

Group B Streptococcus:

Postpartum Management of the Neonate

The observed incidence of early-onset Group B Streptococcal disease (EOGBSD) in the setting of widespread screening and prevention strategies is approximately 0.36/1000 live births in Canada. The incidence of EOGBSD in Canada and the United States (U.S.) has declined significantly since the introduction of screening for maternal colonization of GBS and implementation of intrapartum antibiotic prophylaxis (IAP). There are three approaches to identifying women to whom to offer IAP: the risk factor strategy, the universal screening strategy and the screening with risk factors strategy. The relative merits of each approach are explored in greater detail in AOM Clinical Practice Guideline No 11 – *Group B Streptococcus: Prevention and Management in Labour*. (1)

Which risk factors are most likely to be associated with EOGBSD?

Consideration of maternal risk factors that arise during the antenatal and intrapartum period is an essential component in decision-making for the management of the neonate in the early postpartum period. While maternal risk factors are helpful in identifying infants who may be at higher risk of developing EOGBSD, research suggests that intrapartum risk factors are absent in 30% to 50% of EOGBSD cases. (3-5)

- **Maternal GBS colonization:** screening positive for GBS at term (≥ 37 weeks) is the primary risk factor for EOGBSD.
- **Gestational age and birth weight.** Preterm (< 37 weeks) and/or low-birth weight (≤ 2500 g) infants are at significantly higher risk of EOGBSD than term infants.
- **Maternal intrapartum fever.** Maternal fever ($\geq 38.0^\circ\text{C}$) is a non-specific indicator of maternal and/or neonatal infection.

This summary provides easy access to some of the most essential content of AOM CPG No. 16 – *Group B Streptococcus: Postpartum Management of the Neonate* and is intended for use in conjunction with the full-length CPG. For a complete analysis of the research relevant to the midwife's management of Group B Streptococcus (GBS) in the postpartum period, along with all citations, readers are encouraged to refer to the full CPG, available at http://www.aom.on.ca/files/Health_Care_Professionals/Clinical_Practice_Guidelines/CPG_GBS_0505_FINAL.pdf. Antenatal and intrapartum considerations related to GBS are addressed in AOM Clinical Practice Guideline No 11 – *Group B Streptococcus: Prevention and Management in Labour*. (1)

Antenatal and perinatal risk factors associated with EOGBSD

Odds ratios for risk factors associated with EOGBSD from one review based on findings of studies published from the 1960s to the mid-1990s are listed below. Note: data collected prior to widespread GBS screening and use of IAP and may have limited applicability to a context in which prenatal screening is widely available.

Association with EOGBSD

Risk Factor	Estimated (pooled) OR	
GBS status known	Maternal vaginal GBS culture at delivery	204
	Maternal rectovaginal culture at 36 w	26.7
GBS status not known	Low birth weight (≤ 2500 g)	7.33
	Prelabour rupture of membranes (PROM) > 18 hours	7.28
	Chorioamnionitis	6.43
	Preterm birth (< 37 weeks)	4.83
	Intrapartum fever ($> 37.5^\circ\text{C}$)	4.05

Source: (2)



- **Chorioamnionitis.** Researchers have noted a relatively high frequency of maternal fever and chorioamnionitis in neonates who developed EOGBSD despite the administration of IAP, suggesting that chorioamnionitis may be a marker of high risk for EOGBSD.
- **Duration of rupture of membranes.** Studies show risk of EOGBSD increasing with PROM of varying length, but generally risk increases significantly across studies with PROM \geq 18 hours.
- **Specific obstetrical practices,** such as frequency of intrapartum vaginal examinations and intrauterine fetal monitoring, have been variably associated with increased risk of EOGBSD in observational studies. Because such practices may be used more frequently in the presence of other risk factors, this relationship may be confounded.

It is important to note that much of the research pertaining to risk factors for EOGBSD was conducted prior to the widespread implementation of GBS screening and use of IAP. In the current context, prenatal GBS screening is widely available, IAP is offered to women thought to be at increased risk of developing EOGBSD, and overall risk of EOGBSD is low. The provision of IAP is known to decrease the risk of maternal and neonatal colonization; it is likely that it also decreases risk of EOGBSD, even when risk factors are present.

A multivariate predictive model has been developed that predicts individualized risk of early-onset sepsis (all causes) based on objectively assessed intrapartum factors (gestational age, highest maternal intrapartum temperature, length of ROM, maternal GBS status, and type and duration of IAP). (6,7) Midwives may find this model helpful in estimating a neonate's risk of early onset sepsis, relative to an overall neonatal population, in order to facilitate informed choice discussion and decision-making for evaluation and treatment. Presence of risk factors and other clinical observations are added to the risk calculator and probability of early onset sepsis is determined. (6,7) This model has not, however, been thoroughly tested or validated.

