

# Antibiotics for Early Onset Sepsis in Newborn Infants

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## Introduction

Excessive, uncontrolled use of antibiotic not only disrupt the neonatal microbiome but also lead to the development of antibiotic resistance [1]. Strict stewardship is therefore should be followed when caring for newborn with suspected early onset sepsis. In addition to the clinical assessment and laboratory analysis, we found the early onset sepsis (EOS) calculator, an online tool, extremely helpful [2]. Here we present the outline of three neonatal cases that highlights on the clinical utility of the EOS calculator.

**Case 1:** A newborn is born at 39 1/7 weeks, maternal temperature was 96.3 °F, rupture of membrane at delivery, negative mater-

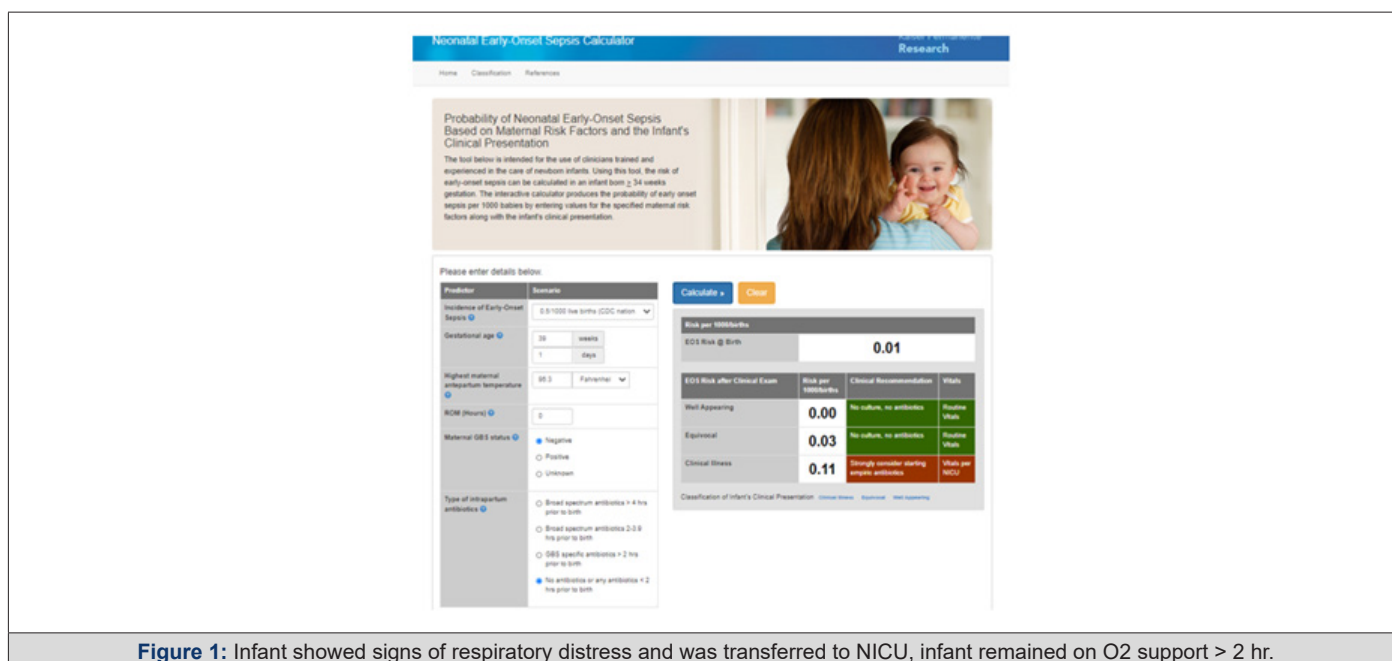
nal group B streptococcus (GBS) screen, and no use of intrapartum antibiotics.

Early onset sepsis calculator has 2 components:

