REPORT OF THE
DEPARTMENT OF HEALTH ON

DETECTION, PREVENTION AND TREATMENT OF GROUP B STREPTOCOCCUS INFECTION (GBS)

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

SENATE DOCUMENT NO. 16

COMMONWEALTH OF VIRGINIA
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1997

COMMONWEALTH of VIRGINIA

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COMMISSIONER

TDD 1-800-828-1120

December 27, 1996

TO: The Honorable George Allen

and

The General Assembly of Virginia

The report contained herein is pursuant to Senate Joint Resolution 51, agreed to by the 1996 General Assembly.

This report constitutes the response to the Commissioner of Health from the panel of experts he assembled to: (i) develop a protocol for the detection, prevention and treatment of Group B Streptococcus (GBS); and (ii) include representatives on this panel from the Virginia chapter of the American Academy of Pediatrics (AAP), the American College of Obstetricians and Gynecologists (ACOG), the Virginia Perinatal Association (VPA), and the Medical Society of Virginia.

Respectfully Submitted,

Randolph L. Gordon, M.D., M.P.H.
Commissioner

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Executive Summary

Since its emergence in the 1970's, group B streptococcal (GBS) disease has been the leading bacterial infection associated with illness and death among newborns in the United States. A protocol would provide guidance to health care professionals and women of childbearing age on how to adequately detect, prevent and treat GBS infection. The Virginia Center for Health Statistics reports seven infants died from GBS infection from 1990-1994. According to Virginia Health Information (VHI), in 1994 there were 139 cases of hospitalized neonates under 30 days old, with 129 of these cases being infants under 8 days old, with the diagnosis of GBS infection. A hospital neonatal chart review from Region 5 Northern Virginia Regional Perinatal Coordinating Council (RPCC) indicates that GBS infections may be under reported as a causative factor in infant deaths. From this chart review, GBS infection was listed as a contributing factor in 7 infant deaths in 1992, 5 deaths in 1993 and 5 deaths in 1994. GBS was not listed as the underlying cause of death in any of these reviews. Individual chart reviews and VHI data may more accurately capture the incidence of GBS infection, because GBS is often listed as a contributing cause of death, with sepsis listed as the cause of death on the death certificates. Sepsis is a broader term that encompasses all types of infection, while GBS is the specific organism that causes the infection.

Senate Joint Resolution (SJR) 51 passed by the 1996 General Assembly, requests the Commissioner of Health to assemble a panel of experts to develop a protocol for the detection, prevention and treatment of Group B Streptococcus (GBS). The Commissioner is further requested to include representatives on this panel from the Virginia Chapters of the American Academy of Pediatrics (AAP), the American College of Obstetricians and Gynecologists (ACOG), the Virginia Perinatal Association (VPA), and the Medical Society of Virginia.

The panel of experts met on June 10, 1996 to review GBS incidence and mortality data and the current GBS protocols of professional organizations. The Centers for Disease Control and Prevention (CDC) document published May 31, 1996 is endorsed by the AAP and ACOG. ACOG's Committee Opinion (Number 173, June 1996) on Prevention of Early-Onset Group B Streptococcal Disease in Newborns was distributed and discussed at the meeting. ACOG supports the CDC guidelines which is reflected in the Committee Opinion. AAP will be publishing its Policy Statement on Group B Streptococcus in Newborns in July 1996. Guidelines for Perinatal Care, 4th Edition published by AAP and ACOG, will be printed with the CDC guidelines for GBS in the new text. The professional organizations have agreed to adopt the CDC guidelines and their own publications reflect this position. The panel acknowledged the extensive research CDC has devoted to the development of the guidelines and agreed that the state of Virginia should adopt them. The panel recommends supporting the CDC protocol but not legislating the protocol. A brief overview of the CDC recommendations follows:

Screening-Based Approach

All pregnant women should be screened at 35-37 weeks' gestation for vaginal and rectal GBS colonization. Patients should be informed of screening results and of potential benefits and risks of intrapartum antimicrobial prophylaxis for GBS carriers. Information systems should be developed and monitored to ensure that prenatal culture results are available at the time and place of delivery. Intrapartum chemoprophylaxis should be offered to all pregnant women identified as GBS carriers by culture at 35-37 weeks' gestation. Women who develop rupture of membranes or labor before 37 weeks, in the absence of a negative GBS culture, should be given intrapartum chemoprophylaxis as well.

Risk-Factor Approach

A prophylaxis strategy based on the presence of intrapartum risk factors alone (e.g., 37 weeks' gestation, duration of membrane rupture greater than or equal to 18 hours or temperature greater than or equal to 100.4F) is an acceptable alternative. Women who develop membrane rupture without labor, before 37 weeks' completed gestation should have a vaginal and rectal culture collected and may be treated with antimicrobial prophylaxis until culture results become available.

The panel recommends supporting the CDC protocol but not legislating the protocol. By publicizing the long awaited CDC guidelines, it will decrease some of the confusion that health care providers currently have. The panel supported the CDC recommendations with the prenatal screening at 35-37 weeks algorithm. The panel agreed that the screening-based approach which prevents 86% of early-onset neonatal GBS disease is preferable to the risk-factor approach which prevents only 68.8% of early-onset neonatal GBS disease (Appendix 4). The panel strongly encourages women to discuss this issue with their health care provider and supports proper testing procedures for obtaining specimens and proper lab medium.

The utilization of improper culture mediums and inappropriate site of cultures was discussed by the panel at length. It was agreed that lack of information and knowledge by health care providers and laboratories about the appropriate culture media and correct culture sites is evident. Insurance coverage for these cultures needs to be investigated. Both CDC approaches listed above, require laboratories to use appropriate culture methods for collection of GBS from vagina-rectal swabs. Some insurance companies pay for a screening test but not a culture, or require a screening test before reimbursing for a culture. Due to the low specificity of GBS screening tests, with none of them having greater than 80% accuracy, the screening test is not considered reliable.

The panel also recommended that a statewide educational campaign on GBS and the new CDC guidelines is necessary. A campaign to educate women of childbearing age about GBS will also increase the amount of women who will talk to their health care provider about this disease. The campaign will reflect a preference for the screening-based approach over the risk-factor

based approach. Educating the laboratories, insurance companies and hospitals about these state supported guidelines will increase their compliance with the accepted manner of testing individuals for GBS colonization.

