CLINICAL PRACTICE GUIDELINE 19

Antepartum, Intrapartum and Postpartum Management of GROUP B STREPTOCOCCUS

2022

Association of Ontario Midwives
Delivering what matters.

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The views expressed in this guideline are strictly those of the Association of Ontario Midwives. No official endorsement by the Ministry of Health is intended or should be inferred.

The AOM is committed, through our statement on Gender Inclusivity and Human Rights, to reflect and include trans, genderqueer and intersex communities in all aspects of our work.

In this document, there are references to sources that use gendered language to refer to populations of pregnant and birthing parents. To accurately represent these sources, the AOM may have maintained gendered language.

The AOM supports research and knowledge translation that engages and reflects the entire childbearing population.

AOM Clinical Practice Guideline No. 11: Group B Streptococcus: Prevention and Management in Labour was approved by the AOM Board of Directors: January 10, 2010.

AOM Clinical Practice Guideline No. 16: Group B Streptococcus: Postpartum Management of the Neonate was approved by the AOM Board of Directors: May 2014.

An updated version of these guidelines (AOM Clinical Practice Guideline No. 19: Antepartum, Intrapartum and Postpartum Management of Group B Streptococcus) was approved by the AOM Board of Directors: March 21, 2022.

This document replaces both AOM Clinical Practice Guideline No. 11 and 16.

This document may be cited as: Association of Ontario Midwives. Antepartum, Intrapartum and Postpartum Management of Group B Streptococcus. 2022 (Clinical Practice Guideline No. 19).

ABOUT THIS CPG

This guideline reflects information consistent with the best evidence available as of the date issued and is subject to change. The information in this guideline is not intended to dictate a course of action, but to inform clinical decision-making. Local standards may cause practices to diverge from the suggestions within this guideline. If practice groups develop protocols that depart from a guideline, it is advisable to document the rationale for the departure.

Midwives recognize that client expectations, preferences and interests are an essential component in clinical decision-making. Clients may choose a course of action that differs from the recommendations in this guideline, within the context of informed choice. When clients choose a course of action that diverges from a clinical practice guideline and/or practice group protocol, this should be well documented in their charts.

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AIM OF THE GUIDELINE

Statement of purpose

The goal of this document is to provide an evidence-based clinical practice guideline (CPG) on antepartum, intrapartum and postpartum management of group B streptococcus (GBS) that is consistent with the midwifery philosophy and model of care. Midwives in Ontario are encouraged to use this CPG as a tool in clinical decision-making.

Objective

The objective of this CPG is to provide a critical review of the research literature on antepartum, intrapartum and postpartum management of GBS within the context of midwifery care in Ontario. Evidence relating to the following will be discussed:

- Prevention of GBS colonization
- Screening for GBS colonization
- Intrapartum antibiotic prophylaxis (IAP) strategies
- Postpartum management of the neonate

Additional clinical situations, such as the management of prelabour rupture of membranes (PROM) and chorioamnionitis in the context of GBS, will also be explored.

Literature search

A search of MEDLINE, CINAHL and the Cochrane Library from 2009 to 2021 was conducted using a defined search strategy. Literature from the original CPGs was reviewed for inclusion. Reference lists of relevant systematic reviews and key papers were also reviewed. When synthesizing evidence, systematic reviews were prioritized; if no systematic reviews were found, randomized controlled trials (RCTs) and observational studies were retrieved.

Outcomes of interest

The following outcomes were rated as either "critical" or "important," following the GRADE (Grading of Recommendations, Assessment, Development and Evaluation) process for each research question addressed in the guideline.

Critical outcomes:

- Neonatal mortality
- Early-onset GBS disease (EOGBSD): sepsis/bacteremia, pneumonia, meningitis
- Long-term sequelae of EOGBSD

Important outcomes:

- GBS colonization in the birthing parent
- Birthing parent infection or sepsis
- Diagnostic accuracy of screening tests
- Adverse treatment effects

Methods

This CPG uses the GRADE methodology for guideline development. The GRADE process determines the certainty of the evidence (how certain we should be of the results) as well as the strength of the recommendation. Certainty of evidence in this CPG is rated from very low to high, according to five GRADE domains: risk of bias, inconsistency, indirectness, imprecision and publication bias. Methodological concerns about the included studies, variability across results, applicability of the evidence to our context, precision of the results and completeness of the evidence base are considered as part of these domains. The CPG Committee's judgments about the certainty of evidence reflect the work group's confidence that available evidence correctly reflects the true effect of an intervention and is sufficient to support decision-making.

Results from low certainty of evidence are described using language such as "may"; results from moderate certainty of evidence are described using language such as "probably" or "likely"; and results from high certainty of evidence are described without these qualifiers.

When RCT evidence was available, it was assessed using GRADE methodology. In instances where RCT evidence was not available, observational studies were assessed using GRADE.

CERTAINTY OF EVIDENCE	How certain we ought to be about an estimate of effect or association
High	Further research is very unlikely to change confidence in the estimate of effect. • This evidence provides a very good basis for decision-making.
Moderate	Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate. • This evidence provides a good basis for decision-making.
Low	Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate. • This evidence provides some basis for decision-making.
Very low	Any estimate of effect is very uncertain. • This evidence does not provide much of a basis for decision-making.

Based on: (1-3)

Recommendations in this CPG are based on formal ratings of the certainty of evidence and are described as either strong or weak according to the GRADE approach. The strength of recommendation reflects the extent to which the CPG Committee is confident that the benefits of a recommended intervention outweigh its harms or vice versa. The strength of recommendation is influenced by the certainty of supporting evidence, the balance between desirable and undesirable effects and the perceived variability or uncertainty in clients' values and preferences with respect to the intervention. (1–5) For these reasons, weak recommendations use the terminology "may" and strong recommendations use the terminology "should" within this CPG.

Good practice statements in this CPG represent guidance that the CPG Committee deemed important but not appropriate for formal ratings of certainty of evidence, as there was no direct evidence on the research question. Good practice statements are made when the CPG Committee is confident that the action has a net benefit to the client and no sensible alternatives exist. (6)

Complete GRADE evidence tables used to summarize research and inform the recommendations in this guideline are available on the AOM website. A full description of the AOM's approach to clinical practice guideline development using GRADE is also available on the AOM website.

TYPES OF STATEMENTS IN THIS CPG

- **Recommendations:** Action statements about an intervention based on the certainty of the evidence, clinical considerations, preferences and values.
- **Good practice statements:** Statements whereby the net benefit of an intervention is large and unequivocal and the CPG Committee has considered it useful to provide guidance to clinicians. The evidence for good practice statements is typically difficult to collect and summarize, and therefore no formal rating of the certainty of evidence is undertaken.

STRENGTH OF RECOMMENDATION	The extent to which the CPG Committee is confident that the benefits of the recommended intervention outweigh its harms (or vice versa)
Strong	Benefits clearly outweigh risks and burdens (or vice versa). *Can be interpreted as:* • Most clients should be offered the intervention, assuming that they have been informed about and understand its benefits, harms and burdens. • Most clients would want the recommended course of action, and only a small proportion would not.
Weak	Benefits, risks and burdens are closely balanced. *Can be interpreted as:* • The majority of clients would want the suggested course of action, but an appreciable proportion would not. • Values and preferences vary widely.

Based on: (1-4)

Updating the CPG

In 2022, both AOM CPGs on group B streptococcus were updated and merged, to include more recent literature published from 2009 to 2021. Based on consultation with the AOM's Clinical Practice Guideline Committee and a preliminary review of emerging research, all sections of these guidelines were selected for updating. Changes have been made to the current edition of this guideline to reflect the new research.

Recommendations and good practice statements in updated CPGs will now be marked with one of the following labels: [new 2022], [2022], [2014] or [2010]. These will appear at the end of recommendations and good practice statements. See the table below (Key to Partial Update Labelling for Recommendations, Good Practice Statements) for an explanation of these labels.

The Appendix provides a detailed list of the updated or new recommendations and good practice statements in this guideline, along with an explanation for the changes.

Key to partial update labelling for recommendations and good practice statements	
Recommendation or good practice statement label	**Meaning of label**
[new 2022]	New recommendation or good practice statement as of 2022: • Indicates that the recommendation or good practice statement is new as of 2022. New evidence has prompted a change to or the addition of a recommendation or good practice statement. • An explanation of this change is provided in the Appendix.
[2022]	Reaffirmed recommendation or good practice statement as of 2022: • Indicates that the recommendation or good practice statement is consistent with new evidence as of 2022. New evidence has not prompted a change to the original statement. • Small changes may have been made to the wording of this statement but do not affect the meaning.

Review

This CPG was reviewed using a modified version of the AGREE (Appraisal of Guidelines for Research and Evaluation) instrument and the AOM Values-Based Approach to CPG Development, as well as consensus of the CPG Committee; the Quality, Insurance and Risk Management Committee; the Racial Equity Committee and the AOM Board of Directors.

INTRODUCTION

GBS is a gram-positive bacteria commonly found in the gastrointestinal and genital tracts of adults. During birth, it may be transmitted from the birthing parent to the neonate; transmission may occur as the fetus passes through the birth canal or as ascending infection crosses intact membranes. Fetal or neonatal GBS exposure may also occur through the spread of the bacteria into the amniotic fluid, which is then aspirated. (7) In the 1970s, group B streptococcus was identified as the leading infectious cause of neonatal morbidity and mortality.

This guideline focuses on midwifery management of GBS in the antepartum, intrapartum and postpartum periods for both the birthing parent and the neonate. Midwives providing care for clients with GBS aim to avoid unnecessary intervention while limiting the risk of EOGBSD in the neonate.

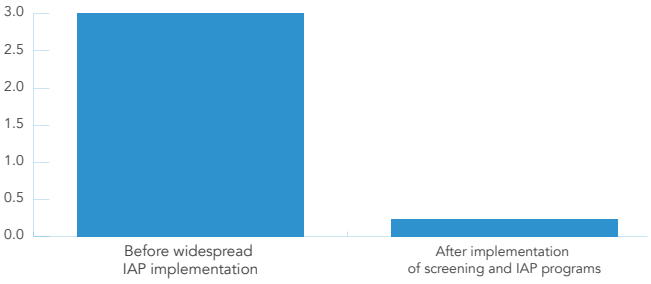
Prevalence of GBS in birthing parents

The gastrointestinal tract acts as a reservoir for GBS and is the most likely source of vaginal colonization. GBS is part of the normal vaginal flora; estimates suggest that approximately 15% to 40% of pregnant people are colonized with GBS in the vagina and/or rectum, with rates varying by study populations, specimen collection and culturing techniques. (8) In Ontario in 2019, approximately 19% of pregnant people who were screened for GBS between 35 and 37 weeks' gestation had a positive result. (9) Of pregnant people who did not undergo screening for GBS at 35 to 37 weeks' gestation, 0.5% had already screened positive for GBS bacteriuria through a urine test.

Incidence of EOGBSD

EOGBSD occurs within the first seven days of life, and incidence rates vary. Before the widespread adoption of prevention strategies such as IAP in the 1980s, the incidence was estimated at 3/1000 live births. This has dramatically changed over several decades; in Ontario in 2019, there were only 35 cases of EOGBSD in neonates, a rate of 0.23 per 1000 live births.

Figure 1. Incidence of EOGBSD



ASSOCIATED COMPLICATIONS

Birthing parent complications of GBS

GBS is part of the normal vaginal flora, and most pregnant people have no symptoms related to colonization. Rarely, GBS can cause urinary tract infections, amnionitis, endometritis, sepsis and meningitis. (10)

Fetal complications of GBS

Stillbirth is a potential outcome of fetal aspiration of GBS-infected amniotic fluid. (11)

Neonatal complications of GBS

Most neonates with EOGBSD present with one of the following conditions: bacteremia, pneumonia or meningitis. CDC surveillance data from 1999 to 2005 found that 83% of EOGBSD cases had bacteremia, 9% had pneumonia, and 7% had meningitis. (12) In a 2008 Toronto study, similar proportions were noted: 64% bacteremia, 23% pneumonia and 12.5% meningitis. (13) The onset of EOGBSD is generally rapid, and a clinical diagnosis of suspected sepsis is often made before a site of infection or causative organism is identified. Canadian surveillance data from 2009 to 2014 reported that 85% of EOGBS sepsis cases present within the first 24 hours and 94% within the first 48 hours. (14)

Ontario case fatality rates range from 2% to 17% over the past five years, with an average case fatality rate of 5%. (15)

Studies providing current estimates of long-term morbidity from EOGBSD were not identified. Cases from the 1970s and 1980s mainly focused on the outcomes for survivors of EOGBS meningitis and may not necessarily reflect the outcomes for infants under current standards of intensive care. Neurological impairment is reported in some infants who survive infection.

Understanding GBS prevalence, incidence and complications

The following statistics help explain how GBS may impact the neonate:

- 15% to 40% of pregnant people are GBS positive;
- 40% to 70% of babies born to GBS-positive pregnant people will be colonized if untreated;
- 1% to 2% of colonized babies will develop an infection if untreated (16);
- 5% of babies who develop an infection will die. (8,17)

Using these statistics as a guide, if we take an initial group of 50 000 pregnant people:

- 7500 to 20000 pregnant people will be colonized with GBS;
- 3000 to 14000 babies will be colonized with GBS;
- 30 to 280 babies will develop an infection if untreated:
- bacteremia (19 to 232 babies)
- pneumonia (three to 64 babies)
- meningitis (two to 35 babies)
- Two to 14 babies will die.

RISK FACTORS

Factors associated with GBS colonization in the birthing parent

Associated risk factors in the birthing parent have been studied; however, the research investigating these factors varies in quality.

Colonization in a previous pregnancy

Systematic review evidence suggests that in term pregnancies, birthing parents who were colonized with GBS in a previous pregnancy are more likely to be colonized in a subsequent pregnancy (OR 5.80, 95% CI 4.18-8.05). (18) Individuals who were heavily colonized (defined as bacteriuria of greater than 80 colony-forming units) had higher chances of recurrence in subsequent pregnancies (OR 1.59, 95% CI 1.05-2.42).

Body mass index (BMI)

Research evidence suggests that individuals with a BMI > 25 kg/m^2 have increased odds of GBS colonization compared with those with a BMI < 25 kg/m^2 (OR 1.21, 95% CI 1.11-1.35). (19–24) This association has been confirmed in several other studies, which used differing BMI cut-offs. (25–28) The biological mechanism for the association is unclear, although researchers have suggested that it may relate to alterations in the gut microbiota. (23, 24)

Gestational diabetes

Researchers have examined the association between diabetes (type 1, type 2, gestational diabetes and pregestational diabetes) and colonization status. Evidence consistently shows that both gestational diabetes (OR 1.17, 95% CI 1.03-1.31) and pregestational diabetes (OR 1.34, 95% CI 1.09-1.63) are associated with GBS colonization. (19–24,29–32) Gestational diabetes may be associated with changes in vaginal lactobacillus, which may facilitate GBS colonization. (19)

Unclear risk factors

Some additional studies have suggested that young age (19–21,25,26,29,30,32–45), education, (19,25,31,34–36,39–41,43,46–48) and race (21–23,26,27) may be associated with birthing parent colonization. However, research on these factors is extremely limited due to inconsistency across studies, issues with confounding variables within studies, and variability in categorization of these factors. Therefore, no clear conclusions can be drawn and results must be interpreted with caution.

