PEDIATRIC NEWBORN MEDICINE CLINICAL PRACTICE GUIDELINES

Guideline for Management of Asymptomatic Infants Born at ≥ 35 weeks Gestation at Risk of Early-Onset Sepsis: Using the Sepsis Risk Calculator
I. **Purpose:** To provide an updated guideline for the evaluation and treatment of asymptomatic newborns $\geq 35$ weeks gestation using the Neonatal Sepsis Risk Calculator.

II. All CPGs will relay on the [NICU Nursing Standards of Care](https://hospitalpolicies.ellucid.com/documents/view/3168/active/). All relevant nursing PPGs are listed below.

- CLB I.2 Care of the Newborn Infant in the Center for Labor and Birth

- NICU/SCN B.1 Arterial and Venous Blood Drawing

- NICU/SCN I.2 Intravenous Angiocatheter Placement

- WNH I.2 Care of the Term Infant

- WNH I.6 Care of the Late Preterm Infant and Infant less than 2500 grams

- WNH M.1 Administration of medications to Infants
III. Scope

a. Indication: These guidelines apply to all asymptomatic infants born at a gestational age ≥ 35 weeks at Brigham & Women’s Hospital

b. Contraindications to using the calculator
   i. GA < 35 weeks
   ii. Symptomatic or ill-appearing infants
      1. Respiratory:
         a. Respiratory rate persistently <30 or >70.
         b. Oxygen saturation <95% in room air.
         c. Dusky spell(s).
         d. Apnea/bradycardia.
         e. Respiratory distress (grunting, flaring, retractions).
      2. Neurologic:
         a. Seizures or seizure like activity.
         b. Lethargy/hypotonia/floppiness.
         c. New/unexplained focal weakness.
      3. Cardiovascular:
         a. Heart rate (HR) persistently <75 or >210.
      4. Other:
         a. Diffuse petechiae/vesicular eruptions.
         b. Unexplained pain, e.g., irritable persistent cry.

IV. Guidelines: Kaiser Newborn Sepsis Risk Calculator Overview

a. An online tool which utilizes a multivariate risk prediction model to calculate the probability of early onset sepsis (EOS) in well-appearing newborns ≥ 35 weeks gestation.  
   https://neonatalsepsiscalculator.kaiserpermanente.org/

b. Definition of well-appearing, equivocal vs. ill-appearing on Kaiser Calculator
c. **ALL** infants born at Brigham & Women’s Hospital with a **gestational age >/= 35 0/7 weeks** will have the Neonatal Early-Onset Sepsis Calculator performed by Labor and Delivery RN.

d. Infants with the following criteria are at higher risk of having an elevated EOS score.
   
i. Any infant with a gestational age between 35 0/7 – 36 6/7 weeks must have sepsis risk score performed regardless of presence or absence of any other risk criteria as listed in ii – vii.
   
   ii. PROM >/= 18 hours
   
   iii. Significant maternal fever (>/= 100.4) or intrauterine infection as determined by Obstetrical Providers
   
   iv. Maternal GBS positive status and inadequate intrapartum antibiotics
      1. **ADEQUATE GBS PROPHYLAXIS**: Penicillin G, ampicillin, or cefazolin given >/= 4 hours prior to delivery
      2. **INADEQUATE GBS PROPHYLAXIS**: any antibiotic given < 4 hours prior to delivery **OR** any other antibiotic for any duration (e.g., vancomycin, clindamycin) regardless of sensitivities
v. GBS unknown

vi. Maternal fever within one hour of delivery

vii. ADDITIONAL NOTES:

1. Maternal fever that occurs within one hour of delivery should be treated like intrapartum fever and the infant should be evaluated via the sepsis risk calculator.
2. Women with a previous infant with GBS disease should receive intrapartum GBS prophylaxis.
3. Blood cultures should be obtained per unit protocol.
4. To facilitate family bonding and initiation of breastfeeding, the sepsis evaluation (if indicated by the calculator) can be delayed for up to one hour after birth, at the discretion of the obstetrical and neonatal caregivers.

e. Personnel: Sepsis Calculator screening will primarily be performed by L&D nursing staff; however, NICU staff and/or WBN staff may also run calculator if needed.

f. Baseline Incidence of EOS:

   i. BWH-specific for January 2018 – November 2018: 1 positive blood culture in 6533 live births for a rate of 0.153 per 1000 live births

   ii. CDC reports a national incidence of 0.5 per 1000 live births

   iii. Conservative approach → Use CDC estimate (0.5 per 1000 live births)

