Assessing a Newborn’s Risk of Sepsis: Does Chorioamnionitis Matter?

Seattle Children’s Nursing Grounds
October 6, 2016

J. Craig Jackson, MD, MHA
UW Professor of Pediatrics
Neonatologist at Seattle Children’s and CHI-Franciscan Health
• I do not have any conflict of interest or will be discussing any off-label product use.

• This class has no commercial support or sponsorship, nor is it co-sponsored.
Objectives

- State two key concerns with CDC and AAP guidelines on prevention of neonatal sepsis from GBS.
- List evidence that not all healthy-appearing newborns delivered to mothers with suspected chorioamnionitis need 2 days of antibiotics.
- Demonstrate use of the Kaiser neonatal sepsis risk calculator.
- Describe the importance of communication between OB and pediatric providers when chorioamnionitis is suspected.
Intrapartum prophylaxis to prevent perinatal GBS with universal screening at 35-37 weeks gestation

Intrapartum prophylaxis indicated

- Previous infant with invasive GBS disease
- GBS bacterurina during pregnancy
- Positive GBS screening culture in late gestation (except in planned C-section without labor or ROM)
- Unknown GBS status at onset of labor AND any of the following
  - Delivery at < 37 weeks gestation
  - ROM > 18 hours before delivery
  - Intrapartum temperature ≥ 100.4°F (≥ 38°C)
  - Intrapartum nucleic acid amplification test + for GBS

Dramatic decline in incidence of early onset neonatal GBS infection
Current Incidence and Mortality

- Incidence of early-onset GBS disease: 0.3 per 1000 live births
  - 90% of newborns have respiratory distress, apnea, or other signs of sepsis within first 24 hours after birth

- Modern case-fatality rates:
  - 20% if premature
  - 2-3% if term

- Predicted incidence at hospital with 3000 annual deliveries
  - 1 term newborn with early-onset GBS sepsis per year
  - 1 death of term newborn from GBS every 40 years
Chorioamnionitis

- 10-30% of pregnant women are colonized with GBS in vagina or rectum
  - May be transient, intermittent, or persistent
  - If present at delivery and in the absence of any intervention, 1-2% of their infants will develop early-onset GBS infection
  - Antepartum prophylaxis is 87% effective
- Chorioamnionitis is diagnosed in about 3% of all births (~120,000 per year in US)
  - ~90 per year in hospital with 3000 births
2010 CDC GBS Guideline

* Full diagnostic evaluation includes a blood culture, a complete blood count (CBC) including white blood cell differential and platelet counts, chest radiograph (if respiratory abnormalities are present), and lumbar puncture (if patient is stable enough to tolerate procedure and sepsis is suspected).
† Antibiotic therapy should be directed toward the most common causes of neonatal sepsis, including intravenous ampicillin for GBS and coverage for other organisms (including Escherichia coli and other gram-negative pathogens) and should take into account local antibiotic resistance patterns.
§ Consultation with obstetric providers is important to determine the level of clinical suspicion for chorioamnionitis. Chorioamnionitis is diagnosed clinically and some of the signs are nonspecific.
¶ Limited evaluation includes blood culture (at birth) and CBC with differential and platelets (at birth and/or at 6–12 hours of life).
** See table 3 for indications for intrapartum GBS prophylaxis.
†† If signs of sepsis develop, a full diagnostic evaluation should be conducted and antibiotic therapy initiated.
§§ If ≥37 weeks’ gestation, observation may occur at home after 24 hours if other discharge criteria have been met, access to medical care is readily available, and a person who is able to comply fully with instructions for home observation will be present. If any of these conditions is not met, the infant should be observed in the hospital for at least 48 hours and until discharge criteria are achieved.
¶¶ Some experts recommend a CBC with differential and platelets at age 6–12 hours.
• Well-appearing newborns whose mothers had suspected chorioamnionitis should undergo a limited evaluation and receive antibiotic therapy pending culture results (AII). The evaluation should include a blood culture and a CBC including white blood cell differential and platelet count; no chest radiograph or lumbar puncture is needed. Consultation with obstetric providers to assess whether chorioamnionitis was suspected is important to determine neonatal management (CIII).

2010 CDC GBS Guideline

A-II: Strong evidence for efficacy and substantial clinical benefit. Evidence from at least one well-designed clinical trial without randomization, cohort or case-controlled analytic studies, …

C-III: Insufficient evidence for efficacy, or efficacy does not outweigh possible adverse consequences. Evidence from opinions of respected authorities based on … descriptive studies or reports of expert committees.
FIGURE 2
Evaluation of asymptomatic infants ≥37 weeks’ gestation with risk factors for sepsis. The diagnosis of chorioamnionitis is problematic and has important implications for the management of the newborn infant. Therefore, pediatric providers are encouraged to speak with their obstetrical colleagues whenever the diagnosis is made. Lumbar puncture is indicated in any infant with a positive blood culture or in whom sepsis is highly suspected on the basis of clinical signs, response to treatment, and laboratory results. WBC, white blood cell; Diff, differential white blood cell count.
Definition of chorioamnionitis?

Clinical signs and symptoms of chorioamnionitis include:

- Fever: $T > 101^\circ F$ (38.3 $^\circ C$) at any time or intrapartum $T > 100.4^\circ F$ ($>37.8^\circ C$) twice, more than 1 hour apart
- Maternal tachycardia ($>100-120$ beats per minute [bpm])
- Fetal tachycardia ($>160-180$ bpm)
- Purulent or foul-smelling amniotic fluid/vaginal discharge
- Uterine fundal tenderness
- Maternal leukocytosis (total $>15,000-18,000$ cells/$\mu$L)

- Fever + 2 or more above criteria is the most common definition in published studies

- In practice, often based on fever alone! (Malloy, 2014)
- OBs are often reluctant to make, or rule out, a diagnosis that they know will influence neonatal care (Puopolo, 2012)
Epidemiology of chorioamnionitis

- Occurs in 1-4% of livebirths
  - Preterm: 40-70% (histologic + clinical)
  - Term: 1-13% (histologic + clinical)

- Risk factors:
  - Long ROM (>18 hours) and prolonged labor
  - Nulliparity
  - Internal monitors during labor
  - Multiple vaginal exams with ROM(≥3)
  - Culture positive – GBS, bacterial vaginosis, ureaplasma
  - Alcohol and tobacco use
  - Epidural anesthesia

Tita, 2010
Mechanisms of chorioamnionitis

- Passage of infectious organisms to chorioamnion or umbilical cord
  - Primarily ascending infection from cervix & vagina (GBS, E. Coli, Ureaplasma, Mycoplasma, etc.)
  - Hematogenous – transplacental (Listeria)
  - Iatrogenic – with amniocentesis
- Infection stimulates maternal and fetal inflammatory response
- Inflammatory response produces clinical & histologic chorioamnionitis
- Inflammation also leads to fetal cerebral white matter injury

Tita, 2010
Neonatal Sepsis Work-Up in Infants > 2000 g: A Population Based Study

- Retrospective review of 18,300 neonates born 10/95-11/96 and followed for 1 wk after discharge
- 2785 infants (15%) evaluated for sepsis
  - 62 (2.2%) proven, possible, or suspected sepsis
    - 22 (0.8%) positive cultures
      - 12 asymptomatic or very transient signs
      - 2 discharged before confirmation and were brought back in for antibiotic treatment
  - 40 (1.4%) clinical evidence of bacterial infection

Escobar, 2000
Definitions used in Escobar study

- **Chorioamnionitis** = documented by OB provider +
  - Highest temperature > 101.9°F (38.8°C)
  - Evidence of uterine infection – uterine tenderness/foul smelling amniotic fluid
- **Probable chorioamnionitis** = documented by OB provider +
  - Highest temperature > 100.4°F (38.0°C)
  - Evidence of uterine infection (as above)
- **Possible chorioamnionitis** = documented by OB provider

Culture proven neonatal infection = positive blood culture
- **Probable infection** = negative culture, strong suggestion of sepsis from clinical signs
- **Possible sepsis** = negative culture, equivocal findings, infection not excluded as main diagnosis

Escobar, 2000
Relationship Between Infection Rates and Maternal Characteristics

Infection increased more than 2x in untreated mothers
Estimating the probability of neonatal early-onset infection on the basis of maternal risk factors

- Case-control study of 608,014 infants born ≥34 weeks’ gestation
  - 14 hospitals in CA (Kaiser) and MA, 1993-2007
  - 350 cases of early-onset GBS infection
- Multivariate analysis to define model based only on information available in immediate perinatal period, e.g., maternal fever, ROM and gestational age
  - Avoid using simple cutoff variables, e.g., there is 4x greater risk of infection with maternal temp of 102.4 than 101