TABLE 1: FACTORS ASSOCIATED WITH GBS COLONIZATION IN THE BIRTHING PARENT

Risk factor	OR	Interpretation	Source(s)
Strong predictive factor (OR > 1.75 or < 0.25)			
Colonization in a previous pregnancy	(OR 5.80, 95% CI 4.18-8.05)	Increases likelihood of colonization	(18)
Moderate predictive factor (OR 1.25-1.75 or 0.26-0.75)			
Pregestational diabetes	(OR 1.34, 95% CI 1.09-1.63)	Increases likelihood of colonization	(20,21,23,24,32,40)
Weak predictive factor (OR < 1.25 and > 0.76)			
Gestational diabetes	(OR 1.17, 95% CI 1.03-1.31)	Increases likelihood of colonization	(19–24,29,30,49)
BMI > 25 kg/m^2	(OR 1.21, 95% CI 1.11-1.33)	Increases likelihood of colonization	(25–28)

Risk factors for EOGBSD

A considerable body of research on risk factors has been published since the widespread adoption of EOGBSD prevention strategies. The following risk factors remain associated with EOGBSD despite widespread use of IAP. Understanding the significant risk factors that arise during the antenatal and intrapartum periods can allow for timely and appropriate follow-up of the neonate in the early postpartum period. Despite these associations, research also shows that intrapartum risk factors may be absent in 30% to 50% of EOGBSD cases. (13,50–52)

GBS-positive birthing parent

GBS colonization in the birthing parent is the primary risk factor for EOGBSD. Data from three studies (n = 10344) shows that a positive GBS swab is a significant predictor of EOGBSD (OR 10.44, 95% CI 3.69-29.56). (53–55)

Previous infant with EOGBSD

Having an infant with EOGBSD is considered a significant independent risk factor for the occurrence of EOGBSD in future infants (OR 27.81, 95% CI 9.08-85.17). (19) In Canada, individuals who previously had an infant with EOGBSD are considered at greater risk of having another infant with EOGBSD, and therefore they rarely undergo culture screening at 35 to 37 weeks' gestation.

Bacteriuria

Data from three studies (n = 7643) shows that GBS bacteriuria in the birthing parent is a strong predictor of the development of EOGBSD in the neonate (OR 5.34, 95% CI 2.49-11.46). (19,53,56) In Ontario, individuals who screen positive for GBS bacteriuria are considered GBS carriers, and rarely undergo culture screening at 35 to 37 weeks' gestation. Clients with GBS bacteriuria who wish to swab for GBS at 35 to 37 weeks' gestation can be informed that although GBS bacteriuria is associated with increased risk of EOGBSD, the predictive ability of a urine test for GBS bacteriuria compared with culture screen is unclear.

Gestational age and birth weight

Both preterm and low birthweight infants have a twofold increased risk of developing EOGBSD (OR 2.02, 95% CI 1.36-3.01) and (OR 2.01, 95% CI 1.39-2.92), respectively. (19,53–55,57–59)

Intrapartum fever

Intrapartum fever (temperature ≥ 38.0°C) is a non-specific indicator of maternal and/or neonatal infection. A key criterion for the diagnosis of clinical chorioamnionitis, maternal intrapartum fever may also result from increased metabolic activity or poor ventilation, or because of epidural analgesia. (60–63) Data from four studies (n = 7778) indicates that intrapartum fever is associated with an increased risk of EOGBSD (OR 3.62, 95% CI 1.71-7.66). (19,56,57,64)

Chorioamnionitis

Researchers have noted a relatively high frequency of maternal fever and chorioamnionitis in neonates who go on to develop EOGBSD despite the administration of IAP, suggesting that chorioamnionitis may be a marker of high risk for EOGBSD. (58,65–67) This observation is supported by data from four recent studies, which shows that chorioamnionitis may be a strong predictor of an increased risk of developing EOGBSD (OR 4.19, 95% CI 0.71-24.59). (19,57–59)

Duration of rupture of membranes

PROM (≥ 18 hours) may be associated with an increased risk of EOGBSD (OR 2.02, 95% CI 0.87-4.73). (19,54–57) In a 2011 case-control study in which IAP use was widespread and overall risk of early-onset sepsis (EOS) was consequently low, Puopolo and colleagues observed a nearly linear relationship between length of rupture of membranes and risk of EOS (all causes), with risk increasing with duration of prelabour rupture of membranes. (68)

Specific obstetric practices

Practices such as frequent intrapartum vaginal examinations (> three or ≥ six exams) (OR 6.32, 95% CI 2.44-16.40) and membrane sweeping (OR 2.52, 95% CI 1.13-4.78) have been associated with increased risk of EOGBSD in observational studies. (55,57,69) Because such practices may be used more frequently in the presence of other risk factors, this relationship may be confounded. (70)

Multiple pregnancies

Multiple pregnancies may be associated with an increased risk of EOGBSD (OR 1.98, 95% CI 0.78-5.02). (19,59,64)

TABLE 2: FACTORS ASSOCIATED WITH THE DEVELOPMENT OF EOGBSD IN NEWBORNS

Risk factor	OR	Interpretation	Source(s)
Strong predictive factor (OR > 1.75 or < 0.25)			
Previous infant with EOGBSD	(OR 27.81, 95% CI 9.08-85.17)	Increases likelihood of EOGBSD	(19)
GBS-positive birthing parent	(OR 10.44, 95% CI 3.69-29.56)	Increases likelihood of EOGBSD	(53–55)
Frequent vaginal exams	(OR 6.32, 95% CI 2.44-16.40)	Increases likelihood of EOGBSD	(57)
GBS bacteriuria	(OR 5.34, 95% CI 2.49-11.46)	Increases likelihood of EOGBSD	(19,53,56)
Chorioamnionitis	(OR 4.19, 95% CI 0.71-24.59)	May increase likelihood of EOGBSD	(19,57–59)
Intrapartum fever (> 38°C)	(OR 3.62, 95% CI 1.71-7.66)	Increases likelihood of EOGBSD	(19,55–57,64)
Membrane sweeping	(OR 2.52, 95% CI 1.33-4.78)	Increases likelihood of EOGBSD	(55)
Preterm birth (< 37 weeks)	(OR 2.02, 95% CI 1.36-3.01)	Increases likelihood of EOGBSD	(19,53–55,57–59)
PROM (> 18 hours)	(OR 2.02, 95% CI 0.87-4.73)	May increase likelihood of EOGBSD	(19,54–57)
Low birth weight (< 2500 g)	(OR 2.01, 95% CI 1.39-2.92)	Increases likelihood of EOGBSD	(19,53,55,57)
Multiple pregnancy	(OR 1.98, 95% CI 0.78-5.02)	May increase likelihood of EOGBSD	(19,59,64)

EOGBSD in GBS-negative clients

While vaginal colonization with GBS must be present for EOGBSD to occur, studies have established that 52% to 82% of term neonates who develop EOGBSD are born to individuals who screened negative for GBS prenatally. (51,71–73) It is unclear whether these cases are associated with a false-negative screening result or colonization after screening has occurred. The absolute risk of EOGBSD in the context of a negative prenatal screen is low; however, the majority of cases diagnosed in the current context occur in infants born to pregnant people who screened negative at 35 to 37 weeks' gestation and did not receive IAP. This trend reflects the limitations of current methods of assessing colonization status, as well as the relative decrease in incidence of EOGBSD among individuals targeted for IAP based on a positive prenatal screen.

Two research studies suggest that Black pregnant people may have higher rates of conversion from a negative antepartum GBS culture to a positive intrapartum culture, as well as higher rates of infants with EOGBSD despite screening negative on antepartum culture. (74,75) These findings suggest a racial disparity in neonatal outcomes for Black infants, despite parental access to screening for GBS. Further research is needed to understand this disparity, although researchers have hypothesized that it could be due to differential rates of GBS acquisition and clearance, inequitable delivery of IAP, or other systematic health disparities faced by Black pregnant people.

Research Gap:

Researchers have yet to identify birthing parents and intrapartum characteristics that identify at-risk neonates with accuracy and precision. Studies are needed to assess infection-related outcomes in large cohorts of infants, stratified based on GBS colonization in the birthing parent, as well as intrapartum antibiotic treatment and treatment strategy.

ANTEPARTUM PREVENTION OF GBS COLONIZATION

Several strategies to prevent GBS transmission and disease have been proposed. These aim to reduce or eliminate GBS colonization in the birthing parent before birth, thereby reducing the risk of transmission to the neonate. Evidence on the use of probiotics and homeopathic or natural remedies to prevent GBS colonization at birth in the birthing parent is summarized below.

Probiotics

Microbial balance in the vagina can help protect clients from GBS colonization. Supplementation with probiotics, specifically lactobacillus, may improve the microbial balance, inhibiting growth and adhesion of streptococci and therefore reducing GBS colonization. (76,77)

We identified seven studies that investigated the effect of oral probiotics for prevention of GBS colonization in the birthing parent at or before birth. (76,78–83) Four RCTs compared the use of oral probiotics starting in the antepartum period with a placebo (76,79–81), while one RCT compared the use of oral probiotics with no treatment or the usual care. (78) Treatment regimens varied across studies. Meta-analyses show that oral probiotics:

- Likely reduce GBS colonization close to delivery (from 35 weeks) in the birthing parent, (RR 0.71, 95% CI 0.51-1.00, p = 0.05) [*moderate certainty of evidence*; n = 378; five RCTs]; (76,78–81)
- Likely have no side effects [*moderate certainty of evidence*; n = 268; four RCTs]. (76,78,80,81)

Observational literature supports these findings. (82,83)

We identified no studies that investigated the effect of dietary sources of probiotics for the prevention of GBS colonization in the birthing parent before or at birth.

Other important client considerations regarding probiotics

Although the evidence suggests that probiotics may reduce GBS colonization at birth in the birthing parent, no studies have examined the impact of probiotic use on transmission of GBS or the development of EOGBSD in neonates. The available research also does not demonstrate an optimal duration or dosage for probiotics, and it does not provide information on the efficacy of alternate sources of probiotics, such as food. Despite gaps in the research, some clients may prefer probiotics as a means of reducing the potential need for IAP at birth.

It is also important to consider the question of access, as probiotics can be costly. In Canada, they are considered a natural health product, and therefore they do not carry a drug identification number (DIN) and are not covered by insurance, including the Ontario Drug Benefit (ODB) for those enrolled in Ontario Works (OW), or the Ontario Disability Support Program (ODSP). Access to probiotics may also be limited in areas where natural health products are not readily available.

Recommendation:

1. Midwives may discuss the use of probiotics in the antepartum period with clients as a means of reducing the chances of GBS colonization at birth. [new 2022]

   Weak recommendation; moderate certainty of evidence

   This recommendation recognizes the limitations of existing research on probiotics for GBS, as well as barriers to access.

Homeopathic and natural remedies

We did not identify any studies on the use of homeopathic or natural remedies (including but not limited to garlic suppositories, vitamins and echinacea) in the antepartum period for prevention of GBS colonization at birth.

Research gap:

Large-scale published research is required to understand the effects of homeopathic and natural remedies on prevention of GBS colonization at birth.

VAGINAL-RECTAL CULTURE SCREENING FOR GBS

A vaginal-rectal swab taken between 35 and 37 weeks' gestation is the gold standard for the prediction of GBS colonization in labouring people. Evidence on the diagnostic accuracy of vaginal-rectal swabs, the optimal timing for swabs and self-swabbing is summarized below.

Diagnostic accuracy of vaginal-rectal swabs

We identified 12 observational studies (n = 15 610) (*moderate certainty of evidence*) that compared the sensitivity and specificity of an antepartum GBS culture taken at 35 to 37 weeks' gestation with an intrapartum GBS culture. (84–95)

The sensitivity of a test correlates with its ability to correctly identify people with a disease; a highly sensitive test (sensitivity of 100%) would identify all people with GBS colonization. The specificity of a test correlates to its ability to correctly identify all people without the disease; a highly specific test (specificity of 100%) would identify all people who do not have GBS colonization. (96)

The results show a weighted pooled sensitivity of antepartum culture screening of 0.77 (95% CI 0.44-1.09) and a weighted pooled specificity of 0.90 (95% CI 0.73-1.08). This means that 77% of those who have GBS at birth will accurately screen positive on an antepartum culture, whereas 90% of those who do not have GBS during labour will accurately screen negative by antepartum culture. In other words, approximately 23% of birthing parents with a negative antepartum culture screen will go on to be GBS positive in labour, while 10% of birthing parents with a positive antepartum culture will go on to be GBS negative in labour. The concern with these findings is that some pregnant people who have GBS at birth will be missed and therefore will not receive IAP, while a smaller proportion may receive unnecessary IAP.

In contrast to the routine use of antepartum culture screens, some countries, including the UK, continue to rely on risk factors to predict GBS colonization at birth. Compared with the diagnostic accuracy of antepartum culture screening, research from four studies shows that using risk factors alone to predict GBS colonization at birth has very low sensitivity (from 0.21 to 0.32) and will not accurately capture those who will be positive at birth. (50,93,97,98)

Self-sampling with vaginal-rectal swabs

We identified one study (n = 800) (*very low certainty*) that compared the prevalence of GBS in vaginal-rectal swabs among a group who self-swabbed with a group who were swabbed by a health-care provider. (99) Results suggest that self-sampling may capture more positive GBS results (RR 1.25, 95% CI 0.85-1.84, p = 0.26), although we are uncertain of these results, due to concerns about the imprecision of the estimate effect.

Other observational studies have examined the diagnostic accuracy of self-sampling compared with samples taken by a health-care provider. Across these studies, there was a considerable range in sensitivity, from 61.4% to 97%. However, sensitivity was 91.7 to 97% in three out of four of these studies. (100–103) The performance of self-collected swabs appears very similar to that of swabs collected by health professionals.

Other important client considerations regarding swabbing

Client preferences, values and ability to perform vaginal-rectal culture screening may vary. Some clients may prefer self-sampling. Research suggests that reasons for this preference may include: desire for privacy, fewer clinic visits, greater physical comfort, ease of performance, desire for knowledge about one's own body, and desire to understand how to perform the test. (104) For others, apprehension and lack of confidence may contribute to a preference for a health-care provider to perform the screening. (103) For clients with disabilities, self-swabbing may be difficult. For clients who have experienced trauma, vaginal-rectal culture screening may be difficult. A trauma-informed approach that allows time for questions and empowers clients to make decisions, particularly around self-swabbing, may help.