The statewide campaign should include:

- A fact sheet on the diagnosis, prevention and treatment of GBS with a letter from the Commissioner to be mailed to health care providers, labs, hospitals, and insurance companies. The letter would include advising all perinatal care providers to discuss GBS infection with pregnant women and employ the prevention strategies recommended by the CDC.

- A brochure to be developed in cooperation with the Group B Streptococcus Association to educate women of childbearing age.

The cost to implement this statewide campaign would be approximately $17,000.00. Funding would have to be sought either through public/private partnership or Virginia Department of Health support.

The panel also recommended developing a method for collecting data about GBS infection in Virginia in order to document progress in educating the public on GBS and the CDC guidelines. If progress in educating both professionals and women of childbearing age is successful, GBS infections and deaths of Virginia's newborns should be decreased. Working in cooperation with Virginia Health Information to track this data is an important strategy. In addition, the panel recommended insurance companies cover the cost of GBS cultures with no prerequisite for initial GBS screening test.

I. Purpose/Scope of Study

Senate Joint Resolution (SJR) 51 passed by the 1996 General Assembly, requests the Commissioner of Health to assemble a panel of experts to develop a protocol for the detection, prevention and treatment of Group B Streptococcus (GBS) (Appendix 1). The Commissioner is further requested to include representatives on this panel from the Virginia Chapters of the American Academy of Pediatrics, the American College of Obstetricians and Gynecologists, the Virginia Perinatal Association, and the Medical Society of Virginia.

Group B Streptococcus Infection (GBS) is the leading bacterial infection associated with illness and death among newborns in the United States. One of the Commonwealth's charges is to protect women and infants in Virginia. A protocol would provide guidance to health care professionals and women of childbearing age on how to adequately detect, prevent and treat GBS infection.

II. Background

A. Overview of GBS Infection

Since its emergence in the 1970's, group B streptococcal (GBS) disease has been the leading bacterial infection associated with illness and death among newborns in the United States. The Virginia Center for Health Statistics reports seven infants died from GBS infection from 1990-1994. In 1994 there were 139 cases of hospitalized neonates under 30 days old, with 129 of these cases being infants under 8 days old, with the diagnosis of GBS infection, according to Virginia Health Information (Appendix 2).

Most neonatal GBS infections can be prevented by administering intrapartum antibiotics to women at increased risk for transmitting the infection to their newborns. Unfortunately, prevention strategies have not been implemented widely or consistently, and the incidence of neonatal GBS disease has not declined. Approximately 10-30% of pregnant women are carriers of GBS with vaginal and rectal colonization most common (colonization refers to the presence of the GBS bacterium). Of infants born to colonized women, approximately 1%-2% will develop early-onset invasive disease. Maternal carriage of GBS is transient, and which women will be colonized at the time of labor and delivery is not predicted with complete accuracy by prenatal cultures.[1]

GBS is a bacterium that causes invasive disease primarily in newborns, pregnant women, and adults with underlying medical conditions. In infants, GBS is characterized as either early onset or late onset. Early onset occurs in infants <7 days of age, with late-onset occurring in infants >7days of age. The disease usually manifests itself as bacteremia (a bacterial infection in the blood), pneumonia or meningitis.[2] The case-fatality rate for newborn GBS disease is estimated to be 5%-20% with 6% of early-onset GBS infections resulting in death. In 1990, the incidence of GBS was 1.8 per 1,000 live births in the U.S. Eighty percent of GBS infections are

early-onset with long-term neurologic sequelae estimated to occur in 15%-30% of meningitis survivors. [3]

Results from research show that infants whose mothers had a positive GBS culture prenatally had 29 times the risk of developing early-onset GBS disease. Deliveries to women who had premature infants, prolonged duration of membrane rupture and intrapartum fever were approximately 7 times more likely to have their infants contract early-onset GBS disease.[4] Other criteria that increase a mother's risk of delivering an infant with invasive GBS disease include: <20 years of age, black race [5], heavy colonization of maternal GBS genital cultures[6], low levels of anti-GBS capsular antibody[7], previous delivery of a GBS infected infant[8], GBS bacteriuria during pregnancy.[9] Several vaccines are being developed to induce antibodies against GBS.[10] Reduced transport from the maternal placenta to the fetus may occur before 32-34 weeks gestation (length of time from conception to birth) making the vaccine's impact limited in pregnant women with preterm labors.

Laboratory identification of GBS colonization depends upon several factors. The culture specimen should be from both the anorectum and vaginal opening to increase the likelihood of GBS isolation in the culture. Culturing both sites increases the likelihood of isolating the GBS bacterium by 5%-27% over vaginal culture alone.[11] Laboratories need to utilize selective media (broths containing antimicrobial agents to inhibit competing organisms) to increase the yield of screening cultures by as much as 50%.[12] Utilization of inappropriate culture media will yield false negative results. A rapid test for GBS detection is available from several manufacturers and can be performed in <1 hour. However, the sensitivity of these rapid-detection tests has been variable and often unacceptably low (15%-74%). [13]

The later in pregnancy the cultures are performed, the closer the correlation with intrapartum culture results. The duration of GBS carriage is unpredictable, and does not change with the length of pregnancy. Prenatal screening cultures will not correctly identify all women with intrapartum GBS carriage. Scheduling routine cultures late in pregnancy improves accuracy, but means that if a women delivers prematurely or does not receive prenatal care she will not be screened for GBS.[14]

Intrapartum chemoprophylaxis (administering antibiotics after the onset of labor or membrane rupture but before delivery) is the most feasible method of preventing both early-onset GBS disease and maternal illness from GBS. Intrapartum antibiotic administration decreases neonatal infection with GBS. A large number of pregnant women are colonized with GBS, but administration of intrapartum antibiotics is not realistic for all GBS carriers and may lead to a number of adverse drug reactions. If all GBS carriers or all women with risk factors, received intrapartum antibiotics, approximately 10 deaths per year from anaphylaxis (severe allergic reaction) could theoretically occur.[15] Severe complications can occur in the unborn infant even when maternal anaphylaxis is not life threatening.[16] Widespread antibiotic use, may also increase the risk for the development of antibiotic resistant organisms. Restricting antibiotic agents to selected populations at increased risk for delivering a newborn with GBS would

decrease this occurrence. Penicillin G may be preferable to ampicillin for routine prophylaxis (contributes to the prevention of infection and disease). Ampicillin has a broader level of antimicrobial action than penicillin. Utilizing ampicillin more frequently than penicillin may increase the amount of resistant organisms.[17]

B. Incidence and Mortality of GBS in Virginia

From 1990 to 1994, there was a total of seven recorded deaths from GBS according to the Virginia Center for Health Statistics. This data was obtained from infant birth and death certificates. (Appendix 3).