II. How to Use the Neonatal Sepsis Risk Calculator (SEE PAGES 15 - 25: EPIC TIP SHEET)

a. NURSING: Calculator
   i. Access EOS (Early Onset Sepsis) Calculator from the Newborn or NICU Assessment Flowsheets
ii. Within the EOS Calculator group, there is an **EOS Assessment** row
   1. 2 options: Linked mom/Pull data or Manual override
   2. Use **Linked Mom/Pull Data** (only in rare situations will manual override be indicated)

iii. Within the EOS Screening, the Gestational age (in weeks), highest maternal antepartum temperature (in Centigrade), Rupture of Membranes (in hours, always rounded UP – e.g., if ROM occurred for 6 hours, 3 minutes → EMR rounds to 7 hours), and type of Intrapartum Antibiotics **automatically** files into chart. Of note, for incidence of EOS, the CDC risk of 0.5/1000 live births is the automatic default.
iv. Maternal GBS status must be **MANUALLY** entered (positive, negative, unknown).
v. Once all rows have documentation/been completed, the EOS score will populate within the EOS Calculated Risk section.
vi. If the baseline “EOS risk @ birth” is < 0.7 and infant is well-appearing, then the following is to occur.
   1. Infant to receive q4 hr vital signs for a minimum of the first 24 hrs of life.
   2. Nursing assessments per protocol
   3. Physician assessments per protocol

vii. If the baseline “EOS risk @ birth” is >/= 0.7, notify DR1.

viii. The newborn must have an exam performed by 1 hour of age. This exam may occur in the delivery room, so as to not separate the mother/newborn dyad.

ix. DR1 in conjunction with an attending, fellow, or APP team member will examine infant to determine the further classification of infant’s clinical presentation: well- appearing, equivocal, or clinical illness
x. If it is determined that the infant with “EOS risk at birth” \( \geq 0.7 \) is well-appearing, then:
   1. Follow clinical suggestions of calculator
   2. Vitals per NB policy should be followed (q4 hrs x 24 hrs as a minimum)
   3. Nursing assessments per protocol
   4. Physician assessments per protocol

xi. If it is determined that the infant with EOS risk at birth \( \geq 0.7 \) is equivocal-appearing, infant will be brought to NICU triage for monitoring and assessment or admitted to NICU as deemed clinically indicated. Automatic sepsis evaluation is not immediately mandated. Observation and assessment over time is needed to determine if findings on clinical exam are secondary to issues unrelated to sepsis (e.g., TTN)

xii. If it is determined that infant with EOS risk at birth \( \geq 0.7 \) is clinically ill-appearing, immediate admission to the NICU is indicated. Antibiotics should be strongly considered in this case.

xiii. In the scenario of a maternal fever within one hour of delivery with a well-appearing infant, LDR will re-calculate score on EOS calculator.

b. **PROVIDER:** Calculator
   i. Open Admission Navigator → click on EOS (Early Onset Sepsis) calculator section.
   ii. There is an EOS Assessment row
      1. 2 options: Linked mom/Pull data or Manual override
      2. Use Linked Mom/Pull Data (only in rare situations will manual override be indicated)
   iii. Within the EOS Screening, the Gestational age (in weeks), highest maternal antepartum temperature (in Centigrade), Rupture of Membranes (in hours, always rounded UP – e.g., if ROM occurred for 6 hours, 3
minutes → EMR rounds to 7 hours), and type of Intrapartum Antibiotics automatically files into chart. Of note, for incidence of EOS, the CDC risk of 0.5/1000 live births is the automatic default.

iv. Maternal GBS status must be MANUALLY entered (positive, negative, unknown).

v. Once all rows have documentation/been completed, open the Sidebar and search for Early Onset Sepsis Sidebar.

vi. This report shows an EOS chart that pulls in data for clinical review.

vii. In Exam Findings, enter well-appearing. Then close the Navigator section. (If patient is equivocal or ill-appearing, infant should be brought to NICU triage for further monitoring and evaluation).

viii. The EOS risk score will be calculated and displayed.

ix. If the baseline “EOS risk @ birth” is < 0.7 and infant is well-appearing, then the following is to occur.