In terms of performing GBS screening, one study examined experiences of self-swabbing and found that clients appreciated the autonomy associated with completing a self-swab, although they also reported uncertainty about their ability to perform the test and felt reluctant to ask for more information. (105) It is important that midwives give clients proper instructions for self-swabbing, in plain language and with images. Ensuring that the client understands the technique by having them repeat the instructions back to the care provider is particularly important if the client may have difficulty understanding, such as when there is a language barrier.

Facilitating decision-making with clients

Research indicates that birthing parents are generally willing to be screened for GBS and view it as easy to undergo. (106–108) However, they benefit from receiving information about GBS, the screening process and the implications of a positive result prior to screening, as well as more detailed instructions on how to perform a self-swab. (105)

For those who test positive for GBS, birthing parents in some settings have indicated that they had limited knowledge about GBS and screening for it. (105,107,109,110) This research comes from varying settings and different care providers, including one study of midwifery clients in Toronto.

Testing positive for GBS can be stressful, and it can elicit varying responses. A study of midwifery clients in Toronto found that after testing positive, some people felt calm, while others were frustrated, alarmed or concerned about how their diagnosis would impact their pregnancy and birth plans. (105) Another study found that birthing parents who tested positive experienced higher levels of anxiety directly after receiving their diagnosis compared with those who tested negative. (108) This increased anxiety did not persist into the postpartum period. (108) Support and clear information about the screening process and options after testing positive may help dissipate any stress clients may experience. (105,108)

How a positive test result is communicated to the client is important. Studies show that clients prefer to receive their screening results in person (106), as hearing results over the phone can be upsetting to some clients, and they may interpret the information as more serious than if it were delivered in person. (105) Giving clients more information about the implications of testing positive for GBS before screening may better prepare them to receive this information. (105)

One study found that some clients found the language used to describe GBS confusing. (105) Using the words "normal" or "natural" to describe GBS colonization created some confusion for clients, as it seemed to contradict the information that GBS can result in risk to the baby. Additionally, the use of the word "positive" to describe GBS status can be confusing, as some associated it with sexually transmitted infections. This suggests that it may be important for midwives to be aware of the influence of language when discussing GBS with clients. This study suggests that midwives describe GBS colonization as "common" rather than "normal." (105)

After testing positive, clients will often conduct their own research. (105) Midwives can direct their clients to resources, such as the AOM's client handout on GBS, to facilitate their understanding of GBS.

Practice points for communication during management of GBS

Based on the experiences of clients described in the literature, the practice points in Figure 2 outline strategies that may lessen the emotional and psychological impacts of screening positive for GBS.

FIGURE 2: Practice points for communication during management of GBS

Prior to GBS screening	• Provide general information about GBS and the meaning of a positive result. • Discuss screening options and support informed choice. • If client is self-swabbing, ensure that they have detailed instructions and feel confident about performing the swab
When delivering a positive result to a client	• Share result and explain its meaning. • If possible, deliver the result in person. • Consider the language you use and how it may affect the client: try using "common" rathen than "normal" and explain the meaning of "positive."
After the client receives a positive result	• Provide support and reassurance. • Allow time to answer any questions. • Discuss treatment options and support informed choice. • Discuss relevant risk factors for EOGBSD with client.

Recommendation:

2. Offer all clients screening for GBS at 35 to 37 weeks' gestation, with a culture done from one swab first to the vagina then the rectum. Clients may be offered instructions on how to do the swab themselves. [2022]

   Strong recommendation; moderate certainty of evidence

   This recommendation recognizes the evidence on diagnostic accuracy of vaginal-rectal culture screening, as well as variability in client preferences, values and ability regarding self-sampling.

Timing of vaginal-rectal screening

We identified one systematic review (*moderate certainty of evidence*), including nine studies, that investigated the optimal time to perform antepartum GBS culture screening. (111) The results were not pooled, due to differences across the study designs; however, the results are summarized narratively below.

The systematic review shows that:

- An antepartum culture is most accurate in predicting GBS status at birth when it is performed at a later gestational age, allowing for a shorter interval between screening and birth.
  - For example, the positive predictive value of a culture screen at 30 weeks is approximately 60%, whereas at 36 weeks it increases to approximately 75%.
- An interval of greater than six weeks between antepartum culture and birth likely reduces the probability of an accurate result.
  - For example, the positive predictive value (PPV) of a culture screen with an interval between zero and six weeks is around 90%; after six weeks, the PPV drops by at least 20%.

There is no research to guide practice if a client has multiple swabs within five weeks of delivery that indicate two different results.

Recommendation:

3. Offer re-screening if more than five weeks have elapsed from initial swab and the client has not yet given birth. [2022]

   Strong recommendation; moderate certainty of evidence

   This recommendation recognizes the evidence to demonstrate that the predictive ability of a swab declines after six weeks. However, there may be practical limitations due to long sampling and processing times, which warrant earlier re-swabbing.

Considerations for collection of vaginal-rectal swabs:

The CDC gives a detailed set of instructions for collecting GBS culture specimens.

The Ontario Association of Medical Laboratories (OAML) and laboratories (including LifeLabs and Gamma-Dynacare) recommend storing GBS samples at room temperature. Some literature suggests that for longer transport times after specimen collection (> 72 hours), refrigeration may improve test accuracy. (112)

Rapid testing for GBS:

While prenatal vaginal-rectal cultures are the current gold standard for predicting intrapartum colonization, a reliable intrapartum rapid test would be ideal. The development of a reliable rapid test could prevent unnecessary antibiotic treatment for clients who might have tested positive on prenatal cultures but became GBS negative between testing and birth. Moreover, it would also facilitate treatment for GBS carriers who previously tested negative or those with unknown GBS status.

Researchers have been examining the diagnostic accuracy of RT-PCR intrapartum tests. Systematic review evidence, which includes 6268 participants, suggests that intrapartum RTPCR testing has a sensitivity of 93.7% (CI 29.1-95.3) and a specificity of 97.6% (CI 97.0-98.1). (113)

Rapid tests have yet to be used outside of a research study setting, and therefore our understanding of their clinical utility in real-life practice is limited. Further research is required. To provide equity in access and care, such a test should ideally be available in various settings, including in hospital, at home and at birth centres.

ANTEPARTUM MANAGEMENT OF CLIENTS WITH PENICILLIN ALLERGIES

Penicillin G is considered the first line of treatment for a positive GBS screen. It is the preferred drug for intrapartum antibiotic prophylaxis, as GBS isolates remain highly sensitive to the penicillin family.

Penicillin allergy testing

Approximately 10% of people report penicillin allergies, with less than 1% reporting a severe reaction, such as anaphylaxis. Research suggests that immune-mediated allergic responses are rare among people who report unconfirmed penicillin allergies, and up to 95% of those people may have the label removed through testing. (114,115) Allergy tests have been shown to be safe for pregnant people (with or without GBS), with few adverse reactions. (114,116)

GBS-positive pregnant people with active, unverified penicillin allergies have higher rates of caesarean section and spend significantly more total days in the hospital within six months of delivery, compared with GBS-positive pregnant people with no penicillin allergies. (117) As most individuals who undergo allergy testing receive negative results, testing increases the likelihood that they will receive narrow beta-lactams, specifically penicillin, rather than beta-lactam alternatives in current and future pregnancies. This is important in the context of GBS, as alternatives such as cefazolin and clindamycin may not be as effective for preventing EOGBSD. (118)

Other important client considerations regarding penicillin allergy testing

Testing may not be easily accessible to all clients. It may be limited in more rural, remote settings; wait lists may mean timely testing is not available; and additional appointments may result in an undue financial burden (time off work, transportation, child care, and cost of the appointment for uninsured clients).

TABLE 3. ALLERGIC AND NON-ALLERGIC REACTIONS

Symptoms of IgE-mediated allergic reactions to penicillin	Symptoms of non-allergic adverse reactions to penicillin
• Usually occur immediately or within one hour • Hives • Angioedema: localized edema without hives, affecting the abdomen, face, extremities, genitalia, oropharynx or larynx • Wheezing and shortness of breath • Anaphylaxis	• Often start several days after treatment • Rash • Nausea, vomiting • Diarrhea
Likely candidate for penicillin allergy testing	Penicillin may be used safely

Good Practice Statement:

4. Midwives should discuss the risks and benefits of penicillin allergy testing with clients who have an unconfirmed allergy, as early in their pregnancy as possible. [new 2022]

   Good practice statement

   This good practice statement recognizes the long-term health benefits of penicillin allergy testing and the importance of appropriate antimicrobial use, as well potential constraints around prompt access to penicillin allergy testing.

Testing of GBS isolates

Different strains of GBS have different levels of resistance to antibiotics. An antimicrobial resistance panel can determine how susceptible the particular strain is to various antibiotics.

We found no direct studies that compared GBS outcomes for those who had GBS isolate testing. However, in a recent systematic review that explored the antimicrobial susceptibility of GBS isolates worldwide, the results showed that most GBS isolates were susceptible to penicillin, ampicillin and vancomycin; and that the pooled rates of resistance to erythromycin, clindamycin and tetracycline were 25%, 27% and 73%, respectively. (119) In Canada, studies have consistently found that GBS isolates are

susceptible to penicillin, but resistance to erythromycin and clindamycin has been identified and is increasing. (17,120–122) In Ontario, a 2017 study that examined the susceptibility of GBS isolates found that all strains were sensitive to penicillin, ampicillin and vancomycin. However, it found that 89% of the isolates were resistant to tetracycline, 36% were resistant to erythromycin, and 33% were resistant to clindamycin. (122)

Good Practice Statement:

5. Request sensitivity testing for the GBS swab if:
   - Client has a confirmed penicillin allergy.
   - Client reports symptoms consistent with a penicillin allergy and has not been tested to confirm an allergy. [2022]

   Good practice statement

   This good practice statement recognizes the larger body of evidence on antimicrobial susceptibility of GBS isolates.

INTRAPARTUM MANAGEMENT STRATEGIES

Clinical trials in the late 1980s that evaluated various treatment methods for reducing EOGBSD found that IAP was the most effective method of interrupting transmission of the bacteria from GBS carriers to their newborns, thereby preventing EOGBSD. IAP has been widely accepted as the best means of preventing EOGBSD; prevalence data suggests that IAP strategies may have reduced rates of EOGBSD in the newborn from one in 100 to one in 2000. (8,16)

Effectiveness of intrapartum antibiotic prophylaxis

We identified two systematic reviews, including 13 RCTs and one cohort study, that reported on the effectiveness of IAP for birthing parents known to be colonized with GBS in the vaginal/ intestinal tract and/or the urinary tract at any time during their pregnancy. (123,124)

Evidence from these systematic reviews shows that IAP:

- Likely reduces EOGBS infections (RR 0.28, 95% CI 0.15-0.55, p = 0.0002) [*moderate certainty of evidence*; n = 1014; six RCTs]. (123)
- Likely reduces neonatal infections from other bacteria (RR 0.25, 95% CI 0.20-0.62, p = 0.0002) [*moderate certainty of evidence*; n = 592; six RCTs]. (123)
- May make little to no difference in non-GBS neonatal sepsis (RR 1.00, 95% CI 0.10-9.94, p = 1.00) [*very low certainty of evidence*; n = 289; two RCTs]. (125)
- May reduce neonatal mortality from EOGBSD infection (RR 0.31, 95% CI 0.01-7.50, p = 0.47) [*very low certainty of evidence*; n = 164; one RCT] (126), although we are uncertain of these effects.
- May reduce neonatal mortality from infections caused by bacteria other than GBS (RR 0.31, 95% CI 0.01-7.50, p = 0.47) [*very low certainty of evidence*; n = 164; one RCT] (126), although we are uncertain of these effects.

Evidence suggests that IAP likely reduces EOGBS infections, although its impact on neonatal mortality is less clear. Neonatal mortality is a rare outcome, and much larger sample sizes would be required to have more precision in the estimate of effect. Furthermore, IAP is meant to halt the transmission of GBS bacteria from birthing parent to infant; it is not indicated for the treatment of infants who develop EOGBS infections. While reductions in GBS transmission, in theory, reduce rates of neonatal mortality, IAP plays an indirect role in reducing neonatal mortality.

TABLE 4. EFFECTS OF IAP FOR GBS-POSITIVE BIRTHING PARENTS

Outcome	IAP for GBS-positive parents	Findings
Neonatal sepsis from non-GBS infections	Uncertain effects	(RR 1.00, 95% CI 0.10-10.04, p = 1.00)
Neonatal infection from non-GBS infections	Likely decreases	(RR 0.35, 95% CI 0.20-0.62, p = 0.0002)
Neonatal mortality – EOGBS	Uncertain effects	(RR 0.31, 95% CI 0.01-7.50, p = 0.47)
Neonatal mortality – other infection	Uncertain effects	(RR 0.31, 95% CI 0.01-7.50, p = 0.47)
EOGBS	Likely decreases	(RR 0.28, 95% CI 0.15-0.55, p = 0.0002)

Other important client considerations regarding IAP

Beyond the effects of IAP on EOGBSD, researchers studied the effects of IAP on the infant microbiota, candidiasis, antibiotic resistance, penicillin allergies in children and atopic dermatitis. Many of these studies compared outcomes for GBS-positive birthing parents who received IAP with outcomes for GBS-negative birthing parents who did not receive IAP. Other studies considered the effects of intrapartum antibiotics for any indication (rather than IAP specifically for GBS) vs. no intrapartum antibiotics. As such, these studies constitute indirect evidence, but they may also be considered when discussing IAP with clients.

Effects on the infant microbiota

The first microbes infants are exposed to are crucial for the establishment of microbial communities and the development of the immune system. (127) A recent systematic review investigated the effects of IAP on the infant microbiome. In the six included cohort studies, which were assessed as being at low risk of bias, IAP was given to birthing parents for GBS colonization. (127) The systematic review reports that the intestinal microbiota of infants exposed to IAP for GBS colonization in the birthing parent (compared with those who did not have a GBS-positive parent and who had not been exposed to IAP) had:

- Lower bacterial diversity
- Lower relative abundance of Actinobacteria, especially *Bifidobacteriaceae*
- Larger relative abundance of Proteobacteria

These results indicate that IAP may diminish beneficial commensals in the newborn's intestinal microbiota, although the long-term effects of these changes is unclear; results from these studies only cover the first three months of life.

Antibiotic resistance

Researchers have also investigated differences in bacterial antibiotic resistance between infants exposed to IAP for GBS colonization and those who were not exposed. (127) Two included studies found:

- No increase in genes coding for resistance to tetracyclines;
- No effect of GBS IAP exposure on the proportion of beta-lactamase-resistant bacteria.

Another systematic review included birthing parents who received intrapartum antibiotics for any indication. It found increased antimicrobial resistance for those who received intrapartum antibiotics, but it notes that these studies were at high or unclear risk of bias. (128) Further evidence is required to understand the effects of IAP on antimicrobial resistance.

Anaphylaxis

One of the main concerns of widespread use of IAP is the danger, albeit rare, of anaphylaxis. A recent multinational study found 65 cases of anaphylaxis across 4 446 120 pregnancies (1.5 per 100 000 pregnancies; 95% CI 1.1-1.9). In this population, three birthing parents had anaphylaxis following IAP for GBS (0.07 per 100 000 pregnancies). (129)

Candidiasis

One study (n = 345) investigated the relationship between birthing parents who received intrapartum antibiotics (79%

for GBS prophylaxis) and rates of neonatal thrush and maternal breast candidiasis in the first month postpartum. Individuals who received IAP were more likely to be diagnosed with breast candidiasis (OR 2.10, 95% CI 1.08-4.08) than those who did not receive IAP. (130) However, neonatal rates of thrush were not statistically significant. As a dyad, parent and neonate pairs exposed to IAP were more likely to develop yeast infections (OR 2.14, 95% CI 1.15-3.97). These findings suggest that yeast infections may be a complication of IAP use; given the potential for such infections to interfere with successful chest/breastfeeding, this topic warrants further study.

Other considerations

One study (n = 804) found that IAP for GBS did not increase the risk of penicillin allergy in children (OR 0.84, 95% CI 0.45-1.57, p = 0.59); nor did exposure to amoxicillin or ampicillin. (131) Another study examined the effects of intrapartum antibiotics on infants of birthing parents who delivered vaginally (indication for intrapartum antibiotics was not explicit). It found that the risk of atopic dermatitis in children under age two was not increased unless intrapartum antibiotic exposure lasted more than 24 hours (RR 1.99, 95% CI 1.13-3.49, p = 0.0173). (132)

Determining who receives IAP

As no reliable method exists for detecting which newborns will fall ill with EOGBSD, ongoing debates have taken place over which birthing parents should receive IAP. Although neonatal complications of EOGBSD are potentially very serious, they are relatively rare; and they must be weighed against the potential harms of IAP as well as the growing calls in the medical community for judicious antibiotic use. (133) The following approaches to determining who receives IAP have been studied:

- The culture-screening approach: IAP is given to labouring people who screened positive on a vaginal-rectal culture between 35 and 37 weeks' gestation.
  - Many guideline groups (Royal College of Obstetricians and Gynaecologists, American College of Obstetricians and Gynecologists, Society of Obstetricians and Gynaecologists of Canada) also recommend that individuals who have had GBS bacteriuria or previously had an infant with EOGBSD, or those with unknown GBS status who develop risk factors, receive IAP.
- The risk-factor approach: IAP is given to labouring people with one or more of the following risk factors:
  - Gestation < 37 weeks
  - Rupture of membranes (ROM) ≥ 18 hours
  - Intrapartum fever ≥ 38°C
  - GBS bacteriuria in pregnancy
  - Prior infant with GBS disease
- The culture-screening and risk-factor approach: IAP is given to labouring people who screened positive on a vaginal-rectal culture between 35 and 37 weeks' gestation and who have one or more of the following risk factors:
  - Gestation < 37 weeks
  - ROM ≥ 18 hours
  - Intrapartum fever ≥ 38°C

In the studies described below, "no policy" was defined as a situation in which no consistent protocol was used, but IAP could have been administered on an individual basis.

Culture screening vs. no policy

We identified very low certainty of evidence from four observational studies that reported on the effects of the culture-screening approach to IAP compared with no policy on rates of EOGBSD. (134) Results show that the culture-screening approach reduces rates of neonatal EOGBSD (RR 0.31, 95% CI 0.11-0.84, p = 0.02) when compared with no policy. Due to the risk of bias across the included studies, we are uncertain of these results.

Risk-factor approach vs. no policy

We identified very low certainty of evidence from seven observational studies that reported on the effects of risk-factor approaches compared with no policy on rates of EOGBSD. (134) Results show that risk-factor approaches may reduce rates of neonatal EOGBSD (RR 0.84, 95% CI 0.59-1.20, p = 0.34); however, due to the risk of bias across the included studies we are uncertain of these results.

Culture-screening and risk-factor approach vs. no policy

We identified very low certainty of evidence from one observational study that reported on the effects of using a culture-screening and risk-factor approach compared with no policy. (135) In this study, results show that using a culture-screening and risk-factor approach may reduce cases of EOGBSD (RR 0.54, 95% CI 0.20-1.47, p = 0.22) compared with no policy.

Culture-screening vs. risk-factor approach

We identified very low certainty of evidence from 10 observational studies that examined the effects of a culture-screening vs. risk-factor approach on rates of EOGBSD. (134) Results show that culture screening may reduce rates of neonatal EOGBSD (RR 0.43, 95% CI 0.32-0.58, $p < 0.00001$) when compared with a risk-factor approach. Due to a risk of bias across the included studies, we are uncertain of this result.

There are some limitations to the evidence available on the different approaches to determining who receives IAP, as well as benefits and drawbacks to each approach. For example, the risk-factor approach cannot detect the significant proportion of EOGBSD cases that do not present risk factors in labour, whereas culture screening at 35 to 37 weeks' gestation alone may miss pregnancies at the highest risk for EOGBSD.

There is no research available that provides a direct comparison between the culture-screening approach and the culture-screening plus risk-factor approach. Well-designed comparative studies with similar populations and settings are needed to understand the relative efficacy of these two strategies. Without this direct comparison, we cannot be certain that similar results, as presented above, would be found. While the research to date suggests that the incidence of EOGBSD and neonatal mortality is lowest when a culture-screening strategy is used, the culture-screening plus risk-factor approach may serve as a targeted approach to EOGBSD prevention that could result in lower rates of IAP use.

To help contextualize these research findings, Table 5 models the impact of each IAP approach on important neonatal outcomes, as well as the number of birthing parents needed to treat (NNT) with antibiotics to prevent one case of EOGBSD.

Until further evidence becomes available, either of the EOGBSD prevention strategies involving antenatal GBS screening may be offered to clients through an informed choice discussion. For clients who refuse GBS screening or for those who commence labour prior to the results of the GBS screening being available, a risk-factor strategy should be offered for prevention of EOGBSD.

Other important client considerations regarding IAP strategies

For clients who wish to minimize exposure to antibiotics and are comfortable with the possibility of a small increased risk of EOGBSD, the culture-screening and risk-factor approach may be an appealing option, as it appears to limit overall risk and result in less frequent antibiotic use. This information, as well as considerations related to choice of birthplace and local community standards, may be included in informed choice discussions.

IAP is routinely offered and administered by midwives to individuals who are planning home births or who prefer to labour at home for as long as possible. Prescription and administration of antibiotics at home should be discussed with clients as part of an informed choice discussion about the risks and benefits of IAP; potential significant side-effects (such as anaphylaxis); and emergency measures, including administration of epinephrine. Local resource constraints regarding procurement and administration of IAP at home may also be discussed. Until better evidence emerges, the antenatal and intrapartum management of GBS should not differ whether in home or in hospital.

Canadian obstetric standards associated with IAP delivery are based on guidance from the Society of Obstetricians and Gynecologists of Canada (SOGC), which recommends the provision of IAP for GBS at the onset of labour or rupture of membranes to:

- any pregnant person positive for group B streptococcus by vaginal-rectal swab culture screening done at 35 to 37 weeks' gestation (II-2B);
- any pregnant person with an infant previously infected with group B streptococcus (II 3B);
- any pregnant person with documented group B streptococcus bacteriuria (regardless of level of colony-forming units) in the current pregnancy (II-2A). (136)

Clients may make choices that differ from community standards, and midwives should be mindful of personal biases as well as systemic biases to fully support clients in informed choice decisions. Clients who decline interventions may experience tension and strife with care providers, which may affect their sense of autonomy. (137) Pregnant clients with medical or social risk factors in Canada, without postsecondary education, or who experienced racial discrimination all reported lower autonomy scores. (138)

TABLE 5. NEONATAL OUTCOMES BY APPROACH TO IAP

	No approach	Risk-factor approach	Culture-screening and risk-factor approach	Culture screening
Cases of EOGBSD	10 per 1000	8.4 per 1000	5.4 per 1000	3.1 per 1000
Neonatal mortality	0.9 per 1000	0.76 per 1000	0.49 per 1000	0.28 per 1000
NNT with IAP	–	23	22	63

Recommendations:

6. The risks and benefits of the following two approaches to IAP delivery should be discussed with clients as part of their informed choice discussion about GBS:

   a) Culture-screening approach

   - All clients who receive a GBS-positive swab at 35 to 37 weeks' gestation, have documented GBS bacteriuria or previously had an infant with GBS should be offered IAP.

   b) Culture-screening and risk-factor approach

   - All clients who receive a GBS-positive swab at 35 to 37 weeks' gestation and develop one or more of these intrapartum risk factors should be offered IAP. Intrapartum risk factors include:
     - Preterm labour (< 37 weeks)
     - Prolonged rupture of membranes (≥ 18 hours)
     - Maternal fever (≥ 38°C)
   - All clients with documented GBS bacteriuria or who previously had an infant with GBS should be offered IAP.

   Informed choice discussions should address:

   - The body of evidence for both strategies, including a discussion of the larger body of evidence in support of a culture-screening approach;
   - The SOGC recommendation to use a culture-screening approach;
   - Community standards regarding approaches to determining who receives IAP;
   - Alternatives to penicillin, as well as choice of birthplace considerations for those with penicillin allergies;
   - Client values, preferences and risk tolerance. [2022]

   Strong recommendation; very low certainty of evidence

   This recommendation acknowledges that both approaches reduce EOGBSD, and it recognizes the larger body of evidence in support of the culture-screening approach.

7. For clients with an unknown GBS status, offer IAP if one or more intrapartum risk factors are present:
   - Preterm labour (< 37 weeks)
   - Prolonged rupture of membranes (≥ 18 hours)
   - Maternal fever (≥ 38°C) [2022]

   Strong recommendation; very low certainty of evidence

   This recommendation acknowledges the evidence suggesting that administering IAP to those with risk factors, in the absence of known GBS status, is more protective than no policy.

Practical considerations for administering IAP:

Current guidance from the SOGC suggests the following approach to IAP:

1. Penicillin G 5.0 million units IV, then 2.5 to 3.0 million units every four hours until delivery; or
2. If the pregnant person is allergic to penicillin but has a low risk of anaphylaxis, cefazolin 2 g IV, then 1 g every eight hours until delivery; or
3. If the pregnant person is allergic to penicillin and at risk of anaphylaxis: clindamycin 900 mg IV every eight hours until delivery (if isolate is susceptible to clindamycin with no inducible resistance), or vancomycin 1 g IV every 12 hours until delivery. (136)

Vancomycin hydrochloride is indicated for GBS IAP in the rare event that the birthing parent has a penicillin allergy; is at risk of anaphylaxis; and tests positive for a GBS strain that is resistant to both clindamycin and erythromycin. If vancomycin is the only IAP option, clients should be informed of the following:

- Vancomycin must be administered intravenously in a dilute solution by intermittent infusion over a period of no less than 60 minutes (at a rate of no more than 10 mg/min), by IV pump. Exaggerated hypotension, including shock, and rarely cardiac arrest, may result from rapid bolus administration of vancomycin.
- Vancomycin is irritating to tissue and causes drug fever, pain and possibly necrosis if injected intramuscularly. (139)
- Due to the controlled conditions under which vancomycin is administered, home birth is not a feasible option for GBS-positive individuals who choose IAP and whose only choice of antibiotic is vancomycin.

Intrapartum management of PROM: induction vs. expectant management

In 2019, 9.6% of pregnant people in Ontario who experienced PROM were GBS positive. As PROM (≥ 18 hours) may increase the likelihood of EOGBSD (see Risk Factors), management of PROM in GBS-positive people raises two important questions for care providers:

1. When is the ideal time to start IAP?
2. When is the ideal time to induce labour?

We identified one RCT (*very low certainty*) that investigates induction vs. expectant management for those with PROM (with and without GBS). (140) In a secondary analysis of the TermPROM study, results show that for pregnant people with GBS (n = 270), induction may reduce cases of neonatal infection (RR 0.31, 95% CI 0.09-1.07, p = 0.06) compared with expectant management. However, we are very uncertain of these findings for the following reasons:

- Risk of bias: This study was conducted in 1996 and has a number of methodological limitations.
- Directness: When this study was conducted, there was no standardized approach to screening for GBS or delivery of IAP, which suggests that estimates of neonatal infection in this study are likely overestimated. Decisions about when to treat birthing parents with IAP were left to clinicians' individual judgment. Furthermore, the results of GBS culture screening were not available at birth for most individuals, which means clinicians were not basing treatment decisions on known GBS status.
- Precision: The number of participants in the trial who had GBS and PROM was quite low; larger sample sizes would be required to have confidence in these estimates.

The data from the TermPROM trial also does not address different management approaches based on length of PROM.

Despite these limitations in the research evidence, many pregnant people who test positive for GBS through vaginal-rectal screening and who experience PROM undergo induction of labour with oxytocin, based on the suspected association between PROM ≥ 18 hours and neonatal infection. In 2019, the rate of induction following PROM in GBS-positive birthing parents was 76.5% overall and 68.6% for midwifery clients.

Intrapartum management of PROM: timing of IAP

We identified no studies that compared different timing of IAP for GBS-positive pregnant people who experience PROM. In the absence of research on this topic, midwives use a variety of approaches to ensure adequate administration of IAP for these clients. Further research is needed to understand optimal timing of IAP for those who experience PROM. For a full discussion related to management of PROM at term, see AOM CPG No. 13: Management of Prelabour Rupture of Membranes at Term.

Recommendations:

8. Offer a choice between expectant management and immediate medical induction of labour to clients at term who are GBS positive, experience PROM for < 18 hours, and have no other risk factors.

   Informed choice discussions should include information on:

   - Research gaps regarding the most effective approach to preventing EOGBSD in infants born to GBS carriers who experience term PROM;
   - Guidance from the SOGC on induction for those who experience PROM;
   - Client preferences and values. [2022]

   Strong recommendation; very low certainty of evidence

   This recommendation recognizes the limited evidence on expectant management and induction of GBS-positive clients who experience PROM < 18 hours, and it recognizes the client as the primary decision-maker.