a) Risk with recommendation

b) Classification on clinical presentation

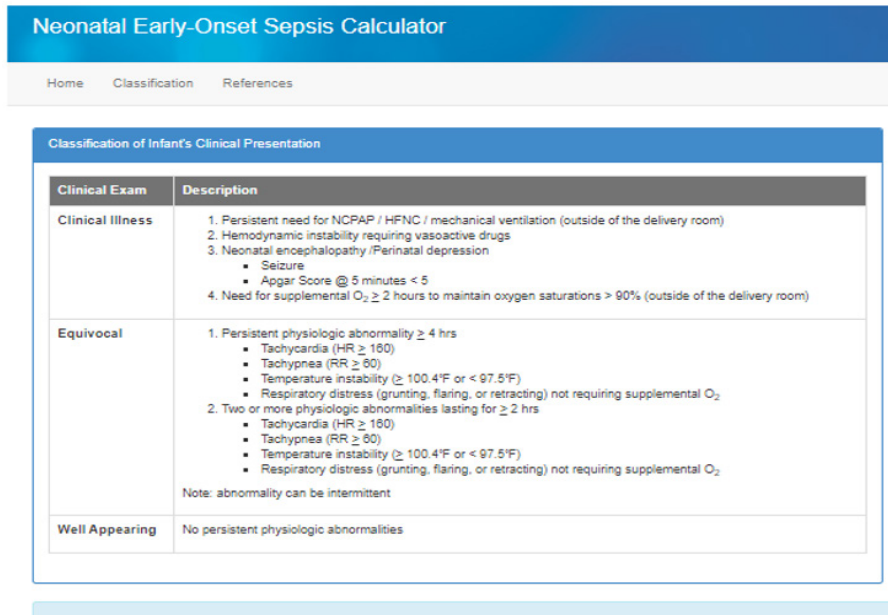
1) EOS calculation on the case, part A (putting the information in the appropriate section): Initial assessment/calculation at birth shows the risk to be 0.00, 'no culture, no antibiotics', see below Figure 1.



2) EOS calculation on the case, part B (Physical Examination): Infant showed signs of respiratory distress and was transferred to NICU, infant remained on O2 support > 2 hr. Antibiotics were started (at~20 hours of life) after looking at the complete

blood count (CBC) that showed band count of 16, with IT ratio 0.23.

In this case, antibiotics should have been started earlier by following the EOS calculation (Figure 2).



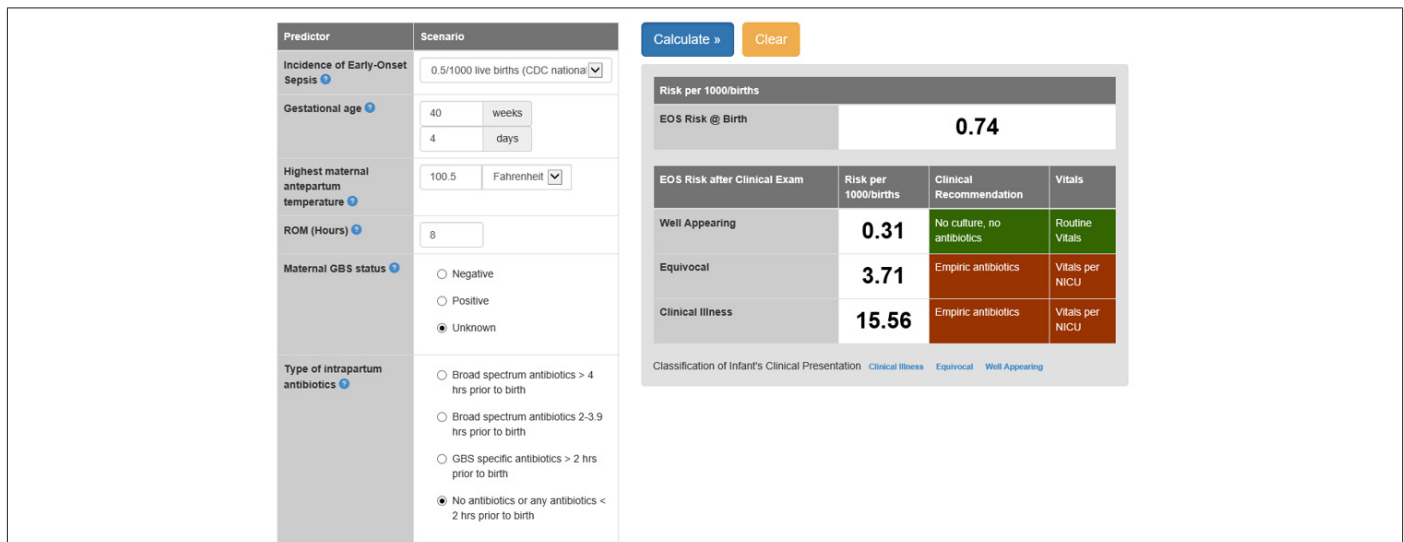
**Figure 2:** Antibiotics were started (at ~20 hours of life) after looking at the complete blood count (CBC) that showed band count of 16, with IT ratio 0.23. In this case, antibiotics should have been started earlier by following the EOS calculation.

**Case 2**

Infant was born at 40 4/7 weeks, maternal temperature was 100.5 °F, rupture of membrane was 8 hours, negative maternal group B streptococcus (GBS) screen, intrapartum antibiotics were given < 2 hours. Initial assessment/calculation by EOS calculator at birth shows the risk to be 0.31, 'no culture, no antibiotics. Complete

blood count (CBC) obtained twice were normal, C-Reactive Protein was < 0.27. Infant was weaned off oxygen in < 2 hours. No antibiotics were started. Infant was transferred back to the nursery.

In this case, antibiotics were rightly avoided by following the EOS calculation (Figure 3).



**Figure 3:** Complete blood count (CBC) obtained twice were normal, C-Reactive Protein was < 0.27. Infant was weaned off oxygen in < 2 hours. No antibiotics were started. Infant was transferred back to the nursery. In this case, antibiotics were rightly avoided by following the EOS calculation.

**Case 3:**

34 6/7 weeks, maternal temperature was 97.6 °F, rupture of membrane was one-hour, negative maternal group B streptococcus (GBS) screen, no use of intrapartum antibiotics. Initial assessment/calculation at birth shows the risk to be 0.08, 'no culture, no antibi-

otics.' Infant was admitted to NICU for prematurity (34-week gestation), complete blood count was normal. Antibiotics were started by the on-call team (which was later discontinued).

In this case, antibiotics could have been avoided by following the EOS calculation (Figure 4).

Predictor	Scenario
Incidence of Early-Onset Sepsis	0.5/1000 live births (CDC national)
Gestational age	34 weeks 6 days
Highest maternal antepartum temperature	97.6 Fahrenheit
ROM (Hours)	1
Maternal GBS status	<input type="radio"/> Negative <input type="radio"/> Positive <input checked="" type="radio"/> Unknown
Type of intrapartum antibiotics	<input type="radio"/> Broad spectrum antibiotics > 4 hrs prior to birth <input type="radio"/> Broad spectrum antibiotics 2-3.9 hrs prior to birth <input type="radio"/> GBS specific antibiotics > 2 hrs prior to birth <input checked="" type="radio"/> No antibiotics or any antibiotics < 2 hrs prior to birth

Calculate » Clear

Risk per 1000/births			
EOS Risk @ Birth		<b>0.20</b>	
EOS Risk after Clinical Exam	Risk per 1000/births	Clinical Recommendation	Vitals
Well Appearing	<b>0.08</b>	No culture, no antibiotics	Routine Vitals
Equivocal	<b>0.99</b>	No culture, no antibiotics	Routine Vitals
Clinical Illness	<b>4.17</b>	Empiric antibiotics	Vitals per NICU

Classification of Infant's Clinical Presentation [Clinical Illness](#) [Equivocal](#) [Well Appearing](#)

**Figure 4:** In this case, antibiotics could have been avoided by following the EOS calculation

**Note:** For screenshot sharing of EOS calculator, a phone permission is obtained from Kaiser Permanente, Division of Research, 2000 Broadway, Oakland, CA 94612, Telephone 510-891-3400.

## Conclusion

If a newborn is showing signs of respiratory distress that require supplemental oxygen for greater than 2 hours, the staff should obtain a blood culture and start broad spectrum antibiotics.

For suspected infection (maternal fever >100.4 °F (38°C), suspected chorioamnionitis, group B streptococcus positive/unknown, prolong rupture of membrane), the staff should use the EOS calculator.

Information needed for EOS calculation:

1. Gestational age (week/day)
2. Maternal fever (°F or °C)
3. Rupture of membrane (hours)
4. GBS status (positive, negative, unknown) [3]
5. Intrapartum use of antibiotics (> 4 hours, 2-3.9 hours, > 2 hours, no or < 2 hours)

### Look at both the components of EOS:

- a) Risk with recommendation
- b) Classification on clinical presentation

If no antibiotics were started at birth, reassess/exam at 2-4 hour and follow complete blood count (CBC) and C-reactive protein (CRP) results, if clinical status worsens (see EOS chart) or CBC/CRP results suggestive of infection, consider antibiotics.

### A word about maternal fever alone versus chorioamnionitis: [4]

Chorioamnionitis is defined clinically as a combination of maternal fever >100.4, maternal leukocytosis >15,000, foul smelling amniotic fluid, uterine tenderness. Fever alone, especially noted after epidural or post-partum, should not be used as a sole criterion to start antibiotics in neonates.

### Reference

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