Based on 1994 hospital submitted discharge claims data, Virginia Health Information (VHI) assisted the Virginia Department of Health by preparing a report focusing on the frequency of Group B Streptococcus among infants. Detailed data provided by VHI are included as Appendix 2. The following ICD-9-CM codes were identified as being relevant: Group B Streptococcus (GBS), Meningitis, Sepsis and Other Infection During the Perinatal Period. VHI found a total of 2,338 cases having the above conditions for children under 1 year of age, the vast majority being diagnosed with Other Infection During the Perinatal Period.

VHI data report for infants under the age of 8 days, 116 cases were diagnosed with GBS during their initial delivery hospital stay. The average total charge for the birth and care of each of these infants was found to be $6,942.84. The total cost to Virginia was $805,369.44. These infants were not discharged home and later readmitted with GBS. There were 13 infants less than 8 days old which were admitted after their initial discharge or home birth having a diagnosis of GBS. The average total charge for the care of each of these infants was $12,344.38. The total cost to Virginia was $160,476.94.

VHI data show that among all 2,338 cases of infants with the ICD-9-CM diagnosis codes of 771.8 Other Infection of the Perinatal Period, 038.0 Sepsis, 320.2 Meningitis and 041.02 Group B Streptococcus, there were 56 recorded deaths. None of the infants died had a diagnosis of GBS or Meningitis. However, 55 infants who died were diagnosed as Other Infection During the Perinatal Period and one infant died with diagnosis of Sepsis. All of the infants which died were under the age of 30 days at the time of admission. Forty-three of the infants who died were admitted at the time of birth and had an average length of stay of 23 days.

VHI acknowledges that these numbers could be affected by the under reporting of information, incomplete or inaccurate coding as well as by an incomplete submission of data.

A hospital neonatal chart review from Region 5 Northern Virginia Regional Perinatal Coordinating Council (RPCC) indicates that GBS infections may be under reported as a causative factor in infant deaths. GBS infection was listed as a contributing factor in 7 infant deaths in 1992, 5 deaths in 1993 and 5 deaths in 1994. GBS was not listed as the underlying cause of death in any of these reviews. Individual chart reviews and VHI data may more

accurately capture the incidence of GBS infection, because GBS is often listed as a contributing cause of death, with sepsis listed as the cause of death on the death certificates. Sepsis is a broader term that encompasses all types of infection, while GBS is the specific organism that causes the infection.

A diagnosis of GBS is difficult to obtain without extensive chart reviews. The lack of data reported on the birth and death certificates is evident considering the VHI data. The incidence and prevalence of GBS is under reported utilizing data from vital statistics. The long term sequela from GBS infection, other than death, is even more difficult to ascertain.

C. Management of GBS Infection

The lack of agreement on the management of perinatal GBS, in the past, is well documented in the literature. The American Academy of Pediatrics (AAP) and The American College of Obstetricians and Gynecologists (ACOG), which had established protocols on the prevention, detection and treatment of GBS and other infections, agreed that intrapartum antibiotic prophylaxis does appear to be effective in reducing the incidence of neonatal GBS colonization and early onset of neonatal sepsis, but differ in the detection and subsequent treatment modality. The controversy existed relative to determining which patients should receive antibiotic prophylaxis, as a mother's colonization status is not known at the time of labor.

The CDC has developed prevention guidelines in conjunction with experts from AAP, ACOG and other relevant experts in the field as well as other professional organizations. The CDC developed these guidelines to promote a coordinated approach to prevention among obstetric and pediatric care practitioners as well as clinical microbiology laboratory personnel. The guidelines are intended for the following groups: providers of prenatal, obstetric, and pediatric care; microbiology laboratories; hospital administrators; managed-care organizations; childbirth educators; public health authorities; expectant parents and advocacy groups for expectant parents.[18]

D. Cost of GBS Infection

There are many research studies estimating the cost-benefit of GBS testing and treatment, versus cost to treat GBS infected infants. In one study, the cost of testing a woman for GBS at 35-37 weeks gestation and treating her with antibiotics during labor if she is GBS positive is estimated to be $52.00 per woman. The cost to treat an infant with long-term GBS related sequelae was estimated to be over $100,000.[19] Another research study demonstrates that the universal GBS treatment protocol is cost-effective because the cost of treating affected infants is so high.[20] The study concludes the benefit-cost ratio is greater than 1 for all the strategies; therefore, for every dollar invested in prevention, more than a dollar would be saved by eliminating the costs of treating an infant with GBS disease.[21] The benefit-cost ratio for Virginia is difficult to obtain due to the difficulty in accurately determining infant morbidity and mortality resulting from GBS disease.

Costs of the Screening-Based Approach in Virginia
If all pregnant women who gave birth to an infant in Virginia had GBS testing the cost would be: 94,355 births (1994 births in Virginia) x $10.00 (approximate cost of GBS culture) = $943,550.00.

It is estimated that 10%-30% of all pregnant women will have positive GBS cultures.[22] Based on 94,355 births in Virginia in 1994, it is estimated that the number of pregnant women who will be have GBS positive cultures is between 9,435 and 28,306.

Intravenous penicillin (5 million unit vial) costs $16.61 for the drug with the mixture and administration costs factored in, making the average cost of intravenous penicillin $49.83 per patient in labor.[23] The average length of labor is twelve hours.[24] The total cost of treating these GBS positive women would be between $470,146.05 - $1,410,487.98.

The total cost to implement this protocol in Virginia would be from $1,413,696 - $2,354,037.90 to culture and treat GBS positive pregnant women for GBS infection.

Costs of Risk-Based Approach in Virginia
According to the literatuare, it appears that 18% of all women will present with one of the CDC risk factors listed, during pregnancy. In Virginia this would be approximetely 16,984 women. If these women are treated with antibiotics during labor the cost would approximetely be $846,312.72.

Health Department Cost of Culturing and Treating Women
The health department costs of culturing women from July 1994 - July 1995 are based upon the 20,000 unduplicated maternity patient visits to local health departments statewide.[25] It appears that health department practice is variable. The cost to culture these pregnant women (based on the costs outlined above) would be $200,000.00. The number of these women who would be GBS positive is 2,000-6,000 with the cost of treating these GBS positive women being between $99,660.00 - $298,980.00. The total cost to Virginia for treating and culturing these women would average $399,320.00.