1. Infant to receive q4 hr vital signs for a minimum of the first 24 hrs of life.
2. Nursing assessments per protocol
3. Physician assessments per protocol

x. If the baseline “EOS risk @ birth” is >/= 0.7, newborn exam must be performed and documented.

xi. Initial exam may be performed in the delivery room.

xii. DR1 in conjunction with an attending, fellow, or APP team member will examine infant to determine the further classification of infant’s clinical presentation: well-appearing, equivocal, or clinical illness.

xiii. If it is determined that the infant with “EOS risk at birth” >/= 0.7 is well-appearing, then:

1. Follow clinical suggestions of calculator
2. Vitals per NB policy should be followed (q4 hrs x 24 hrs as a minimum)
3. Nursing assessments per protocol
4. Physician assessments per protocol

xiv. If it is determined the infant with EOS risk at birth >/= 0.7 is equivocal-appearing, infant will be brought to NICU triage for monitoring and assessment or admitted to NICU as clinically indicated.
Automatic sepsis evaluation is not immediately mandated. Observation and assessment over time is needed to determine if findings on clinical exam are secondary to issues unrelated to sepsis (e.g., TTN)

xv. If it is determined that infant with EOS risk at birth $\geq 0.7$ is clinically ill-appearing, immediate admission to the NICU is indicated. Antibiotics should be strongly considered in this case.

III. Documentation
   a. The EOS score is automatically populated into the flowsheet.
   b. If score $\geq 0.7$, L&D nursing should document DR1 was notified.
   c. If score $\geq 0.7$ and infant is well-appearing, initial NB exam needs to be documented in EMR by MD/NNP/PA via a progress note.
   d. If score is $\geq 0.7$ and newborn’s clinical status is equivocal or ill-appearing, standard Triage or NICU documentation is indicated.

IV. Antibiotic Usage: If it is determined a newborn will receive antibiotics STAT, ampicillin and gentamicin will be ordered by NICU LIP. Please refer to NICU DAG for administration guidelines.
   a. Ampicillin:
      http://www.bwhpikenotes.org/Departments_Centers/NewbornMedicine_NICU/documents/Ampicillin.pdf
   b. Gentamicin:

V. Communication: DR1 will communicate all evaluations for infants with EOS $\geq 0.7$

VI. Reasoning for Utilization of the Neonatal Sepsis Risk Calculator: Reduction in Antibiotics Usage in Well- Appearing Newborns $\geq 35$ weeks gestation.
   a. Past BWH data $\rightarrow$ 2008/2009 BWH treated 8% of well-appearing infants $\geq 34$ weeks gestation with antibiotics, while the incidence of EOS in those cases was 0.4/1000 live births.
b. BWH January 2018 – November 2018, 8.3% of well-appearing babies ≥ 35 weeks gestation were treated with antibiotics. The incidence of EOS in these cases was 0.153/1000 live births.

c. Early antibiotic exposure in neonates (even 48 hours) has been associated with:
   i. Increased asthma
   ii. Allergic/autoimmune disease (IBD, arthritis, and multiple sclerosis)
   iii. Obesity
   iv. Neurodevelopmental sequelae (in mice models, longer antibiotic exposure increased aggression behaviors as well as impaired anxiety and social behaviors)
References

- Puopolo KM, Benitez WE, Zaoutis TE, AAP COMMITTEE ON FETUS AND NEWBORN, AAP COMMITTEE ON INFECTIOUS DISEASES. Management of Neonates Born at >/= 35 0/7 weeks’ Gestation With Suspected or Proven Early-Onset Bacterial Sepsis. Pediatrics 2018;142(6):e20182894.
- Turta O, Rautava S. Antibiotics, obesity and the link to microbes – what are we doing to our children? BMC Medicine 2016;14:57-62.
Neonatal Early-Onset Sepsis (EOS)

EOS Assessment and Screening

The nurse can complete EOS documentation from the Newborn and NICU Assessment Flowsheets.

EOS Assessment

Within the EOS (Early Onset Sepsis) Calculator group, there is an EOS Assessment row.

1. Document either Linked mom/Pull data or Manual override.

   **NOTE:** You will likely always use Linked Mom/Pull data and only in rare situations use Manual override if mom is not admitted.

2. After documenting Linked mom/Pull data, the EOS Screening and EOS Override Screening groups cascade into the flowsheet.