An online risk calculator based on this model may be found at: <http://www.dor.kaiser.org/external/DORExternal/research/infectionprobabilitycalculator.aspx>

Signs of EOGBSB

- Apnea (unexplained episode of cessation of breathing for 20 seconds or longer)
- Lethargy / irritability
- Poor feeding
- Poor peripheral perfusion
- Respiratory distress
- Tachycardia
- Temperature instability (fever is very uncommon)
- Hypoglycemia (uncommon)
- Uncommon physical findings: skin lesions, petechiae, organomegaly

Maternal risk factors for EOGBSD are explored in greater detail in AOM Clinical Practice Guideline No 11 – *Group B Streptococcus: Prevention and Management in Labour*.

Are there effective strategies for preventing EOGBSD in the well-appearing newborn?

- Research has not identified any effective strategies for preventing EOGBSD during the postpartum period beyond vigilance in identifying clinical signs of sepsis.

How is EOGBSD manifested in the neonate?

- Researchers have identified numerous signs associated with neonatal sepsis. The majority of these signs are non-specific, subjectively assessed, and relatively weak predictors of EOGBSD.
- Initial asymptomatic status is a strong negative predictor of EOGBSD and is associated with a decreased risk of infection (Adj. OR 0.26; 95% CI 0.11-0.63). (8)
- Due to the non-specific nature of the signs of early onset sepsis, U.S. data suggests that an estimated 7% to 15% of all term and near-term neonates are evaluated for sepsis, due to clinical signs as well as existing risk factors. Only 3% to 8% of those evaluated will go on to have culture-proven sepsis. (9,10)
- The majority of clinical signs of EOGBSD will appear within 6 hours of birth.

Assessment and monitoring

The progression of EOGBSD is very rapid; any neonate with signs of infection should receive immediate assessment and consultation for treatment.

Timing of onset of clinical signs of EOGBSD	
At birth	<ul style="list-style-type: none"> 75% of cases*
Within 6 hrs	<ul style="list-style-type: none"> 80% of cases (median time of onset: 1.2 hours)**
Within 24 hrs	<ul style="list-style-type: none"> 90% to 95% of cases**
After 24 hrs	<ul style="list-style-type: none"> 24 to 48 hours: 4% of cases* > 48 hours: 1% of cases*

Sources: *(11) ** (12) + (13)

Assessment of the newborn for sepsis:

- In general, the value and accuracy of clinical assessment activities for EOGBSD (including vital signs or clinical signs associated with EOGBSD) are difficult to evaluate. Recommendations on monitoring signs of sepsis are based on consensus, rather than research demonstrating efficacy. (14)

Midwifery assessment for sepsis will entail:

- » Taking a history from parents, if applicable, about signs of sepsis noted including: newborn behaviour, feeding and their observations about breathing and colour.
- » Taking the newborn's vital signs, including:
 - monitoring the newborn's breathing rate as well as evaluating for signs of respiratory distress (grunting, nasal flaring, retractions of intercostal muscles or sternum, see-saw respirations);
 - heart rate and sounds;
 - temperature (hypothermia, temperature instability).
- » Evaluation of the newborn's colour (evidence of pallor, mottling, cyanosis), muscle tone, state of consciousness (stupor, irritability), quality of movements and cry, presence of reflexes, feeding behaviour/patterns (poor feeding).
- » Oxygen saturation (SpO₂), if monitoring is available.

The well-appearing neonate: considerations for additional monitoring

- Though infants who appear well within the first few hours after birth will most likely remain well, a small proportion of infants will develop illness at a later time.
- Researchers have long struggled to identify factors that increase risk of EOGBSD in the well-appearing neonate to a point that warrants pre-emptive evaluation and/or treatment.

What is adequate IAP?

- IAP is considered adequate if a client has received intravenous penicillin, ampicillin or cefazolin for ≥ 4 hours before delivery. IAP with penicillin or ampicillin appears to reach bactericidal concentrations in amniotic fluid and/or fetal serum in < 4 hours. However, researchers have not determined the extent to which EOGBSD morbidity and mortality is reduced with durations of IAP < 4 hours.
- Clindamycin, erythromycin and vancomycin are always considered "inadequate" for the purpose of neonatal management because neither efficacy nor effectiveness has been conclusively demonstrated.
- Research supports antibiotic dosing every 4 hours, regardless of the length of labour.
- Infant well-being, maternal GBS status and whether, what type and how long IAP was administered are considered when determining a postpartum care plan, as well as the presence or absence of the following intrapartum risk factors:
 - » presence of chorioamnionitis
 - » gestational age
 - » length of ROM
- See consensus recommendations below for guidance on the midwifery management of the well-appearing newborn, and how presence and absence of risk factors may be factored into informed choice discussions for decision-making regarding monitoring and assessment and/or evaluation of the newborn in the hospital or home setting.
- When discussing management options for the early postpartum care of the well-appearing newborn, midwives are advised to discuss the following with parents:
 - » U.S. Centers for Disease Control (CDC) and Canadian Paediatric Society (CPS) care pathways;
 - » hospital protocols;
 - » what is known about how the presence or absence of risk factors may affect risk of EOGBSD.

For further information:

Centers for Disease Control and Prevention (CDC): *2010 Guidelines for Prevention of Perinatal Group B Streptococcal (GBS) Disease.*

Canadian Paediatric Society: *Management of the infant at increased risk for sepsis (2007).*

The complete blood count

- While the complete blood count (CBC) is commonly used to aid in the diagnosis of EOGBSD, the positive predictive value of an abnormal CBC is low. (9) Available evidence suggests that close observation is a better predictor of EOGBS in the majority of cases.
- A CBC is especially unreliable in the prediction of culture-proven EOGBSD before 4 hours of life; if done, the CBC should be performed once 6 to 12 hours have passed since birth. CBCs are usually done in conjunction with a blood culture.
- Canadian pediatricians define an abnormal white blood cell (WBC) count in the newborn as a total WBC of $5.0 \times 10^9/L$ or lower, or $30 \times 10^9/L$ or greater, or an absolute polymorphonuclear cell count of $< 1.5 \times 10^9/L$ or an immature to mature polymorphonuclear cell ratio greater than 0.2. (11)
- Despite recommending a CBC for the well-appearing newborn with risk factors or who has not received IAP ≥ 4 hours, the CPS guideline acknowledges that the usefulness of CBC for well-appearing infants is “conjectural.” (11)

The near-term neonate

- Near-term neonates are more likely to undergo sepsis evaluations than term infants. If they develop EOGBSD, near-term neonates experience higher mortality rates than term infants.
- For neonates who are 34 to 36+6 weeks old and are well-appearing, whose GBS status is unknown and did not receive IAP, the CPS recommends a limited diagnostic evaluation (CBC and q 4 hours observation for 24 hours). The CPS does not recommend discharge prior to 48 hours. (11)
- If the neonate has received full IAP, the CPS recommends routine neonatal care. The CPS further advises that discharge plans should consider health of the neonate as well as parenting and feeding skills. (15)

Monitoring in the out-of-hospital setting

- As community-based practitioners, midwives may conduct assessments and monitor the newborn in the home, clinic or hospital. No research was found on the assessment and monitoring of the neonate specific to EOGBSD in the home setting.

- Midwives may be unique among health-care providers in the extent to which they educate and engage parents to be involved in the monitoring of their infants. There is little research available to guide midwives in preparing parents to be effectively involved in monitoring their infants for signs of sepsis.
- Midwives look to parents to play an active role in identifying potential signs of sepsis while caring for and interacting with their newborns, provided that
 - » parents are deemed to be capable of identifying signs of sepsis;
 - » parents will be able to contact the midwife and access urgent care if necessary.

Sources

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- (2) Benitz WE, Gould JB, Druzin ML. Risk factors for early-onset group B streptococcal sepsis: estimation of odds ratios by critical literature review.[see comment]. *Pediatrics* 1999 Jun;103(6):e77.
- (3) Puopolo KM, Madoff LC, Eichenwald EC. Early-onset group B streptococcal disease in the era of maternal screening. *Pediatrics* 2005 May;115(5):1240-1246.
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- (13) Verani JR, McGee L, Schrag SJ, Division of Bacterial Diseases, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention (CDC). Prevention of perinatal group B streptococcal disease--revised guidelines from CDC, 2010. *MMWR Recomm Rep* 2010 Nov 19;59(RR-10):1-36.
- (14) Short MA. Guide to a systematic physical assessment in the infant with suspected infection and/or sepsis. *Adv Neonatal Care* 2004 Jun;4(3):141-53; quiz 154-7.
- (15) Whyte R. Safe discharge of the late preterm infant. *Paediatr Child Health* 2010 Dec;15(10):655-666.

Recommendations

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 maternal colonization is an important risk factor for EOGBSD, sepsis may also occur in infants born to women 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.

2. For newborns with signs of sepsis noted upon in-person exam: an immediate consult with a paediatrician (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.

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.

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.

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.

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.

- ii. PROM ≥ 18 hours or intrapartum fever $\geq 38.0^{\circ}\text{C}$: 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.

d. Asymptomatic newborns of clients who have not received IAP:

- i. No risk factors: offer home or hospital observation.

Weak recommendation; low quality evidence.

- ii. PROM ≥ 18 hours or intrapartum fever $\geq 38.0^{\circ}\text{C}$:

- 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.

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.