Cost of Treating GBS Infants
According to VHI, in 1994 for infants under the age of 8 days, 116 cases were diagnosed with GBS during their initial delivery hospital stay. The average total charge for the birth and care of each of these infants was found to be $6,942.84. The total cost to Virginia was $805,369.44. These infants were not discharged home and later readmitted with GBS. There were 13 infants less than 8 days old which were admitted after their initial discharge or home birth having a diagnosis of GBS. The average total charge for the care of each of these infants was $12,344.38. The total cost to Virginia was $160,476.94. This does not reflect the cost of long-term treatment of neurologically impaired infants from sequelae of GBS infection. More detail on VHI data is included in Appendix 3.

III. Methodology and Findings

Each of the organizations specified in the study resolution was asked to designate a representative to participate on the study panel. In addition, the Regional Perinatal Coordinating Councils were asked to supply names of physicians in their region who were involved in the issue of GBS infection. From the list of names, physicians were chosen to represent the state geographically, by medical specialty, by community based practice, and university based practice. A consumer representative was also asked to participate on the panel. The panel is representative of health care professionals throughout the Commonwealth who deal with the issue of GBS infection.

The panel of experts met on June 10, 1996 to review GBS incidence and mortality data and the current GBS protocols of professional organizations. The CDC document published May 31, 1996 is endorsed by the AAP and ACOG. ACOG's Committee Opinion (Number 173, June 1996) on Prevention of Early-Onset Group B Streptococcal Disease in Newborns was distributed and discussed at the meeting. ACOG supports the CDC guidelines which is reflected in the Committee Opinion. AAP will be publishing its Policy Statement on Group B Streptococcus in Newborns in July 1996. Guidelines for Perinatal Care, 4th Edition published by AAP and ACOG, will be printed with the CDC guidelines for GBS in the new text. The professional organizations have agreed to adopt the CDC guidelines and their own publications reflect this position. The panel acknowledged the extensive research CDC has devoted to the development of the guidelines and agreed that the state of Virginia should adopt them. The panel recommends supporting the CDC protocol but not legislating the protocol. The full text of the CDC recommendations is included as Appendix 4. A brief overview of the CDC recommendations follows: [26]

Screening-Based Approach

All pregnant women should be screened at 35-37 weeks' gestation for vaginal and rectal GBS colonization (Appendix 4, Figure 1). Patients should be informed of screening results and of potential benefits and risks of intrapartum antimicrobial prophylaxis for GBS carriers. Information systems should be developed and monitored to ensure that prenatal culture results are available at the time and place of delivery. Intrapartum chemoprophylaxis should be offered to all pregnant women identified as GBS carriers by culture at 35-37 weeks' gestation. Women who develop rupture of membranes or labor before 37 weeks, in the absence of a negative GBS culture, should be given intrapartum chemoprophylaxis as well.

Risk-Factor Approach

A prophylaxis strategy based on the presence of intrapartum risk factors alone (e.g., 37 weeks' gestation, duration of membrane rupture greater than or equal to 18 hours or temperature greater than or equal to 100.4F) is an acceptable alternative. Women who develop membrane rupture without labor, before 37 weeks' completed gestation should have a vaginal

and rectal culture collected and may be treated with antimicrobial prophylaxis until culture results become available (Appendix 4, Figure 2).

The panel agreed that the screening-based approach which prevents 86% of early-onset neonatal GBS disease is preferable to the risk-factor approach which prevents only 68.8% of early-onset neonatal GBS disease (Appendix 4).

The utilization of improper culture mediums and inappropriate site of cultures was discussed by the panel at length. It appears that many health care providers are not aware of the proper site for obtaining GBS cultures, the timing for collecting the specimen and best culture medium for accurate GBS cultures. It was agreed that lack of information and knowledge by health care providers and laboratories about the appropriate culture media and correct culture sites is evident. Insurance coverage for GBS cultures needs to be investigated. Both CDC approaches listed above, require laboratories to use appropriate culture methods for collection of GBS from vagina-rectal swabs. Some insurance companies pay for a screening test but not a culture, or require a screening test before reimbursing for a culture. Due to the low specificity of GBS screening tests, with none of them having greater than 80% accuracy, the screening test is not considered reliable.

IV. Recommendations

The panel recommends supporting the CDC protocol but not legislating the protocol. By publicizing the long awaited CDC guidelines, it will decrease some of the confusion that health care providers currently have. The panel supported the CDC recommendations with the prenatal screening at 35-37 weeks algorithm. The panel agreed that the screening-based approach which prevents 86% of early-onset neonatal GBS disease is preferable to the risk-factor approach which prevents only 68.8% of early-onset neonatal GBS disease (Appendix 4). The panel strongly encourages women to discuss this issue with their health care provider and supports proper testing procedures for obtaining specimens and proper lab medium.

A statewide educational campaign on GBS and the new CDC guidelines is necessary. A campaign to educate women of childbearing age about GBS will also increase the amount of women who will talk to their health care provider about this disease. The campaign will reflect a preference for the screening-based approach over the risk-factor based approach.

Educating the laboratories, insurance companies and hospitals about these state supported guidelines will increase their compliance with the accepted manner of testing individuals for GBS colonization.

The statewide campaign should include:

- A fact sheet on the diagnosis, prevention and treatment of GBS with a letter from the Commissioner to be mailed to health care providers, labs, hospitals, and insurance companies. The letter would include advising all perinatal care providers to discuss GBS infection with pregnant women and employ the prevention strategies recommended by the CDC.

- A brochure to be developed in cooperation with the Group B Streptococcus Association to educate women of childbearing age.

The cost to implement this statewide campaign would be approximately $17,000.00. Funding would have to be sought either through private/public partnership or Virginia Department of Health support.

The panel also recommended developing a method for collecting data about GBS infection in Virginia in order to document progress in educating the public on GBS and the CDC guidelines. If progress in educating both professionals and women of childbearing age is successful, GBS infections and deaths of Virginia's newborns should be decreased. Working in cooperation with Virginia Health Information to track this data is an important strategy. In addition, the panel recommended insurance companies cover the cost of GBS cultures with no prerequisite for initial GBS screening test.

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SENATE JOINT RESOLUTION NO. 51

Requesting the Commissioner of Health to assemble a panel of experts for the purpose of developing a protocol for the detection, prevention, and treatment of Group B Streptococcus (GBS).