EOS Screening

1. Within the EOS Screening group, Gestational Age (Weeks), Highest Maternal Antepartum Temp, Rupture of Membranes (Hours), and Type of Intrapartum Antibiotics automatically file from the patient’s chart.
2. Within the Details Pane, the Row Information shows an EOS Grid that pulls in info for the clinician to review:

- The GA is pulled from the Working EDD within the mother’s Dating section.
- The Highest Maternal Antepartum Temp will pull the highest temperature up to 1-hour post birth. It will file in Celsius.
- Rupture of Membranes will round up to the nearest hour (Ex. Screenshot above: Actual ROM from details pane shows 1 hour 43 mins but flow sheet row rounds to 2).
- Antibiotics are pulled from mom’s MAR and looks at type, time given and birth time.
3. The only field that does not populate is the Maternal Group B Strep Status. Manually document the Maternal Group B Strep Status.

**NOTE:** The GBS section of the EOS Grid shows the last lab result, Group B Strep result, date, and time:

![EOS Grid Image]

4. Once all rows have documentation, the scores are populated within the EOS Calculated Risk group:

![EOS Calculated Risk Image]

**NOTE:** These scores do **Not** file to the Grease Board view column. The Grease Board view is populated based on the Actual Risk and EOS Exam Findings.

**EOS Override Screening**

1. If you need to override a value after all rows are documented, document the value in the EOS Override Screening group:

![EOS Override Screening Image]
2. The EOS Calculated Risk will then update based on the override screening.

**NOTE:** You will need to document all values, including override, within a singular time column on the flowsheet for the Calculated Risk scores to populate.

### EOS Exam Findings and Actual Risk

**WARNING:** If the nurse documents EOS exam findings at your hospital, skip this section and Go to page 8: “Per Policy...Exam Findings (Nurse).”

1. The Provider can open the Admission navigator > EOS (Early Onset Sepsis) Calculator section to document exam findings and view calculated Actual Risk.
NOTE: All rows need to have documentation in order to calculate Actual Risk.

2. Click to open the Section. Verify Last Filed is selected to view nurse’s previous documentation.

3. Click Linked mom/Pull data (or rarely, Manual override if necessary).

   a. Hint: can use nurse’s previous documentation.

5. Enter any Override values, if necessary.
6. Open the Sidebar and Search for the Early Onset Sepsis Sidebar:

![Early Onset Sepsis Sidebar](image)

7. This report shows an EOS Grid that pulls in patient info for the clinician to review:

![EOS Grid](image)

Exam Findings and Actual Risk

1. In the Exam Findings section, enter Well Appearing, Equivocal or Clinical Illness:

![Exam Findings](image)
2. Close the navigator section. The Actual Risk based on Exam is calculated.

You Can Also...

Use the Flowsheets link within the Report view to document on the EOS flowsheet.

1. With the navigator section closed, click the Flowsheets link:

2. This opens the EOS (Early Onset Sepsis) Calculator Flowsheet.

3. Here you can document Linked Mom/Pull Data, enter Maternal Group B Strep Status, and EOS Exam Findings. Click File to view calculations.
4. Use the back arrow under the Patient Header to go back to the Admission Navigator, if necessary:

Per Policy...Exam Findings (Nurse)

If it is site policy that a nurse document exam findings, the nurse can use the EOS Exam Findings group within the Flowsheets.

NOTE: The Details Pane-Row Information will show descriptions for the terms, Clinical Illness, Equivocal, and Well appearing.
L&D Grease Board
This Exam based Finding and Risk score populate the Exam Finding/Risk Score column of the Grease Board views:

Smartlink
1. Use .eos within any note to pull in the Neonatal Sepsis Onset Findings: Exam findings and Exam calculated risk:

![Image of Smartlink](image1)

Early Onset Sepsis Report and Clinical Recommendations
The Early Onset Sepsis Sidebar (IP NEWBORN SEPSIS SIDEBAR) report will show Calculated Risks and Recommendations in red, orange, and white.

1. Search for the Early Onset Sepsis Sidebar using the selection tool of the sidebar
   
   HINT: Search using the word “sepsis” to make it easier to find.
2. The Early Onset Sepsis Sidebar shows calculated risks and color-coded recommendations:

3. Nurses can also view this information from within the Details Report Pane within the Flowsheet group.
Newborn Summary and Newborn Patient Story

1. The EOS Screening results can also be found within the Newborn Summary and Newborn/NICU Patient Story reports: