by 2017-2018, the percentage rose to 85,1 %. From 29,5 % in 2012-2013 to 34,2 % in 2017-2018, more women got obstetric medicines. In 2012-2013, 73,8 % of mother with an indication for obstetric medicines got chemoprophylaxis, compared to 85,1 % in 2017-2018 shown in figure 2. In just 0,3 % of mother received prophylaxis was vancomycin used. After chemoprophylaxis, no confirmed cases of anaphylaxis occurred.

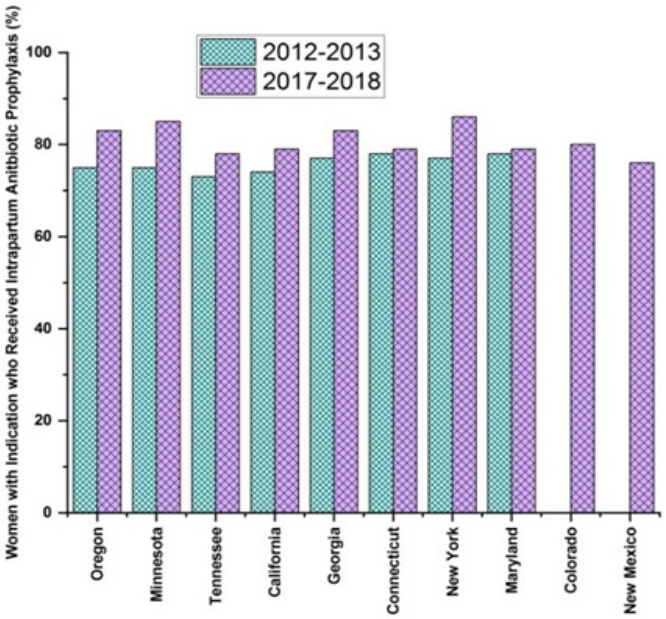

Figure 2. Women's Screening and Treatment

Screening

It further classified the population based on term status because women who gave birth preterm had a lower likelihood of being tested than mothers who gave birth at term. Only 15 % of women who delivered preterm were examined at admission, and only 52,6 % of preterm moms had their pregnancies screened before they gave birth. Of the women whose gestation period was two days or more, 60 % had their pregnancies screened at admission. In a single variable analysis, birth at a gestational age of fewer than 34 weeks was shown.

Antenatal screening was performed at a high rate among women who gave birth at term. A single variable analysis revealed that several subgroups of mothers shown in table 2. Black race, Hispanic ethnic group, prior live birth, drug use history, and insufficient antenatal care were still substantially related with not being tested in the multivariable model shown in table 2.

Table 2. Factors Linked to Missed GBS Screening at term, 2017-2018

Variable	Screened (N=5982)	Unscreened (N=745)	Odds Ratio - 95 % CI	
	%		Single-variable model	Multi-variable Model
Previous infant with invasive GBS disease	1,3	2,2	1,73 (0,94–3,18)	

GBS bacteriuria during current pregnancy	5,8	3,6	0,58 (0,35-0,97)	
Previous preterm delivery	5,1	8,3	1,71 (1,18-2,46)	
Threatened preterm delivery	4,8	2,4	0,59 (0,35-1,01)	
Inadequate antenatal care‡	15,2	39,1	3,42 (2,80-4,17)	3,08 (2,52-3,78)
Black race†	19,7	25,8	1,45 (1,16-1,82)	1,28 (1,01-1,65)
Hispanic ethnic group†	18,9	24,5	1,51 (1,22-1,86)	1,38 (1,12-1,74)
Medicaid coverage for childbirth and labor	25,3	32,2	1,42 (1,17-1,72)	
prior live birth of a child	58,1	73,9	2,02 (1,65-2,48)	1,93(1,57-2,36)
History of drug use	2,8	5,5	2,06 (1,36-3,13) 2	1,73 (1,14-2,63)

Chemoprophylaxis administration

Separated group based on term and preterm birth since recommended doses of chemoprophylaxis vary with gestational age. Preterm mothers are less likely than term mothers to get chemoprophylaxis when it is necessary. Chemoprophylaxis was administered to 84,5 % of pregnant mother with GBS who also gave birth prematurely shown in table 3. However, only 64 % of pregnant mother with unclear colonization status who given premature birth got obstetric medicines. For preterm babies, the average time between admission and delivery time 10 hours.

Table 3. Intrapartum Chemoprophylaxis Recommendations of 2017 Implementation, at term 2017-2018

GBS Status	**Term childbirth (N=6727) % (95 % of CI)**	**Preterm childbirth (N=962)**
Unknown colonization status		
Total	1,7 (1,5-1,1)	55,2 (48,3-58,0)
Received intrapartum medicines		
Overall	79,5 (64,7-89,5)	64,4 (56,1-68,4)
Less than 4 hours between admission and delivery	38,8(8,5-82,6)	35,1(25,4-45,3)
Greater than or Equal to 4 hours between admission and delivery	85,4 (68,3-91,8)	75,1 (66,8-81,5)
History of previous infant with GBS		
Total	6,8 (6,2-8,6)	6,3 (5,4-9,8)
Received intrapartum medicines		
Overall	81,2 (77,1-85,8)	74,6 (54,8-87,9)
Less than 4 hour between admission and delivery	56,7 (45,6-67,2)	60,8 (29,8-85,8)
Greater than or equal to 4 hour between admission and delivery	88,8 (86,1-94,2)	75,8 (52,7-88,4)
prior to birth, a positive antenatal test		
Total	24,9 (23,7-26,2)	30,7 (24,9-37,3)
Received intrapartum medicines		
Overall	88,1 (85,9-89,9)	85,5 (73,9-92,7)
<4 hr between admission and delivery	63,8 (57,2-69,8)	80,6 (55,8-93,6)
≥4 hr between admission and delivery	94,0 (92,2-95,5)	85,8 (71,7-93,5)

In women who gave birth at term, the incidence of chemoprophylaxis was high: 85 % of those who tested positive for GBS and 78,5 % of those who had a risk factor but had no knowledge of their colonization status shown in table 3.

Children of mothers who had been evaluated and tested negative for GBS for the disease accounted for the bulk of GBS sickness cases in neonates 62,4 % shown in table 4.

It made the following assumptions: Predicting colonization status at childbirth using prenatal screening method had a success rate of 96 %. If chemoprophylaxis was not administered, GBS would colonise 50 % of newborn. In colonized newborns, the incidence of disease ranged from 4,5 per 1000 live births, without hazards to 8 per1000 live births in those with risk factors. These assumptions led us to estimate that there would be 30 to 70 fewer cases of GBS sickness among term infants born to moms who had negative results from GBS

antenatal screening than the 120 cases we actually saw, ranging from 45 to 90 cases.

Table 4. GBS disease in infants and features of mothers who gave birth, (2017-2018)

Characteristic	GBS disease in the infants of mothers who gave birth and N=225
	No (%)
Un screened*	35 (19,1)
Inadequate antenatal care	16 (8,8)
Hispanic ethnic group	8 (4,8)
History of drug use	4 (2,7)
Black race	11(6,4)
Previous delivery of live infant	12 (6,9)
screened	156 (83,1)
GBS Negative	117(62,5)
Unknown state of colonization	3 (2,1)
Positive for GBS	38(20,7)

DISCUSSION

The viability of reducing the frequency of Early-onset GBS illness also relies, at least in part, on capacity to lessen the number of lost chances for the prevention. It found possible sides for the development among preterm laboring female with uncertain colonization status, penicillin-allergic female, and preterm laboring women with erroneous negative screening findings. The 2017 recommendations advised screening and chemoprophylaxis for the female with an uncertain infection status and a risk of premature birth at admission and delivery. Nevertheless, more than a third of these women close to half did not undergo chemoprophylaxis, nor were they tested.

The women at risk of premature birth who had their labor effectively stopped were not included. The traditional culture-based screening method, which takes around 48 hours to provide findings, would be most advantageous for the group. Real-time PCR tests that are offered commercially have been said to provide findings in 40 minutes. It is still necessary to evaluate if employing these tests is practical in real-world settings. Studies are required to determine if a comparable percentage of women who have positive findings from rapid-test screening get sufficient and appropriate intrapartum chemoprophylaxis as compared to late antenatal culturing. The observation that screening was less likely to be done when there was less than a four-hour gap between admission and delivery suggests that rapid testing can have a purpose in medicine.

By determining infection status at the time of labor and childbirth, rapid, PCR-based testing can increase the accuracy of screening at the time of admission for childbirth. Screening resulted in a 5 % rise in the total proportion of newborns exposed to intrapartum medicines, which was almost the amount anticipated when the recommendations were released. Despite the fact that case studies of anaphylaxis after intrapartum chemoprophylaxis are reported. In the cohort, didn't find any confirmed occurrences. Infants receiving intrapartum medication injections did not possess an increased chance of contracting E. Coli diseases, the second most prevalent opportunistic disease. No evidence that intrapartum prophylaxis increases the risk of sepsis unrelated to GBS. Neonatal sepsis, however, needs to be closely watched.

CONCLUSION

The problem of black babies being more likely than non-black babies to have early-onset GBS disease remains unresolved. due to an increase in the number of black newborns, since 2017, the number of cases of early-onset GBS disease has increased to 32 per 1000 live newborns. The assessment of GBS prevention methods was limited to the data recorded in labor records. Sufficient antenatal knowledge was lacked to evaluate clinical and laboratory practices. Additionally, there can be variations in providers', institutions', and labs' rules and procedures.

The widespread adoption of universal screening after the release of the 2017 recommendations demonstrates the viability of putting public health policy into practice. Rapid adoption of the recommendations was timed to a drop in the prevalence of early-onset illness. The findings also point up the difficulties and limitations of this method of prevention, which was not anticipated to completely avoid all instances of early-onset GBS illness. The most promising approaches for preventing early-onset GBS illness still include the creation of vaccinations against GBS. Suggestions for further screening were implemented without delay. It is possible to stop early-onset GBS cases in the future by managing preterm deliveries better and processing, collecting, and reporting culture results more effectively.

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FINANCING

The authors did not receive financing for the development of this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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