Agreed to by the Senate, February 28, 1996
Agreed to by the House of Delegates, February 26, 1996

WHEREAS, the Guidelines for Perinatal Care developed by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists include two chapters related to infection; and

WHEREAS, infections, whether viral or bacterial, among pregnant women are frequently very dangerous for such women's fetuses and, if not controlled, to newborn infants; and

WHEREAS, the public is generally aware of the dangers of certain illnesses, such as measles or sexually-transmitted diseases, to pregnant women and their fetuses; and

WHEREAS, most people, even some practitioners, may not be aware, however, of the potentially serious dangers to fetuses and newborn infants from exposure to certain common bacteria; and

WHEREAS, for example, an article published recently in the New England Journal of Medicine implied that infection caused by some common organisms was related to premature births and low birth weights; and

WHEREAS, detection of dangerous infections among pregnant women, including Group B Streptococcal (GBS) colonization, should be made a priority among providers delivering prenatal and perinatal care; and

WHEREAS, Group B Streptococcal infection—caused by a bacteria commonly found in the mouth and the digestive, urinary, and reproductive systems—should not be confused with Group A Streptococcus—the agent causing strep throat and rheumatic fever; and

WHEREAS, although many infants exposed to GBS do not develop infection or suffer any effects from the bacteria, those infants who are exposed to GBS in utero or during labor may become infected; and

WHEREAS, GBS can cause sepsis, pneumonia, encephalitis, and meningitis, and may result in permanent damage or even death to an infant who was born in good health; and

WHEREAS, the tragic instances of permanent damage or death among newborn infants as a result of GBS infection or other infections are often easily preventable through testing of women and newborns and treatment with antibiotics of those found to be colonized or infected; and

WHEREAS, there are, within the medical community, concerns about the proper time(s) for and the effectiveness and costs of repeated testing or culturing of pregnant women to detect GBS infection because a woman may be colonized with the bacteria at certain times during pregnancy and not at other times; and

WHEREAS, many experts caution that prophylactic antibiotic treatment must be monitored to prevent the development of antibiotic-resistant strains of GBS and other microorganisms; and

WHEREAS, to those parents who have lost a child to GBS infection, none of the medical controversy is as compelling and important as the fact that their child's death could have been prevented; now, therefore, be it

RESOLVED by the Senate, the House of Delegates concurring, That the Commissioner of Health be requested to assemble a panel of experts for the purpose of developing a protocol for the detection, prevention, and treatment of Group B Streptococcus (GBS). The panel shall consult the most current revision of the Guidelines for Perinatal Care and experts on infectious diseases concerning the most appropriate means of detection, prevention, and treatment of GBS infection and other infections. The panel may also make recommendations to the Governor and the General Assembly concerning appropriate actions to protect the Commonwealth's women and infants.

The Commissioner of Health or his designee shall serve as chair of the panel and shall provide technical assistance concerning public health matters as necessary to the panel. The Commissioner is further requested to include representatives on this panel from the Virginia Chapters of the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists, the Virginia Perinatal Association, and the Medical Society of Virginia.

The Department of Health shall provide staff support for the study. All agencies of the

Commonwealth shall provide assistance to the panel, upon request.

The panel shall complete its work in time for the Commissioner to submit the panel's findings and recommendations to the Governor and the 1997 Session of the General Assembly as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents.

APPENDIX 2

VIRGINIA HEALTH INFORMATION

1994

Virginia Health Information (VHI) collects and analyzes data from hospital discharge data providing the Commonwealth with patient level data. VHI is a public-private partnership between the Commonwealth of Virginia and a coalition of all parties with a stake in health care.

The number of infants with a diagnosis of Group B Streptococcus (GBS):

	Number of infants with GBS diagnosis	Average hospital total charge	VA Total Cost
Under 30 days old	139	$ 7,279.48	$1,011,847.72
Under 8 days old	129		$ 939,052.92
Under 8 days old w/ Admission date same as birth date	116	$ 6,942.84	$ 805,369.44
Under 8 days old w/ Admission date later than birth date	13	$12,344.38	$ 160,476.94

Based on 1994 hospital submitted discharge claims data, Virginia Health Information (VHI) assisted the Virginia Department of Health with a report focusing on the frequency of Group B Streptococcus among fants. Several ICD-9-CM codes were identified by the Virginia Health Information Management ssociation as being relevant. The codes identified Group B Streptococcus (GBS), Meningitis, Sepsis and Other Infection During the Perinatal Period. VHI found a total of 2,338 cases having the above conditions for children under 1 year of age. The vast majority being diagnosed with Other Infection During the Perinatal Period.

For infants under the age of 8 days, 116 cases were diagnosed with GBS during their initial delivery hospital stay. The average total charge for the birth and care of these infants was found to be $6,942.84. These infants were not discharged home and later readmitted with GBS. There were 13 infants less than 8 days old which were admitted after their initial discharge or home birth having a diagnosis of GBS. The average total charge for the care of these infants was $12,344.38.

Among all 2,338 cases of infants with the ICD diagnosis codes of 771.8 Other Infection of the Perinatal Period, 038.0 Sepsis, 320.2 Meningitis and 041.02 Group B Streptococcus, there were 56 recorded deaths. None of the infants died who had a diagnosis of GBS or Meningitis. However, 55 infants died who were diagnosed as Other Infection During the Perinatal Period, and one infant died with diagnosis of Sepsis. All of the infants who died were under the age of 30 days at the time of admission. Forty-three infants of the infants who died were admitted at the time of birth and had an average length of stay of 23.09 days.

VHI acknowledges that a these numbers could be affected by the under reporting of information, incomplete or inaccurate coding as well as by an incomplete submission of data.

APPENDIX 3

Infant Deaths from Group B Streptococcal Infection in Virginia
A Five Year Review

YEAR	# INFANT DEATHS FROM GBS
1990	2
1991	1
1992	1
1993	2
1994	1
Total	**7**

Of the seven infant deaths from GBS there were:

- No Multifetal Gestation or Premature Rupture of Membranes
- No Maternal History of Hypertension, Fever, Cervical Surgery
- Three mothers had premature labor with infant gestation under 36 weeks
- Two mothers had births of infants 36 weeks gestation
- One mother had a birth of an infant 37 weeks gestation
- One mother had a birth of an infant 41 weeks gestation

Source: ***Virginia Center for Health Statistics, NCHS***
Birth and Death Certificates

ICD-9 Codes:

771.8 Other Infection in the Perinatal Period
0.41 Streptococcus

- There were 110 deaths in this 5 year period from ICD-9 Code 771.8 but upon visual examination of each death certificate, GBS was not listed as a contributing cause of death. The death certificate noted overwhelming or presumed sepsis, without organism identification. There may be 15-20 total deaths due to GBS that were not identified as such on the birth or death certificate.

RECOMMENDATIONS

Enhanced communication among personnel in multiple disciplines is needed to ensure that programs for prevention of GBS disease succeed. Open communication between clinicians and patients is a critical component of GBS disease prevention. An informational brochure for pregnant women on GBS is available through CDC (Childhood and Respiratory Diseases Branch, Division of Bacterial and Mycotic Diseases, National Center for Infectious Diseases, Mailstop C09, Atlanta, GA 30333; Internet address: http://www.cdc.gov/ncidod/diseases/bacter/strep_b.htm. The following recommendations for the prevention of GBS disease will need periodic reappraisal to incorporate advances in technology or other refinements in prevention strategies.

1. Obstetric-care practitioners, in conjunction with supporting laboratories and labor and delivery facilities, should adopt a strategy for the prevention of early-onset GBS disease. Patients should be informed regarding the GBS prevention strategy.
2. Regardless of which preventive strategy is used, a) women with symptomatic or asymptomatic GBS bacteriuria detected during pregnancy should be treated at the time of diagnosis; because such women are usually heavily colonized with GBS, they should also receive intrapartum chemoprophylaxis; and b) women who

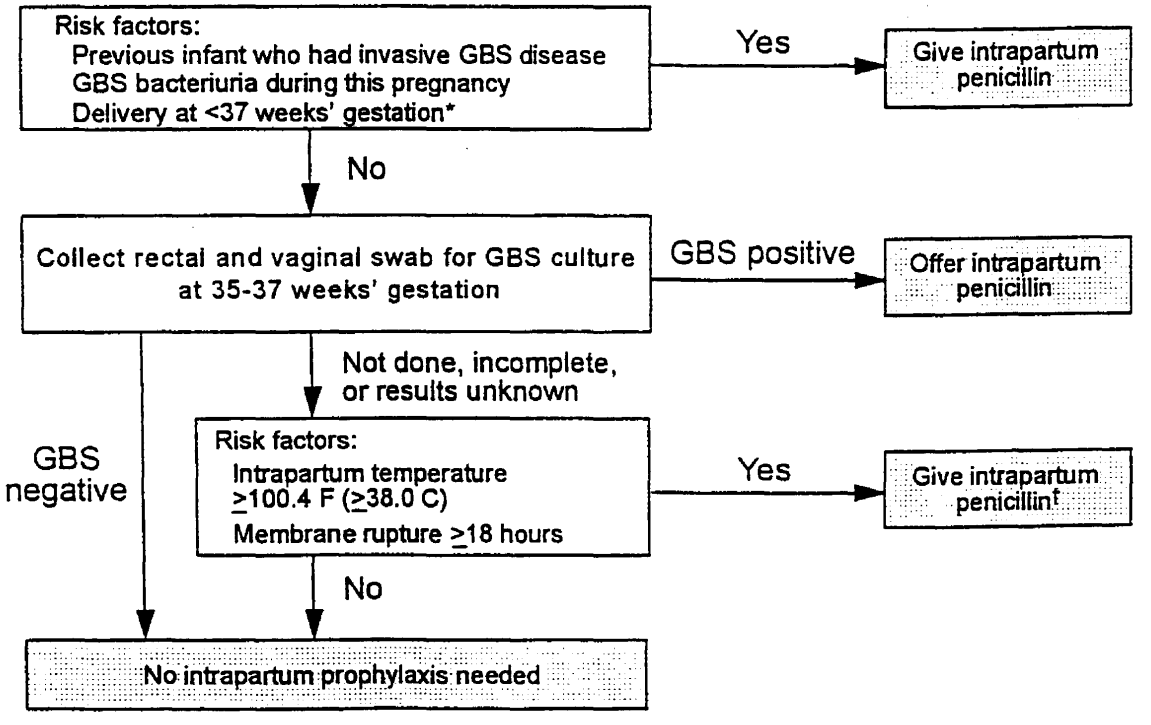
previously have given birth to an infant with GBS disease should receive intrapartum chemoprophylaxis; prenatal screening is not necessary for these women.

3. Until further data become available to define the most effective strategy, the following two approaches are appropriate:

   Screening-Based Approach. All pregnant women should be screened at 35–37 weeks' gestation for anogenital GBS colonization (Figure 1). Patients should be informed of screening results and of potential benefits and risks of intrapartum antimicrobial prophylaxis for GBS carriers. Information systems should be developed and monitored to ensure that prenatal culture results are available at the time and place of delivery. Intrapartum chemoprophylaxis should be offered to all pregnant women identified as GBS carriers by culture at 35–37 weeks' gestation.

   1) If the result of GBS culture is not known at the time of labor, intrapartum antimicrobial prophylaxis should be administered if one of the following risk factors is present: <37 weeks' gestation, duration of membrane rupture ≥18 hours, or temperature ≥100.4 F (≥38.0 C).

FIGURE 1. Algorithm for prevention of early-onset group B streptococcal (GBS) disease in neonates, using prenatal screening at 35–37 weeks' gestation



*If membranes ruptured at <37 weeks' gestation, and the mother has not begun labor, collect group B streptococcal culture and either a) administer antibiotics until cultures are completed and the results are negative or b) begin antibiotics only when positive cultures are available. No prophylaxis is needed if culture obtained at 35–37 weeks' gestation was negative.
†Broader spectrum antibiotics may be considered at the physician's discretion, based on clinical indications.

2) Culture techniques that maximize the likelihood of GBS recovery should be used. Because lower vaginal and rectal cultures are recommended, cultures should not be collected by speculum examination. The optimal method for GBS screening is collection of a single standard culture swab or two separate swabs of the distal vagina and anorectum. Swabs may be placed in a transport medium (e.g., Amies') if the microbiology laboratory is offsite. The sample should be identified for the laboratory as specifically for GBS culture. Specimens should be inoculated into selective broth medium (either SBM broth or Lim broth), followed by overnight incubation and then subcultured onto solid blood agar medium. In this screening culture, there is no need for the laboratory to culture for other organisms. A laboratory procedure to maximize recovery of GBS is detailed (Box 1).
3) Laboratories should report results (both positive and negative) to both the anticipated site of delivery and the health-care provider who ordered the test. Ideally, laboratories that perform GBS cultures will ensure that clinicians have continuous access (i.e., 24 hours a day, 7 days a week) to culture results.