9. Recommend medical induction of labour to clients who are GBS positive with PROM ≥ 18 hours. IAP should be offered upon start of labour. [2022]

   Strong recommendation; very low certainty of evidence

   This recommendation recognizes the increased risk of EOGBSD for clients who experience PROM ≥ 18 hours.

10. Offer GBS-positive clients with PROM who choose expectant management a range of options for IAP administration, taking into account local resource constraints:

    a) IAP in active labour

    b) IAP in the latent phase

    c) IAP upon initiation of induction of labour [2022]

    Weak recommendation; no direct evidence

    This recommendation recognizes the lack of evidence on timing of IAP for clients who experience PROM, as well as acknowledging the client as the primary decision-maker.

POSTPARTUM MANAGEMENT STRATEGIES: EOGBSD

Midwifery management of the neonate in the early postpartum period typically involves monitoring and assessment of the well newborn; identifying and providing parental education about signs of EOGBSD (sepsis); and consulting as required.

Identifying EOGBSD

While the absolute risk of EOGBSD is low, it is a potentially disabling or fatal condition. The risk of EOGBSD in settings without IAP policies is 1.1%, and the risk in settings with 80% IAP coverage is 0.3%. (141) None of the available GBS prevention strategies will prevent all cases of EOGBSD. As current incidence patterns demonstrate, EOGBSD can occur in the presence of a negative prenatal screen, in the absence of risk factors or despite administration of IAP.

Researchers have identified numerous signs associated with neonatal sepsis. The majority are non-specific, subjectively assessed and relatively weak predictors of EOGBSD. Most research on the clinical manifestations of sepsis address severe bacterial illness generally, rather than EOGBSD specifically. (142)

Signs of sepsis include:

- Respiratory distress
- Temperature instability
- Tachycardia
- Seizures
- Hypotonia
- Lethargy
- Poor peripheral perfusion
- Hypotension
- Acidosis

In the presence of unequivocal signs of illness, decision-making is straightforward. As the progression of EOGBSD is very rapid, any neonate with clinical signs that suggest infection should receive immediate assessment and consultation for treatment. (143)

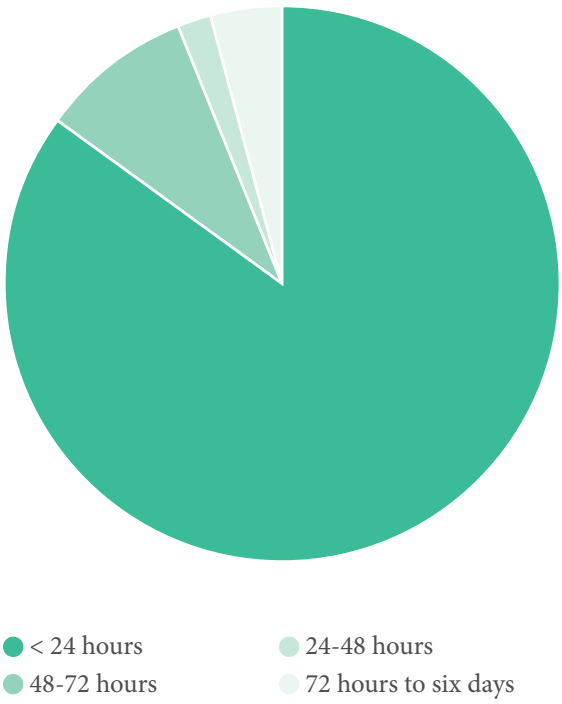
Assessments for EOGBSD

In general, the value and accuracy of clinical assessments for EOGBSD are difficult to evaluate. There is no clear

distinction between EOGBSD and other early-onset infections in the clinical signs that may present, and non-infectious neonatal disorders may share similar signs. Conventional monitoring practices (e.g., assessment of vital signs or clinical signs at specified intervals) have not been evaluated for their impact on clinical outcomes.

While the observed onset of EOGBSD varies by study, method of assessment and diagnosis, studies consistently suggest that most cases occur soon after birth. According to the Canadian Pediatric Society (CPS), 95% of septic infants present within the first 24 hours of life, regardless of antibiotic exposure. (143) A recent observational study (2019) that breaks down the onset of sepsis by IAP exposure suggests that infants exposed to IAP were more likely to develop symptoms earlier (median of zero hours) compared with those who did not receive IAP (median of six hours). Additional estimates suggest that, overall, the median time for presentation of symptoms ranges from zero to four hours. (71,144,145) Canadian surveillance data indicates that the majority of cases present within the first 24 hours (85%), and 94% present within the first 48 hours. (14) The first 24 hours of life is the most critical period of assessment for EOGBSD.

Figure 3. Time at sepsis presentation



Midwifery assessments

Midwives regularly monitor and assess newborns for signs of sepsis. As community-based practitioners, midwives may conduct assessments and monitor the newborn in the home, clinic, birth centre or hospital. Midwives also respond to telephone inquiries from parents about their newborns, give advice by phone and determine the urgency and necessity of an in-person assessment of the newborn, as needed. After discussing concerns with parents, midwives use clinical judgment and consider local community factors to determine whether clinical evaluation of the newborn should occur in the clinic, home or hospital.

A midwifery evaluation to identify illness in the newborn typically includes:

- Taking a history from parents about signs observed, including behaviour, feeding, breathing and colour.
- Taking the newborn's vital signs, including:
  - Monitoring the breathing rate, as well as evaluating for signs of respiratory distress (grunting, nasal flaring, retraction of intercostal muscles or sternum, see-saw respiration)
  - Heart rate, heart sounds
  - Temperature (hypothermia, temperature instability)
- Evaluation of the newborn for:
  - Colour (evidence of pallor, mottling, cyanosis)
  - Muscle tone
  - State of consciousness (stupor, irritability)
  - Quality of movements and cry
  - Presence of reflexes
  - Feeding behaviour and patterns (poor feeding)
  - Oxygen saturation (SpO2), if monitoring is available

Midwives educate parents on how to play an active role in identifying signs of potential illness while caring for and interacting with their newborns. Midwives will instruct clients on when to contact the midwife and access urgent care if necessary.

Other important client considerations regarding EOGBSD

It is acknowledged that neonatal sepsis is over-evaluated and over-treated. (80) The unique circumstances of EOGBSD may make some over-evaluation unavoidable. Clinical signs are varied and non-specific, the disease is rare, and the risk of mortality increases with delayed treatment. Furthermore,

since tests for sepsis (such as blood cultures) take a long time and are not definitive, clinicians may suggest treatment while results are pending or regardless of their eventual outcome.

A note on sepsis:

In the research evidence, sepsis may refer to:

Clinical sepsis: Clinician-diagnosed sepsis lacking culture confirmation. Diagnosis is made based on clinical symptoms and elimination of other possible causes.

Culture-proven invasive sepsis: Pathogen has been isolated from a sterile site culture (blood, cerebrospinal fluid).

No research was found on the qualitative experience of neonatal sepsis evaluation. Clinical and laboratory investigations undertaken to rule out sepsis may involve blood draws, chest X-ray, lumbar puncture, NICU admission and separation of neonate from birthing parent and family. These procedures may cause the neonate pain, although that is difficult to quantify. Parents may experience anxiety while waiting for results, even though the absolute risk of infection and serious outcomes is rare. Neonates may be unnecessarily exposed to antibiotics for empirical therapy pending laboratory results.

Good Practice Statements:

11. Midwives should discuss with all clients, regardless of prenatal GBS status:
    - What to expect as normal newborn transition and behaviour in the first 24 hours;
    - How to recognize signs in the newborn that may be indicative of sepsis (including breathing, temperature instability, colour and tone);
    - How to contact the midwife and access urgent care when necessary. [2022]

    Good practice statement

    This good practice statement recognizes midwives' strengths in providing health education to clients, and it acknowledges that sepsis may occur in infants born to parents who have tested negative for GBS or received IAP.

12. If a midwife suspects EOGBSD, an assessment should be done promptly. If signs of sepsis are noted upon an in-person exam, they should arrange an immediate consult.
    - Once a consult has been initiated, the midwife should discuss with the client any hospital protocols and care plans applicable to management decisions. [2022]

    Good practice statement

    This good practice statement recognizes the rapid progression of sepsis, as well as midwives' ability to identify emerging complications and work interprofessionally to provide safe, excellent client care.

Research gap:

Midwives may be unique among health-care providers for the extent to which they educate and engage parents to be effectively involved in monitoring their infants. There is little research available to guide midwives in preparing parents for this undertaking. Further research is required on best practices for monitoring for signs of illness in the community setting. More research is needed on the optimal methods and timing of home-based monitoring for EOGBSD by midwives and best practices for parent education.

Further research is needed to develop tools for early identification of infants at risk of EOGBSD, ideally before symptoms appear.

Studies of the efficacy of sepsis evaluation in the general population, including low-risk and/or asymptomatic neonates, are lacking. This information may be useful to inform midwifery practice.

POSTPARTUM MANAGEMENT STRATEGIES: CHORIOAMNIONITIS

Researchers have noted a relatively high frequency of maternal fever and chorioamnionitis in cases where neonates develop EOGBSD despite the administration of IAP. Data from risk-factor literature suggests that chorioamnionitis may be strongly predictive of EOGBSD (RR 4.19, 95% CI 0.71-24.59). (19,57–59) Intrapartum fever (> 38°C) is also strongly predictive of EOGBSD (RR 3.62, 95% CI 1.71-7.66). (19,56,57,64)

We identified no studies that compared management strategies – expectant observation vs. routine laboratory testing, including complete blood count (CBC) and/or blood culture – for asymptomatic newborns born to GBS-positive parents who experienced chorioamnionitis.

Other important client considerations regarding chorioamnionitis

A small body of research examines the use of clinical observation for neonates exposed to chorioamnionitis, although these two observational studies do not offer a direct comparison with other management strategies and the majority of birthing parents were GBS negative. Results from the studies suggest that clinical monitoring of well-appearing, asymptomatic newborns exposed to chorioamnionitis, including examination at birth and every four hours in the first 24 hours of life, maintains low rates of laboratory testing and antibiotic use, reduces separation of the parent-infant dyad and results in no adverse events. (146,147)

Some research has examined the use of CBC in neonates exposed to chorioamnionitis as a means of reducing over-treatment with antibiotics. (148,149) As the majority of EOGBSD cases are likely to present within the first 24 hours, a CBC may not be as useful for guiding treatment decisions as the prompt recognition of clinical signs of sepsis would be. If a CBC is done, it is important to note that white blood cell count (WBC), absolute neutrophil count (ANC) and IT ratio may be affected by many factors immediately after birth, such as mode of birth, birth weight and gestational age; these tests are more effective at predicting risk of infection when performed four hours after birth. (150)

Researchers are investigating the effectiveness of additional biomarkers, including serum procalcitonin, CD64 combined with procalcitonin, interleukin (IL)-35, C reactive protein, mean platelet volume, neutrophil-lymphocyte ratio and WBC for the prediction of neonatal sepsis and/or infection.

Guidance from the CPS (143) suggests the following approach:

> **Multiple risk factors for sepsis and/or chorioamnionitis:** Infants should be investigated and treated using an individualized approach that includes consideration of the severity of risk factors and maternal antibiotic therapy. At minimum, infants should have close observation in hospital for at least 24 hours, with vital signs every three to four hours and reassessment before discharge. A CBC done four hours after birth may be helpful; WBC < 5 x 10^9/L and ANC < 1.5 x 10^9/L have the highest positive predictive value. Some infants may warrant investigation and antibiotic therapy.

Good Practice Statement:

13. For asymptomatic newborns of clients with confirmed or suspected chorioamnionitis, midwives should:
    - Offer hospital observation;
    - Discuss the increased risk of EOGBSD for newborns of birthing parents with confirmed or suspected chorioamnionitis, regardless of IAP status;
    - Relay CPS guidance for managing infants born to parents with confirmed or suspected chorioamnionitis;
    - Consult with a pediatrician or physician if assessment or treatment is required. [2022]

Good practice statement

This good practice statement recognizes the evidence on the risks of chorioamnionitis to the neonate and the value of continuity of care, as well as midwives' ability to identify emerging complications and escalate care as the clinical picture requires.

POSTPARTUM MANAGEMENT STRATEGIES: WELL-APPEARING NEONATE

In the absence of signs of illness in the newborn and the birthing or postpartum parent, decision-making around the assessment of EOGBSD is less clear. EOGBSD may be initially asymptomatic, and signs of illness may be equivocal and/or transient in infants with or without EOGBSD. Research suggests that initial asymptomatic status is a strong negative predictor of culture-proven EOGBSD: infants who appear well will most likely remain well. (151–153)

Nevertheless, as primary care providers midwives must be skilled in assessing and monitoring for signs of illness in the neonate and recommending appropriate use of diagnostic tests. Newborns who appear well may be considered at higher risk of EOGBSD due to:

- GBS status of birthing parent (positive or unknown)
- Emergence of risk factors during labour
- Partial or no delivery of IAP

Duration of IAP and newborn assessment

Four or more hours of IAP is considered full IAP, while less than four hours is considered partial IAP. We identified three studies that investigated the effects of varying duration of IAP on neonatal outcomes. (118,154,155) Results from these studies suggest that, compared with full IAP (> four hours), partial IAP (< four hours):

- May result in increased rates of EOGBSD or EOGBS infection (RR 6.86, 95% CI 3.68-12.79, p < 0.00001) [*low certainty of evidence*, n = 6082; three studies];
- May result in increased rates of neonatal clinical sepsis (RR 2.74, 95% CI 1.31-5.74, p = 0.008) [*low certainty of evidence*, n = 4782, one study].

One study examined the effectiveness of partial IAP in more detail, comparing the effectiveness of a duration of < two hours, two to four hours and > four hours. (118) Results suggest that the risk of EOGBSD and sepsis decreases as the duration of IAP increases; receiving IAP for < two hours poses a higher risk to newborns compared with receiving two to four hours or > four hours.

Additional studies examined the impacts of IAP duration on presence of GBS in cord blood, amniotic fluid and the vagina. In GBS-positive birthing parents, 53% had negative cultures in cord blood and amniotic fluid after two hours, and 88% had negative cultures after four hours. (156) A similar effect is seen in vaginal GBS colony counts, with a fivefold decline after two hours; and a 50-fold decline after four hours. (157) Another study found that for at-risk neonates, receiving no IAP significantly increased the risk of GBS colonization, compared with those who received even inadequate IAP (RR 16.44, 95% CI 6.63-40.79, p < 0.00001). (158)

TABLE 6. RATES OF INFECTION BY IAP DURATION

	IAP > four hours	IAP two to four hours	IAP < two hours
EOGBSD	Two per 1000	13 newborns per 1000 (RR 5.28, 95% CI 2.61-10.68)	16 newborns per 1000 (RR 7.98, 95% CI 3.90-16.34)
Neonatal sepsis	Four per 1000	7 newborns per 1000 (RR 1.70, 95% CI 0.58-5.03)	15 newborns per 1000 (RR 3.77, 95% CI 1.47-9.67)

Expectant observation vs. laboratory testing

For well-appearing newborns at risk for EOGBSD, various management strategies have been proposed, including expectant observation and observation combined with laboratory testing (CBC, blood culture).

We identified very low certainty of evidence from two observational studies that examined expectant observation and serial physical examination vs. laboratory testing as management strategies for newborns at risk for EOGBSD. (144,159) Results from these studies suggest that serial physical examinations (expectant observation):

- Are similar in their ability to detect early-onset sepsis (RR 0.80, 95% CI 0.55-1.17) or severe disease (RR 0.70, 95% CI 0.27-1.85, p = 0.47) [*very low certainty of evidence*, n = 532 154, one study]; (144)
- Compared with laboratory testing, expectant management appears to reduce the rate of newborn antibiotic use (RR 0.33, 95% CI 0.14-0.76, p = 0.009), without increasing the risk of suspected sepsis (RR 0.81, 95% CI 0.14-0.76, p = 0.009) [*very low certainty of evidence*, n = 1589, one study]. (159)

Other important client considerations regarding management of well-appearing at-risk neonates

The CPS (143) provides the following guidance for monitoring and assessment of well-appearing newborns (≥ 37 weeks) in the context of GBS:

- **GBS-positive birthing parent, adequate IAP, no risk factors OR GBS-negative or GBS-unknown status, with one other risk factor and adequate IAP:** Infants do not require investigation or treatment for sepsis. They may be discharged home after 24 hours if they remain well, meet other discharge criteria and if parents understand signs of sepsis and when to seek medical care. (Strong recommendation)
- **GBS-positive birthing parent, inadequate IAP, no risk factors OR GBS-negative or GBS-unknown status, with one other risk factor and inadequate IAP:** Infants should be examined at birth, observed closely in hospital with vital signs every three to four hours and reassessed before discharge home. They may be discharged home after 24 hours if they remain well and meet other discharge criteria, providing there is ready access to health care and the parents understand and are able to seek medical care if the infant develops signs of sepsis. Routine investigation or treatment is not required. (Strong recommendation)
- **Multiple risk factors for sepsis and/or chorioamnionitis:** Infants should be investigated and treated using an individualized approach that includes consideration of the severity of risk factors and maternal antibiotic therapy. At minimum, infants should have close observation in hospital for at least 24 hours with vital signs every three to four hours and reassessment before discharge. A CBC done after 4 hours of age may be helpful; WBC < 5 x 10^9/L and ANC < 1.5 x 10^9/L have the highest positive predictive value. Some infants may warrant investigation and antibiotic therapy. (Weak recommendation)

CPS guidance differs from midwifery approaches, as it focuses on in-hospital birth, and recommendations regarding postpartum management are structured around standard discharge times. As a standard of midwifery care, early postpartum visits, along with home visits, are important components of how midwives monitor for signs of sepsis. They are skilled at providing health information to clients and empowering parents to play an active role in identifying signs of sepsis and urgently follow up. Typical models of midwifery care give clients round-the-clock access to midwives by phone or pager should concerns arise; and in-person assessment, rarely available in other models of care, can occur promptly if needed.

For those who have received adequate or inadequate IAP, the CPS is consistent with midwifery approaches suggesting that routine investigation or treatment is not required in these populations. These recommendations also acknowledge that parents are capable of monitoring newborns for signs of sepsis after discharge.

For clients with confirmed penicillin allergies who receive clindamycin or vancomycin, the CPS suggests that due to a lack of clinical trials on these approaches, they should be considered inadequate IAP when managing the neonate.

Good Practice Statement:

14. When discussing management options for the well-appearing term newborn with risk factors for EOGBSD, midwives should address the following in informed choice discussions with clients:
    - CPS guidelines, as well as local hospital protocol applicable to the client's and newborn's clinical circumstances;
    - What is known about how any risk factors may increase the risks of developing EOGBSD;
    - What is known about how full, partial or no IAP may affect the risk of developing EOGBSD;
    - The client's values, preferences and risk tolerance, as well as their comfort level and ability to monitor their newborn. [2022]

    Good practice statement

    This good practice statement recognizes the client as the primary decision-maker.

Recommendations:

The following recommendations refer to management of well-appearing term infants born to parents colonized with GBS:

15. For well-appearing newborns who received IAP ≥ four hours before birth, midwives should offer home observation. [2022]

    Strong recommendation; very low certainty of evidence

    This recommendation recognizes the evidence that IAP is most effective when delivered ≥ four hours before birth. It also acknowledges that observation in the home setting is appropriate for this population.

16. For well-appearing newborns who received < four hours of IAP prior to birth (partial IAP) and had no other risk factors, midwives may offer home observation. [2022]

    Weak recommendation; very low certainty of evidence

    This recommendation recognizes the evidence that IAP < four hours before birth may still reduce risks to the neonate. It also acknowledges that observation in the home setting is appropriate for this population.

17. For well-appearing newborns of clients who received < four hours of IAP prior to birth (partial IAP) and experienced PROM ≥ 18 hours and/or fever, midwives may offer home or hospital observation. [2022]

    Weak recommendation; very low certainty of evidence

    This recommendation recognizes the risks to the neonate posed by multiple risks factors, while acknowledging that the presence of one or more of these factors is not necessarily strongly predictive of EOGBSD and therefore should not limit choice. This recommendation also recognizes midwives' ability to provide relevant education to parents about neonatal sepsis.

18. For well-appearing newborns of clients who have not received IAP but have no other risk factors, midwives may offer home or hospital observation. [2022]

    Weak recommendation; very low certainty of evidence

    This recommendation recognizes the evidence that the risk of EOGBSD is highest when no IAP has been given, while acknowledging that GBS status alone is associated with a low absolute risk of EOGBSD and therefore should not limit choice.

19. For well-appearing newborns of clients who have not received IAP and who experienced PROM ≥ 18 hours and/or fever, midwives may offer hospital observation. [new 2022]

    Weak recommendation; very low certainty of evidence

    This recommendation recognizes the evidence that receiving no IAP, in combination with PROM ≥ 18 hours, may increase risks to the neonate.

POSTPARTUM MANAGEMENT STRATEGIES: NEAR-TERM NEONATE

Since some midwives will maintain primary care of the well near-term neonate (≥ 34 weeks' gestation), research relating to the incidence and etiology of EOGBSD in this population is relevant. The near-term neonate will more likely face challenges with thermoregulation, feeding difficulties and poor immunological and respiratory defence systems. (160) See Risk Factors for evidence related to the increased risk of EOGBSD in preterm populations.

One UK case review of both early-onset (n = 377) and late-onset GBS disease (n = 191) found increased mortality rates for both early and late infection in preterm (15.2% at ≤ 33 weeks' gestation) and near-term infants (13.2% at 34 to 36 weeks' gestation) compared with term infants (6.4% at ≥ 37 weeks). The overall mortality rate in this study was 9.7%, and the overall incidence of EOGBSD was 0.48/1000 births. (161)

Near-term neonates are not uniformly defined in research studies. Two prospective cohort studies were found that examined the incidence of sepsis evaluation and proven sepsis in the near-term neonate. Of 1233 near-term NICU admissions from 2000 to 2004 from a single site, six (4.9/1000) had culture-proven EOGBSD. Because the signs can be subtle or may mimic other medical conditions (hypoglycemia, delayed transition, transient tachypnea of the newborn), diagnosis of EOS in the near-term neonate is challenging. This may result in many near-term neonates being evaluated for sepsis and receiving empiric antibiotics. (162)

In another prospective cohort study of 119 130 neonates < three days old born at 34 to 36 weeks' gestation, 6/1000 cases of EOS were caused by any organism. No deaths were associated with GBS. Twenty-nine percent of near-term

neonates with EOS were exposed to IAP. The proportion of near-term neonates evaluated for sepsis in the first three days was 69%, compared with a rate of only 0.4% of confirmed cases. (163) The relatively low rate of proven EOS vs. the number of near-term neonates being evaluated for sepsis suggests a high rate of unnecessary intervention may be taking place in this population.

The CPS acknowledges that specific evidence related to the management of late-preterm or near-term infants is lacking, but it recommends that:

- If infants are stable enough to remain with their parent in a birthing parent and baby unit, they can be managed similar to infants ≥ 37 weeks' gestation, but they should be observed in hospital for at least 48 hours.

Good Practice Statement:

20. For well-appearing near-term infants, midwives should:
    - Discuss CPS guidance for managing well-appearing near-term neonates;
    - Discuss evidence related to the increased risk of EOGBSD in preterm populations;
    - Consult with a pediatrician or physician if assessment or treatment is required. [new 2022]

Good practice statement

This good practice statement recognizes midwives' ability to identify emerging complications and escalate care as the clinical picture requires.

CONCLUSION

While the absolute risk of EOGBSD is low, it can result in significant morbidity and mortality in the neonate. Decision-making regarding prevention, screening and management will balance the risks and benefits of each approach, as well as a client's values, preferences and risk tolerance. The midwife's role is to ensure that clients are well informed of the risks and benefits of the choices they face in the course of their pregnancy, labour and postpartum care.

This CPG provides a critical overview of the evidence on GBS in pregnancy and the postpartum period. Research on effective methods to prevent transmission of GBS to the neonate is limited, although some evidence suggests that probiotics in the antepartum period may reduce GBS colonization at birth. When determining the presence of GBS, vaginal-rectal culture screening at 35 to 37 weeks' gestation is the most accurate method of predicting GBS colonization in the pregnant person at birth, and it is appropriate to provide self-sampling as an option. If GBS is present, clients may be offered two different approaches to determine when IAP is indicated.

In the postpartum period, midwives are skilled in providing health education to clients regarding signs of sepsis and risks to the neonate, identifying emerging complications and escalating care if required. For the well-appearing neonate, midwives consider the duration of IAP and the presence of additional risk factors when determining appropriate management strategies. More research is needed on the optimal methods and timing of home-based monitoring for EOGBSD by midwives and best practices for parent education.

SUMMARY OF GOOD PRACTICE STATEMENTS & RECOMMENDATIONS

1. Midwives may discuss the use of probiotics in the antepartum period with clients as a means of reducing the chances of GBS colonization at birth. [new 2022]

   Weak recommendation; moderate certainty of evidence

   This recommendation recognizes the limits of the existing research on probiotics for GBS, as well as existing barriers to access.

2. Offer all clients screening for GBS at 35 to 37 weeks' gestation, with a culture done from one swab first to the vagina then the rectum. Clients may be offered instructions on how to do the swab themselves. [2022]

   Strong recommendation; moderate certainty of evidence

   This recommendation recognizes the evidence on diagnostic accuracy of vaginal-rectal culture screening, as well as variability in client preferences, values and ability regarding self-sampling.

3. Offer re-screening if more than five weeks have elapsed from initial swab and the client has not yet given birth. [2022]

   Strong recommendation; moderate certainty of evidence

   This recommendation recognizes the evidence to demonstrate that the predictive ability of a swab declines after six weeks. However, there may be practical limitations due to long sampling and processing times, which warrant earlier re-swabbing.

4. Midwives should discuss the risks and benefits of penicillin allergy testing with clients who have an unconfirmed penicillin allergy, as early in their pregnancy as possible. [new 2022]

   Good practice statement

   This good practice statement recognizes the long-term health benefits of penicillin allergy testing and the importance of appropriate antimicrobial use, as well as potential constraints around prompt access to penicillin allergy testing.

5. Request sensitivity testing for the GBS swab if:

   - the client has a confirmed penicillin allergy
   - the client reports symptoms consistent with a penicillin allergy and has not been tested to confirm an allergy. [2022]

   Good practice statement

   This good practice statement recognizes the larger body of evidence on antimicrobial susceptibility of GBS isolates.

6. The risks and benefits of the following two approaches to IAP delivery should be discussed with clients as part of their informed choice discussion about GBS:

   a) Culture-screening approach
   - All clients who receive a GBS-positive swab at 35 to 37 weeks' gestation, have documented GBS bacteriuria or previously had an infant with GBS should be offered IAP.

   b) Culture-screening and risk-factor approach
   - All clients who receive a GBS-positive swab at 35 to 37 weeks' gestation and develop one or more of these intrapartum risk factors should be offered IAP. Intrapartum risk factors include:
   - Preterm labour (< 37 weeks)
   - Prolonged rupture of membranes (≥ 18 hours)
   - Maternal fever (≥ 38°C)
   - All clients with documented GBS bacteriuria or who previously had an infant with GBS should be offered IAP.

Informed choice discussions should address:

- The body of evidence for both strategies, including a discussion of the larger body of evidence in support of a culture-screening approach;
- The SOGC recommendation to use a culture-screening approach;
- Community standards regarding approaches to determining who receives IAP;
- Alternatives to penicillin, as well as choice of birthplace considerations for those with penicillin allergies;
- Client values, preferences and risk tolerance. [2022]

Strong recommendation; very low certainty of evidence

This recommendation acknowledges that both approaches reduce EOGBSD, and it recognizes the larger body of evidence in support of the culture-screening approach.

7. For clients with an unknown GBS status, offer IAP if one or more intrapartum risk factors are present:

   - Preterm labour (< 37 weeks)
   - Prolonged rupture of membranes (≥ 18 hours)
   - Maternal fever (≥ 38°C) [2022]

   Strong recommendation; very low certainty of evidence

   This recommendation acknowledges the evidence suggesting that administering IAP to those with risk factors, in the absence of known GBS status, is more protective than no policy.

8. Offer a choice between expectant management and immediate medical induction of labour to clients at term who are GBS positive, experience PROM for < 18 hours, and have no other risk factors.

   Informed choice discussions should include information on:

   - Research gaps regarding the most effective approach to preventing EOGBSD in infants born to GBS carriers who experience term PROM;
   - Guidance from the SOGC on induction for those who experience PROM;
   - Client preferences and values. [2022]

   Strong recommendation; very low certainty of evidence

   This recommendation recognizes the limited evidence on expectant management and induction of GBS-positive clients who experience PROM < 18 hours, and it recognizes the client as the primary decision-maker.

9. Recommend medical induction of labour to clients who are GBS positive with PROM ≥ 18 hours. IAP should be offered upon start of labour. [2022]

   Strong recommendation; very low certainty of evidence

   This recommendation recognizes the increased risk of EOGBSD for clients who experience PROM ≥ 18 hours.

10. Offer GBS-positive clients with PROM who choose expectant management a range of options for IAP administration, taking into account local resource constraints:

    a) IAP in active labour
    b) IAP in the latent phase
    c) IAP upon initiation of induction of labour [2022]

Weak recommendation; no direct evidence

This recommendation recognizes the lack of evidence on timing of IAP for clients who experience PROM, as well as acknowledging the client as the primary decision-maker.

11. Midwives should discuss with all clients, regardless of prenatal GBS status:

    - What to expect as normal newborn transition and behaviour in the first 24 hours;
    - How to recognize signs in the newborn that may be indicative of sepsis (including breathing, temperature instability, colour and tone);
    - How to contact the midwife and access urgent care when necessary. [2022]

Good practice statement

This good practice statement recognizes midwives' strengths in providing health education to clients, and it acknowledges that sepsis may occur in infants born to parents who have tested negative for GBS or received IAP.

12. If a midwife suspects EOGBSD, an assessment should be done promptly. If signs of sepsis are noted upon an in-person exam, they should arrange an immediate consult.

    - Once a consult has been initiated, the midwife should discuss with the client any hospital protocols and care plans applicable to management decisions. [2022]

Good practice statement

This good practice statement recognizes the rapid progression of sepsis, as well as midwives' ability to identify emerging complications and work interprofessionally to provide safe, excellent client care.

13. For asymptomatic newborns of clients with confirmed or suspected chorioamnionitis, midwives should:

    - Offer hospital observation;
    - Discuss the increased risk of EOGBSD for newborns of birthing parents with confirmed or suspected chorioamnionitis, regardless of IAP status;
    - Relay CPS guidance for managing infants born to parents with confirmed or suspected chorioamnionitis;
    - Consult with a pediatrician or physician if assessment or treatment is required. [2022]

Good practice statement

This good practice statement recognizes the evidence on the risks of chorioamnionitis to the neonate and the value of continuity of care, as well as midwives' ability to identify emerging complications and escalate care as the clinical picture requires.

14. When discussing management options for the well-appearing term newborn with risk factors for EOGBSD, midwives should address the following in informed choice discussions with clients:

    - CPS guidelines, as well as local hospital protocol applicable to the client's and newborn's clinical circumstances;
    - What is known about how any risk factors may increase the risks of developing EOGBSD;
    - What is known about how full, partial or no IAP may affect the risk of developing EOGBSD;
    - The client's values, preferences and risk tolerance, as well as their comfort level and ability to monitor their newborn. [2022]

Good practice statement

This good practice statement recognizes the client as the primary decision-maker.

The following recommendations refer to management of well-appearing term infants born to parents colonized with GBS:

15. For well-appearing newborns who received IAP ≥ four hours before birth, midwives should offer home observation. [2022]

Strong recommendation; very low certainty of evidence

This recommendation recognizes the evidence that IAP is most effective when delivered ≥ four hours before birth. It also acknowledges that observation in the home setting is appropriate for this population.

16. For well-appearing newborns who received < four hours of IAP prior to birth (partial IAP) and had no other risk factors, midwives may offer home observation. [2022]

Weak recommendation; very low certainty of evidence

This recommendation recognizes the evidence that IAP < four hours before birth may still reduce risks to the neonate. It also acknowledges that observation in the home setting is appropriate for this population.

17. For well-appearing newborns of clients who received < four hours of IAP prior to birth (partial IAP) and experienced PROM ≥ 18 hours and/or fever, midwives may offer home or hospital observation. [2022]

Weak recommendation; very low certainty of evidence

This recommendation recognizes the risks to the neonate posed by multiple risks factors, while acknowledging that the presence of one or more of these factors is not necessarily strongly predictive of EOGBSD and therefore should not limit choice. This recommendation also recognizes midwives' ability to provide relevant education to parents about neonatal sepsis.

18. For well-appearing newborns of clients who have not received IAP but have no other risk factors, midwives may offer home or hospital observation. [2022]

Weak recommendation; very low certainty of evidence

This recommendation recognizes the evidence that the risk of EOGBSD is highest when no IAP has been given, while acknowledging that GBS status alone is associated with a low absolute risk of EOGBSD and therefore should not limit choice.

19. For well-appearing newborns of clients who have not received IAP and who experienced PROM ≥ 18 hours and/or fever, midwives may offer hospital observation. [new 2022]

Weak recommendation; very low certainty of evidence

This recommendation recognizes the evidence that receiving no IAP, in combination with PROM ≥ 18 hours, may increase risks to the neonate.

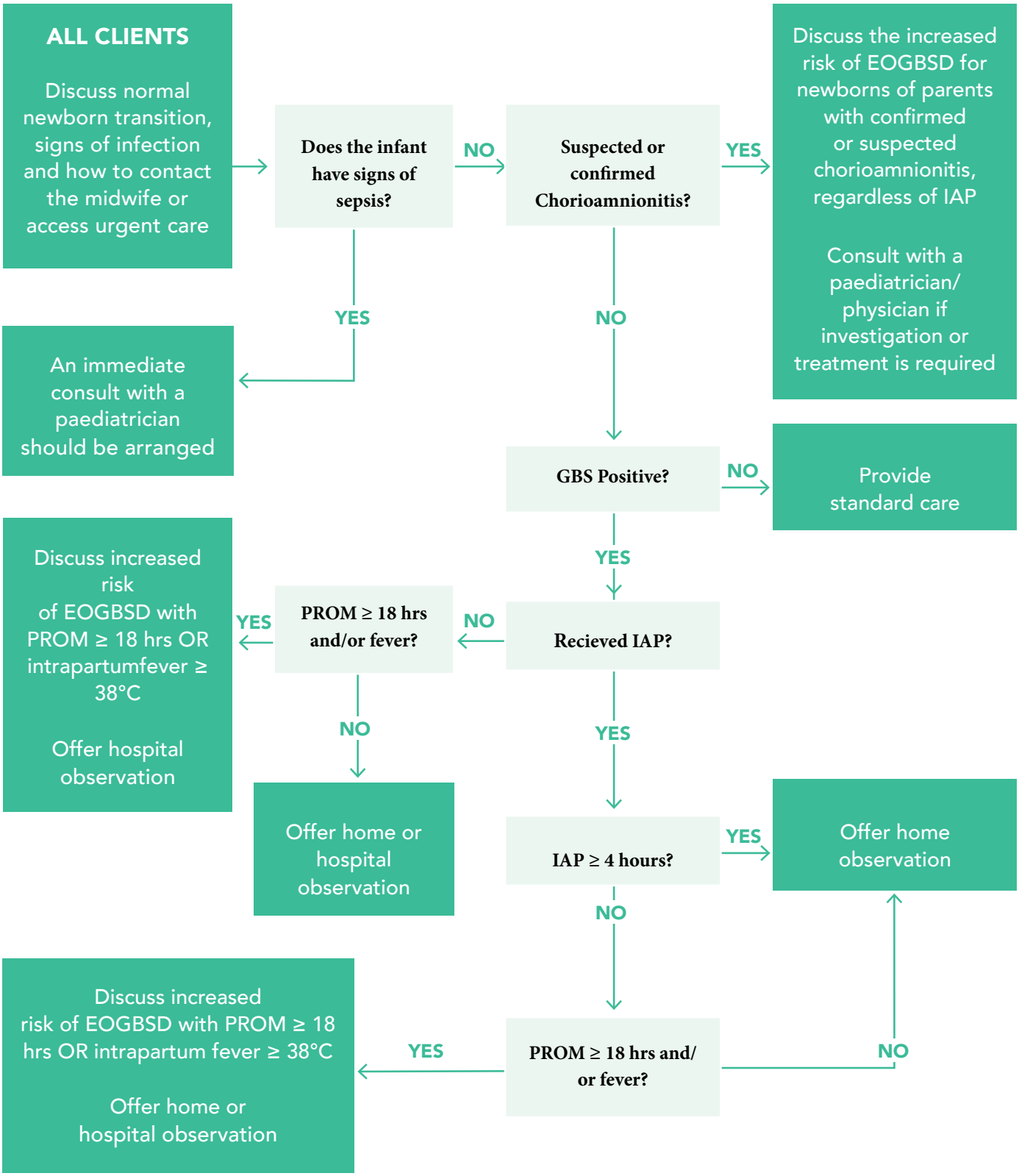
20. For well-appearing near-term infants, midwives should:

- Discuss CPS guidance for managing well-appearing near-term neonates;
- Discuss evidence related to the increased risk of EOGBSD in preterm populations;
- Consult with a pediatrician or physician if assessment or treatment is required. [new 2022]

Good practice statement

This good practice statement recognizes midwives' ability to identify emerging complications and escalate care as the clinical picture requires.

POSTPARTUM MANAGEMENT ALGORITHM



This clinical pathway should not replace professional skill and judgment. Midwives should use their clinical judgment when interpreting and applying this clinical pathway to individual client and practice circumstances.

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APPENDIX

Table 1: Updated 2022 Recommendations, Good Practice Statements and Explanation of Changes		
Original Recommendation [2010 or 2014]	Updated Recommendation [2022]	Explanation of Change(s)
CPG #11: GROUP B STREPTOCOCCUS: PREVENTION AND MANAGEMENT IN LABOUR (2010)		
Antepartum Prevention of GBS Colonization		
None.	**1.** Midwives may discuss the use of probiotics in the antepartum period with clients as a means of reducing the chances of GBS colonization at birth. [new 2022] **Weak recommendation; moderate certainty of evidence** *This recommendation recognizes the limits of the existing research on probiotics for GBS, as well as existing barriers to access.*	Publication of seven studies (5 RCTs) on impacts of probiotics on GBS colonization at birth since last CPG. • RCT evidence shows prenatal probiotics likely reduce GBS colonization close to delivery (from 35 weeks) in the birthing parent and likey have no side effects • Evidence does not cover effects of probiotics on neonatal outcomes
Vaginal-Rectal Culture Screening for GBS		
1. Offer all women screening for group B streptococcus at 35 to 37 weeks' gestation with a culture done from one swab first to the vagina then to the rectal area (through the anal sphincter). It is appropriate to offer women instructions on how to swab themselves for self-collection. [II-2-A]	**2.** Offer all clients screening for GBS at 35 to 37 weeks' gestation, with a culture done from one swab first to the vagina then the rectum. Clients may be offered instructions on how to do the swab themselves. [2022] **Strong recommendation; moderate certainty of evidence** *This recommendation recognizes the evidence on diagnostic accuracy of vaginal-rectal culture screening, as well as variability in client preferences, values and ability regarding self-sampling.*	Language changes only; no change required to recommendation.
2. Offer re-screening to all women if > 5 weeks has elapsed from initial swab and the woman remains undelivered. [II-2-A]	**3.** Offer re-screening if more than 5 weeks have elapsed from initial swab and the client has not yet given birth. [2022] **Strong recommendation; moderate certainty of evidence** *This recommendation recognizes the evidence to demonstrate that the predictive ability of a swab declines after six weeks. However, there may be practical limitations due to long sampling and processing times, which warrant earlier re-screening.*	Language changes only; no change required to recommendation.

Original Recommendation [2010 or 2014]	Updated Recommendation [2022]	Explanation of Change(s)
Antepartum Management of Clients with Penicillin Allergies		
None	**4.** Midwives should discuss the risks and benefits of penicillin allergy testing with clients who have an unconfirmed penicillin allergy, as early in their pregnancy as possible. [new 2022] **Good practice statement** *This good practice statement recognizes the long-term health benefits of penicillin allergy testing and the importance of appropriate antimicrobial use, as well as potential constraints around prompt access to penicillin allergy testing.*	Following GRADE methodology, this information has been included as a Good Practice Statement. Good practice statements in this CPG represent guidance that the WG deemed important but that were not appropriate for formal ratings of certainty of evidence. Good practice statements are made when the Committee is confident that the action has net benefit to the client and that sensible alternatives do not exist.
3. Request sensitivity testing for the GBS swab if the woman has reported a penicillin allergy. [II-2-A]	**5.** Request sensitivity testing for the GBS swab if: • Client has a confirmed penicillin allergy. • Client reports symptoms consistent with a penicillin allergy and has not been tested to confirm an allergy. [2022] **Good practice statement** *This good practice statement recognizes the larger body of evidence on antimicrobial susceptibility of GBS isolates.*	Following GRADE methodology, this recommendation is now considered as a Good Practice Statement. Good practice statements in this CPG represent guidance that the WG deemed important but that were not appropriate for formal ratings of certainty of evidence. Good practice statements are made when the Committee is confident that the action has net benefit to the client and that sensible alternatives do not exist.
Intrapartum Management Strategies		
4. The following EOGBSD prevention strategies should be offered to women as part of their informed choice discussion regarding GBS: a) Universal screening strategy Offer intrapartum antibiotic GBS prophylaxis to: i. Any women positive by GBS culture screening done at 35 to 37 weeks; ii. Any women with an infant previously infected with GBS, regardless of GBS status in current pregnancy; iii. Any women with documented GBS bacteriuria (regardless of level of colony-forming units per mL) in this pregnancy;	**6.** The risks and benefits of the following two approaches to IAP delivery should be discussed with clients as part of their informed choice discussion about GBS: a) Culture-screening approach • All clients who receive a GBS-positive swab at 35 to 37 weeks' gestation, have documented GBS bacteriuria or previously had an infant with GBS should be offered IAP. b) Culture-screening and risk-factor approach • All clients who receive a GBS-positive swab at 35 to 37 weeks' gestation and develop one or more of these intrapartum risk factors should be offered IAP. Intrapartum risk factors include:	Language changes only; no change required to recommendation. Recommendations related to those with unknown GBS status have been separated and are covered now in recommendation # 7.

Original Recommendation [2010 or 2014]	Updated Recommendation [2022]	Explanation of Change(s)
iv. Any GBS unknown women with the following risk factors: preterm labour (< 37 weeks' gestation); prolonged rupture of membranes (> 18 h); maternal fever (temperature ≥ 38°C) Women should be informed that this is the current strategy endorsed by the SOGC and the CDC. [II-2-B] b) Screening with risk factors strategy: Offer intrapartum antibiotic GBS prophylaxis to: i. All women positive by GBS culture screening done at 35 to 37 weeks and who also develop one or more of the following risk factors: • Preterm labour (< 37 weeks' gestation) • Prolonged rupture of membranes (≥ 18 h) • Maternal fever (temperature ≥ 38°C) ii. Any women with an infant previously infected with GBS, regardless of GBS status in current pregnancy; iii. Any women with documented GBS bacteriuria (regardless of level of cfu/mL) in this pregnancy. Women should be informed that there is limited research upon which to compare the relative efficacy of this approach to a screening strategy, nor are there well-designed RCTs that compare this approach against no treatment. [II-3-C]	• Preterm labour (< 37 weeks) • Prolonged rupture of membranes (≥ 18 hours) • Maternal fever (≥ 38°C) • All clients with documented GBS bacteriuria or who previously had an infant with GBS should be offered IAP. Informed choice discussions should address: • The body of evidence for both strategies, including a discussion of the larger body of evidence in support of a culture-screening approach; • The SOGC recommendation to use a culture-screening approach; • Community standards regarding approaches to determining who receives IAP; • Alternatives to penicillin, as well as choice of birthplace considerations for those with penicillin allergies; • Client values, preferences and risk tolerance. [2022] **Strong recommendation; very low certainty of evidence** *This recommendation acknowledges that both approaches reduce EOGBSD, and it recognizes the larger body of evidence in support of the culture-screening approach.*	
5. Women who decline antenatal GBS cultures are considered GBS unknown and those who develop risk factors intrapartum should be offered IAP [II-2-B]. Women may find it helpful to know the statistics included in Tables 1, 2 and 3 and Summary of Prevalence, Incidence and Neonatal Complications associated with GBS to guide their decision-making regarding the prevention of EOGBSD.	**7**. For clients with an unknown GBS status, offer IAP if one or more intrapartum risk factors are present: • Preterm labour (< 37 weeks) • Prolonged rupture of membranes (≥ 18 hours) • Maternal fever (≥ 38°C) [2022] **Strong recommendation; very low certainty of evidence** *This recommendation acknowledges the evidence suggesting that administering IAP to those with risk factors, in the absence of known GBS status, is more protective than no policy.*	Language changes only; no change required to recommendation. Parts of original Recommendation 4 included here.

Original Recommendation [2010 or 2014]	Updated Recommendation [2022]	Explanation of Change(s)
Intrapartum Management of Prelabour Rupture of Membranes (PROM): Induction vs. Expectant Management		
6. Women should be informed of the research gaps regarding the most effective approach to preventing EOGBSD in infants born to GBS carriers who experience term PROM. 7. Offer a choice between expectant management and immediate induction of labour with oxytocin to women with a positive GBS swab result at term who experience PROM for < 18 hours, and have no other risk factors [III-B].	**8.** Offer a choice between expectant management and immediate medical induction of labour to clients at term who are GBS positive, experience PROM for < 18 hours, and have no other risk factors. Informed choice discussions should include information on: • Research gaps regarding the most effective approach to preventing EOGBSD in infants born to GBS carriers who experience term PROM; • Guidance from the SOGC on induction for those who experience PROM; • Client preferences and values. [2022] **Strong recommendation; very low certainty of evidence** *This recommendation recognizes the limited evidence on expectant management and induction of GBS-positive clients who experience PROM < 18 hours, and it recognizes the client as the primary decision-maker.*	Language changes only; no change required to recommendation.
8. Recommend induction of labour with oxytocin to women who are GBS positive with PROM ≥ 18 hours [III-B]. IAP should be offered upon commencement of induction of labour.	**9.** Recommend medical induction of labour to clients who are GBS positive with PROM ≥ 18 hours. IAP should be offered upon start of labour. [2022] **Strong recommendation; very low certainty of evidence** *This recommendation recognizes the increased risk of EOGBSD for clients who experience PROM ≥ 18 hours.*	Language changes only; no change required to recommendation.

Original Recommendation [2010 or 2014]	Updated Recommendation [2022]	Explanation of Change(s)
9. Offer GBS positive women with PROM choosing expectant management a range of options for prophylactic antibiotic administration [III-B]: a. IAP in active labour [II-2-B] b. IAP in the latent phase [III-C] c. IAP upon the initiation of induction of labour [III-B] Please note: recommendations 6 to 9 differ from those of the SOGC and ACOG. Rigorous information sharing with women to assist them in making decisions is essential.	**10.** Offer GBS-positive clients with PROM who choose expectant management a range of options for IAP administration, taking into account local resource constraints: • IAP in active labour • IAP in the latent phase • IAP upon initiation of induction of labour [2022] **Weak recommendation; no direct evidence** *This recommendation recognizes the lack of evidence on timing of IAP for clients who experience PROM, as well as acknowledging the client as the primary decision-maker.*	Language changes only; no change required to recommendation.
CPG #16: GROUP B STREPTOCOCCUS: POSTPARTUM MANAGEMENT OF THE NEONATE (2014)		
Postpartum Management Strategies: EOGBSD		
1. Midwives should review with all clients, regardless of prenatal GBS status: a. What to expect as normal newborn transition and behaviour in the first 24 hours; b. How to recognize signs in the newborn that may be indicative of sepsis (including breathing, temperature instability, colour and tone); c. How to contact the midwife and access urgent care when necessary. **Strong recommendation; low quality evidence** *This recommendation recognizes that while colonization is an important risk factor for EOGBSD, sepsis may also occur in infants born to who have tested negative for GBS; it also recognizes the strengths of continuity of care and values the midwife's ability and opportunity to provide health education to parents and families.*	**11.** Midwives should discuss with all clients, regardless of prenatal GBS status: • What to expect as normal newborn transition and behaviour in the first 24 hours; • How to recognize signs in the newborn that may be indicative of sepsis (including breathing, temperature instability, colour and tone); • How to contact the midwife and access urgent care when necessary. [2022] **Good practice statement** *This good practice statement recognizes midwives' strengths in providing health education to clients, and it acknowledges that sepsis may occur in infants born to parents who have tested negative for GBS or received IAP.*	Following GRADE methodology, this recommendation is now considered as a Good Practice Statement. Good practice statements in this CPG represent guidance that the WG deemed important but that were not appropriate for formal ratings of certainty of evidence. Good practice statements are made when the Committee is confident that the action has net benefit to the client and that sensible alternatives do not exist.

Original Recommendation [2010 or 2014]	Updated Recommendation [2022]	Explanation of Change(s)
2. For newborns with signs of sepsis noted upon in-person exam: an immediate consult with a pediatrician (or other physician if paediatrician is unavailable) should be arranged by the midwife. **Strong recommendation; low quality evidence.** *This recommendation recognizes the critical outcome of EOGBSD and risks to the neonate.*	**12**. If a midwife suspects EOGBSD, an assessment should be done promptly. If signs of sepsis are noted upon an in-person exam, they should arrange an immediate consult. • Once a consult has been initiated, the midwife should discuss with the client any hospital protocols and care plans applicable to management decisions. [2022] **Good practice statement** *This good practice statement recognizes the rapid progression of sepsis, as well as midwives' ability to identify emerging complications and work interprofessionally to provide safe, excellent client care.*	Following GRADE methodology, this recommendation is now considered as a Good Practice Statement. Components from the original Recommendation #5 are included here. Good practice statements in this CPG represent guidance that the WG deemed important but that were not appropriate for formal ratings of certainty of evidence. Good practice statements are made when the Committee is confident that the action has net benefit to the client and that sensible alternatives do not exist.
Postpartum Management Strategies: Chorioamnionitis		
3. For asymptomatic newborns born to a client with confirmed or suspected chorioamnionitis: discuss that chorioamnionitis places the newborn at increased risk of EOGBSD regardless of whether or not IAP has been given, as well as conflicting guidance among key guideline development groups: • CDC recommendation for a limited diagnostic evaluation and antibiotic therapy pending blood culture results. • CPS recommendation that a CBC be performed and that the infant have vitals assessed q 4 hours for a period of 24 hours. Midwives should consult with a paediatrician/physician to facilitate assessment/treatment for infants born to clients with chorioamnionitis. **Strong recommendation; low quality evidence.** *This recommendation recognizes the critical outcome of EOGBSD and risks to the neonate.*	**13.** For asymptomatic newborns of clients with confirmed or suspected chorioamnionitis, midwives should: • Offer hospital observation; • Discuss the increased risk of EOGBSD for newborns of birthing parents with confirmed or suspected chorioamnionitis, regardless of IAP status; • Relay CPS guidance for managing infants born to parents with confirmed or suspected chorioamnionitis; • Consult with a pediatrician or physician if assessment or treatment is required. [2022] **Good practice statement** *This good practice statement recognizes the evidence on the risks of chorioamnionitis to the neonate and the value of continuity of care, as well as midwives' ability to identify emerging complications and escalate care as the clinical picture requires.*	Following GRADE methodology, this recommendation is now considered as a Good Practice Statement. Some language changes/reorganization but content remains largely consistent. Good practice statements in this CPG represent guidance that the WG deemed important but that were not appropriate for formal ratings of certainty of evidence. Good practice statements are made when the Committee is confident that the action has net benefit to the client and that sensible alternatives do not exist.

Original Recommendation [2010 or 2014]	Updated Recommendation [2022]	Explanation of Change(s)
Postpartum Management Strategies: Well-appearing neonates		
4. Management of the term infant born to a client who has screened positive for GBS: a. For all clinical situations listed below, when discussing management options for the newborn, midwives should address the following in informed choice discussions with clients: i. CDC and CPS guidelines as well as local hospital protocol applicable to the client's and newborn's clinical circumstances; ii. What is known about how risk factors, if present, may increase risks of developing EOGBSD; iii. What is known about how full, partial or no IAP may impact risk of developing EOGBSD; iv. Risks and benefits of treatment options and screening tests, as indicated, as well as choosing not to treat; v. The client's values and preferences and risk tolerance, as well as their comfort level and ability to monitor their own newborn. **Strong recommendation; no evidence available.** *This recommendation is based on the values of informed choice and the midwifery model of care.*	**14.** When discussing management options for the well-appearing term newborn with risk factors for EOGBSD, midwives should address the following in informed choice discussions with clients: • CPS guidelines, as well as local hospital protocol applicable to the client's and newborn's clinical circumstances; • What is known about how risk any factors may increase the risks of developing EOGBSD; • What is known about how full, partial or no IAP may affect the risk of developing EOGBSD; • The client's values, preferences and risk tolerance, as well as their comfort level and ability to monitor their newborn. [2022] **Good practice statement** *This good practice statement recognizes the client as the primary decision-maker.*	Following GRADE methodology, this recommendation is now considered as a Good Practice Statement. Some language changes/reorganization but content remains largely consistent. Good practice statements in this CPG represent guidance that the WG deemed important but that were not appropriate for formal ratings of certainty of evidence. Good practice statements are made when the Committee is confident that the action has net benefit to the client and that sensible alternatives do not exist.

Original Recommendation [2010 or 2014]	Updated Recommendation [2022]	Explanation of Change(s)
b. Asymptomatic newborns of clients who have received IAP ≥4 hours prior to birth: i. Home observation may be recommended. Strong recommendation; moderate quality evidence *This recommendation recognizes evidence that EOGBSD rates have been reduced following widespread IAP use.*	The following recommendations refer to management of well-appearing term infants born to parents colonized with GBS: **15.** For well-appearing newborns who received IAP ≥ four hours before birth, midwives should offer home observation. [2022] **Strong recommendation; very low certainty of evidence** *This recommendation recognizes the evidence that IAP is most effective when delivered ≥ four hours before birth. It also acknowledges that observation in the home setting is appropriate for this population.*	Language changes only; no change required to recommendation.
c. Asymptomatic newborns of clients who have received IAP < 4 hours prior to birth (partial IAP): i. No risk factors: home observation may be recommended. Weak recommendation; low quality evidence *This recommendation recognizes evidence that penicillin antibiotics reach bactericidal level in under 4 hours.*	**16.** For well-appearing newborns who received < four hours of IAP prior to birth (partial IAP) and had no other risk factors, midwives may offer home observation. [2022] **Weak recommendation; very low certainty of evidence** *This recommendation recognizes the evidence that IAP < four hours before birth may still reduce risks to the neonate. It also acknowledges that observation in the home setting is appropriate for this population.*	Language changes only; no change required to recommendation.
c. Asymptomatic newborns of clients who have received IAP < 4 hours prior to birth (partial IAP): ii. PROM ≥ 18 hours or intrapartum fever ≥ 38.0°C: offer home or hospital observation. Weak recommendation; low quality evidence. *This recommendation recognizes evidence that penicillin antibiotics reach bactericidal level in less than 4 hours.*	**17.** For well-appearing newborns of clients who received < four hours of IAP prior to birth (partial IAP) and experienced PROM ≥ 18 hours and/or fever, midwives may offer home or hospital observation. [2022] **Weak recommendation; very low certainty of evidence** *This recommendation recognizes the risks to the neonate posed by multiple risks factors, while acknowledging that the presence of one or more of these factors is not necessarily strongly predictive of EOGBSD and therefore should not limit choice. This recommendation also recognizes midwives' ability to provide relevant education to parents about neonatal sepsis.*	Language changes only; no change required to recommendation.

Original Recommendation [2010 or 2014]	Updated Recommendation [2022]	Explanation of Change(s)
d. Asymptomatic newborns of clients who have not received IAP: i. No risk factors: offer home or hospital observation. Weak recommendation; low quality evidence	**18.** For well-appearing newborns of clients who have not received IAP but have no other risk factors, midwives may offer home or hospital observation. [2022] **Weak recommendation; very low certainty of evidence** *This recommendation recognizes the evidence that the risk of EOGBSD is highest when no IAP has been given, while acknowledging that GBS status alone is associated with a low absolute risk of EOGBSD and therefore should not limit choice.*	Language changes only; no change required to recommendation.
d. Asymptomatic newborns of clients who have not received IAP: ii. PROM ≥ 18 hours or intrapartum fever ≥ 38.0°C: • Recommend hospital observation and consultation with physician for CBC and blood culture. Weak recommendation; very low quality evidence. • Midwives may discuss the use of a CBC if client chooses home observation. Weak recommendation; no evidence available.	**19.** For well-appearing newborns of clients who have not received IAP and who experienced PROM ≥ 18 hours and/or fever, midwives may offer hospital observation. [new 2022] **Weak recommendation; very low certainty of evidence** *This recommendation recognizes the evidence that receiving no IAP, in combination with PROM ≥ 18 hours, may increase risks to the neonate.*	Language changes only; no change required to recommendation. Reference to CBC has been removed due to lack of evidence in this population.
5. In the community setting, if a midwife determines an in-person assessment is needed to rule out EOGBSD, it should be carried out promptly with attention to distance and weather concerns. Strong recommendation; no evidence available. *This recommendation recognizes the importance of identifying sepsis in the newborn and values the skill of midwives to assess newborns in the community setting.*		Please see Recommendation # 12 re: in-person assessments.

Original Recommendation [2010 or 2014]	Updated Recommendation [2022]	Explanation of Change(s)
Postpartum Management Strategies: Near-term neonates		
None.	**20.** For well-appearing near-term infants, midwives should: • Discuss CPS guidance for managing well-appearing near-term neonates; • Discuss evidence related to the increased risk of EOGBSD in preterm populations; • Consult with a pediatrician or physician if assessment or treatment is required. [new 2022] **Good practice statement** *This good practice statement recognizes midwives' ability to identify emerging complications and escalate care as the clinical picture requires.*	Following GRADE methodology, the information in this section has been considered in order to develop a Good Practice Statement.