BOX 1. Procedure for collecting and processing clinical specimens for culture of group B *Streptococcus*

1. Obtain one or two swabs of the vaginal introitus and anorectum. Cervical cultures are not acceptable; a speculum should not be used for culture collection.

2. Place the swabs into a transport medium. The swabs in a transport medium will maintain GBS viability for up to 4 days at room temperature or under refrigeration. Appropriate nonnutritive moist swab transport systems (e.g. Amies') are commercially available.

3. Remove the swabs from the transport medium and inoculate both swabs together into selective broth medium. Todd-Hewitt broth supplemented with either colistin (10 µg/mL) and nalidixic acid (15 µg/mL) or with gentamicin (8 µg/mL) and nalidixic acid (15 µg/mL) may be used; appropriate commercially available options include Lim or SBM broth.

4. Incubate selective broth for 18–24 hrs. Subculture the broth to sheep blood agar plate.

5. Inspect and identify organisms suggestive of GBS (beta hemolytic or nonhemolytic, gram-positive and catalase negative). If GBS is not identified after incubation for 18–24 hrs on sheep blood agar plate, reincubate and inspect at 48 hrs to identify suspected organisms.

6. Various slide agglutination tests or other tests for GBS antigen detection (e.g., genetic probe or fluorescent antibody) may be used for specific identification, or the CAMP test may be employed for presumptive identification.

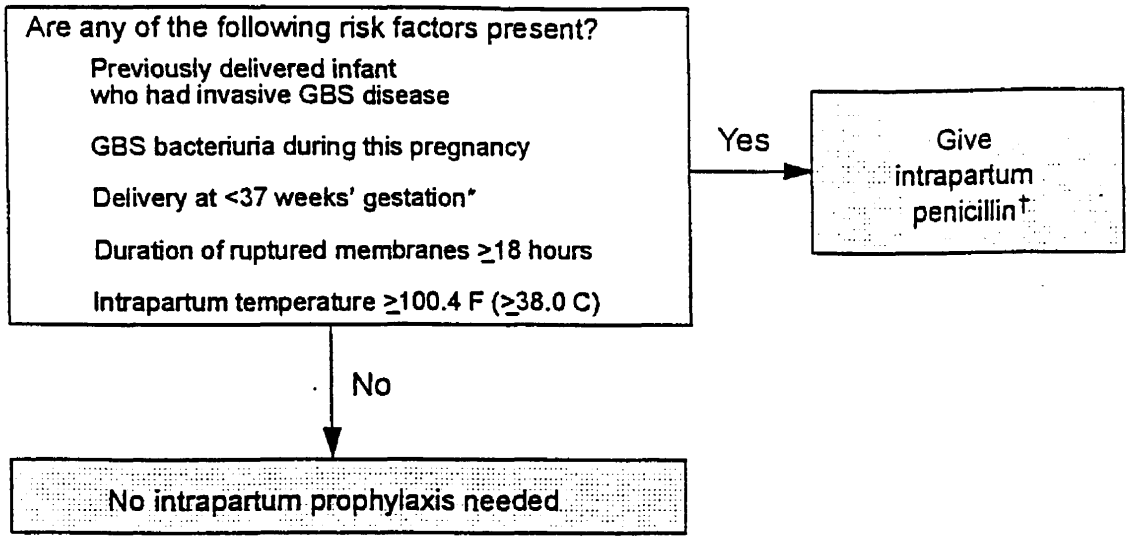
4) Oral antimicrobial agents should not be used to treat women who are found to be colonized with GBS during prenatal screening. Such treatment is not effective in eliminating carriage or preventing neonatal disease.

Risk-Factor Approach. A prophylaxis strategy based on the presence of intrapartum risk factors alone (e.g., <37 weeks' gestation, duration of membrane rupture ≥18 hours, or temperature ≥100.4 F [≥38.0 C]) is an acceptable alternative (Figure 2).

4. For intrapartum chemoprophylaxis, intravenous penicillin G (5 mU initially and then 2.5 mU every 4 hours) should be administered until delivery (Box 2). Intravenous ampicillin (2 g initially and then 1 g every 4 hours until delivery) is an acceptable alternative to penicillin G, but penicillin G is preferred because it has a narrow spectrum and thus is less likely to select for antibiotic resistant organisms. Clindamycin or erythromycin may be used for women allergic to penicillin, although the efficacy of these drugs for GBS disease prevention has not been measured in controlled trials. (Note: Penicillin G does not need to be administered to women who have clinical diagnoses of amnionitis and who are receiving other treatment regimens that include agents active against streptococci [e.g., ampicillin or clindamycin].)
5. Routine use of prophylactic antimicrobial agents for infants born to mothers who received intrapartum prophylaxis is not recommended. However, therapeutic use of these agents is appropriate for those infants suspected clinically of having sepsis. Additional research is needed to determine algorithms for management of infants born to mothers who receive intrapartum antimicrobial prophylaxis. One algorithm for empiric management of these newborns is provided (Figure 3). Other management approaches, developed by individual physicians or institutions, may be appropriate alternatives.
6. Local and state public health agencies, in conjunction with appropriate groups of hospitals, should consider establishing surveillance to monitor the incidence of neonatal GBS disease, occurrence of adverse reactions to antimicrobial prophylaxis, and the emergence of perinatal infections caused by penicillin-resistant organisms.

Investigations designed to evaluate and compare these two strategies and others are needed. Such studies will require the participation of multiple institutions and should evaluate multiple outcomes (e.g., perinatal GBS infections, adverse reactions to antimicrobial prophylaxis, and perinatal infections caused by penicillin-resistant organisms). Characterization of protocol failures may contribute to improvement of future prevention strategies.

FIGURE 2. Algorithm for prevention of early-onset of group B streptococcal (GBS) disease in neonates, using risk factors



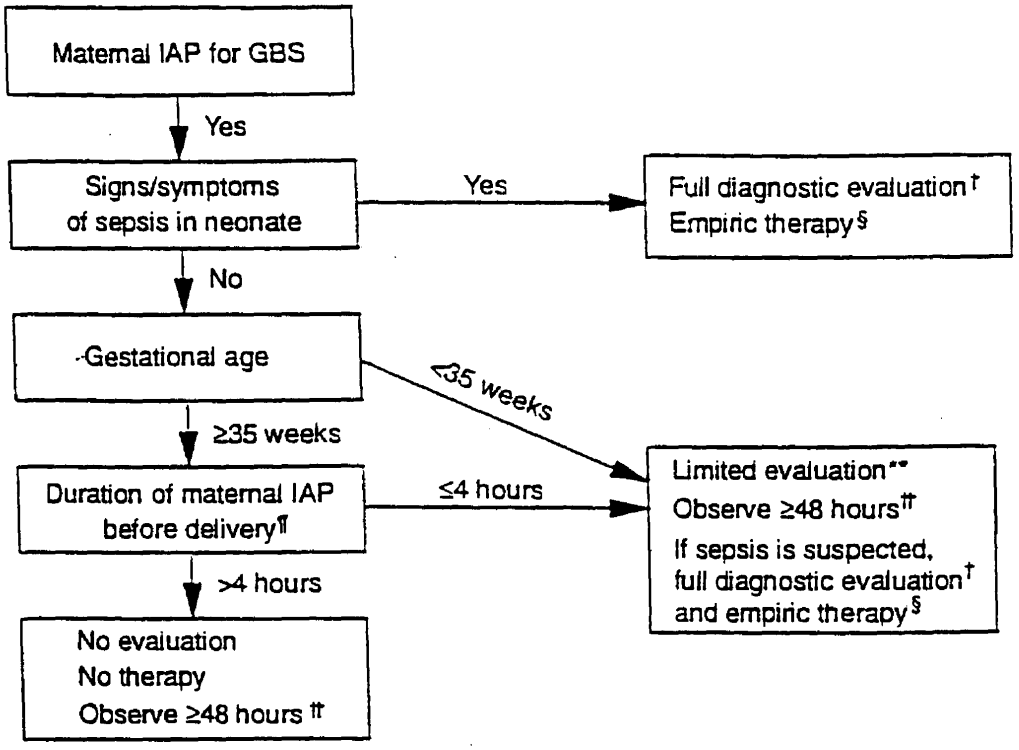
*If membranes ruptured at <37 weeks' gestation, and the mother has not begun labor, collect group B streptococcal culture and either a) administer antibiotics until cultures are completed and the results are negative or b) begin antibiotics only when positive cultures are available.
†Broader spectrum antibiotics may be considered at the physician's discretion, based on clinical indications.

BOX 2. Recommended regimens for intrapartum antimicrobial prophylaxis for perinatal group B streptococcal disease

Recommended	Penicillin G, 5 mU IV load, then 2.5 mUs IV every 4 hrs until delivery
Alternative	Ampicillin, 2 g IV load, then 1 g IV every 4 hrs until delivery
If penicillin-allergic	
Recommended	Clindamycin, 900 mg IV every 8 hrs until delivery
Alternative	Erythromycin, 500 mg IV every 6 hrs until delivery

*Note: If patient is receiving treatment for amnionitis with an antimicrobial agent active against group B streptocci (e.g., ampicillin, penicillin, clindamycin, or erythromycin), additional prophylactic antibiotics are not needed.

FIGURE 3. Algorithm* for management of a neonate born to a mother who received intrapartum antimicrobial prophylaxis (IAP) for prevention of early-onset group B streptococcal (GBS) disease



*This algorithm is not an exclusive course of management. Variations that incorporate individual circumstances or institutional preferences may be appropriate.

†Includes a complete blood count (CBC) and differential, blood culture, and chest radiograph if neonate has respiratory symptoms. Lumbar puncture is performed at the discretion of the physician.

§Duration of therapy will vary depending on blood culture and cerebrospinal fluid (CSF) results and the clinical course of the infant. If laboratory results and clinical course are unremarkable, duration of therapy may be as short as 48–72 hours.

¶Duration of penicillin or ampicillin chemoprophylaxis.

**CBC and differential and a blood culture.

††Does not allow early discharge.

TABLE 1. Risk for early-onset group B streptococcal (GBS) disease (*20*), by prenatal maternal colonization status and intrapartum risk factors

Risk status*	No. of episodes of early-onset GBS disease	No. of deliveries	Attack rate (per 1,000 births)	Deliveries (%)	Early-onset GBS cases (%)
Total population	16	5,292	3.0	100.0	100.0
Colonization+	14	1,029	13.6	19.4	87.5
Colonization-	2	4,263	0.5	80.7	12.5
Risk factors+	11	1,311	8.4	24.7	68.8
Risk factors-	5	3,981	1.3	75.2	31.3
Colonization+ Risk factors+	10	245	40.8	4.6	62.5
Colonization+ Risk factors-	4	784	5.1	14.8	25.0
Colonization- Risk factors+	1	1,066	0.9	20.0	6.2
Colonization- Risk factors-	1	3,197	0.3	60.0	6.2

*Colonization assessed by prenatal rectovaginal cultures. Risk factors defined as rupture of membranes >12 hours, <37 weeks' gestation, or intrapartum temperature >99.5 F (>37.5 C). "+" refers to present; "-" refers to absent.

TABLE 4. Estimated impact of several strategies for the use of intrapartum antimicrobial prophylaxis (IAP) against early-onset group B streptococcal (GBS) disease in a hypothetical population (*68*)

Prevention strategy	Proportion of early-onset GBS disease prevented (%)	Proportion of deliveries receiving IAP (%)
Prenatal culture at 35–37 weeks' gestation; IAP for preterm deliveries and all GBS carriers*	86.0	26.7
Prenatal culture at 26–28 weeks' gestation; IAP for GBS carriers who develop intrapartum risk factors (e.g., fever, prolonged rupture of membranes, <37 weeks' gestation) (*54*)	50.7	3.4†
No prenatal cultures; IAP for all women with intrapartum risk factors (e.g., fever, prolonged rupture of membranes, <37 weeks' gestation)¶	68.8	18.3§

*Combination strategy; refer to Figure 1.
†Percentage was estimated for a hypothetical population (*68*); actual proportion of deliveries among women who had prenatal screening cultures positive for GBS and who also developed intrapartum risk factors was 4.6% (*20*).
§Percentage was estimated for a hypothetical population (*68*); actual proportion of deliveries among women who had intrapartum risk factors was 24.7% (*20*).
¶Empiric strategy suggested by the American College of Obstetricians and Gynecologists in 1993 (*64,65*); refer to Figure 2.