Puopolo, 2011
Most important predictors of early-onset neonatal sepsis

1. Highest antepartum temperature: 58%
2. Gestational age: 17%
3. Duration of ruptured membranes: 13%
4. Duration of intrapartum antibiotics: 10%
5. Maternal GBS status: 2%

Puopolo, 2011
Search web for: “Neonatal Sepsis Calculator”
<table>
<thead>
<tr>
<th>Predictor</th>
<th>Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence of Early-Onset Sepsis</td>
<td>0.3/1000 live births (KPNC incidence)</td>
</tr>
<tr>
<td>Gestational age</td>
<td>40 weeks 0 days</td>
</tr>
<tr>
<td>Highest maternal antepartum temp.</td>
<td>101.6 Fahrenheit</td>
</tr>
<tr>
<td>ROM (hours)</td>
<td>20</td>
</tr>
<tr>
<td>Maternal GBS status</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
</tr>
<tr>
<td>Type of intrapartum antibiotics</td>
<td>Broad spectrum antibiotics &gt; 4 hrs prior to birth</td>
</tr>
<tr>
<td></td>
<td>Broad spectrum antibiotics 2-3.9 hrs prior to birth</td>
</tr>
<tr>
<td></td>
<td>GBS specific antibiotics &gt; 2 hrs prior to birth</td>
</tr>
<tr>
<td></td>
<td>No antibiotics or any antibiotics &lt; 2 hrs prior to birth</td>
</tr>
</tbody>
</table>

**Risk per 1000/births**

| EOS Risk @ Birth | 0.81 |

<table>
<thead>
<tr>
<th>EOS Risk after Clinical Exam</th>
<th>Risk per 1000/births</th>
<th>Clinical Recommendation</th>
<th>Vitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Appearing</td>
<td>0.33</td>
<td>No culture, no antibiotics</td>
<td>Routine Vitals</td>
</tr>
<tr>
<td>Equivocal</td>
<td>4.05</td>
<td>Empiric antibiotics</td>
<td>Vitals per NICU</td>
</tr>
<tr>
<td>Clinical Illness</td>
<td>16.94</td>
<td>Empiric antibiotics</td>
<td>Vitals per NICU</td>
</tr>
<tr>
<td>Clinical Presentation</td>
<td>Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical illness</td>
<td>In the first 12 h of age, the infant had a 5-min Apgar &lt; 5; received nasal continuous positive airway pressure or mechanical ventilation; received continuous infusion of vasoactive drugs; had a clinical seizure; or had significant respiratory distress (nasal flaring, grunting, or retractions were present and the infant received supplemental oxygen within the first 6 h)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equivocal presentation</td>
<td>In the first 12 h of age, the infant experienced at least 2 instances of 1 of the following, with “instance” meaning that there were ≥2 measurements ≥2 h apart:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heart rate ≥ 160</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Respiratory rate ≥ 60</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Temperature ≥ 100.4°F or &lt; 97.5°F</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Respiratory distress (grunting, flaring, or retracting)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well appearing</td>
<td>The infant did not fall into one of the above 2 groups in the first 12 h of age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLINICAL PRESENTATION</td>
<td>Sepsis risk at birth estimated from maternal risk factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 0.65/1000 live births</td>
<td>0.65-1.54/1000 live births</td>
<td>≥ 1.54/1000 live births</td>
<td></td>
</tr>
<tr>
<td>Well appearing</td>
<td>CONTINUED OBSERVATION</td>
<td>OBSERVE AND EVALUATE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>85% of live births</td>
<td>11% of live births</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NNT=9,370</td>
<td>NNT=823</td>
<td></td>
</tr>
<tr>
<td>Equivocal presentation</td>
<td>OBSERVE AND EVALUATE</td>
<td>TREAT EMPIRICALLY</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11% of live births</td>
<td>4% of live births</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NNT=823</td>
<td>NNT=118</td>
<td></td>
</tr>
<tr>
<td>Clinical illness</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Reappraisal of Guidelines for Management of Neonates with Suspected Early-Onset Sepsis

- Senior author reappraisal article (Polin) was lead author of 2012 AAP neonatal sepsis guideline!
- Risk of early-onset sepsis from chorioamnionitis is strongly dependent on gestational age
- If delivered \( \geq 35 \) weeks, number needed to treat one infection is 80-210
- “It is time to abandon the policy of treating well-appearing infants \( \geq 34 \) weeks’ gestation because of chorioamnionitis alone”
- Close clinical monitoring for signs of sepsis is safe (Berardi, 2015), but this requires hospital policy for frequent exams, esp. first 24 hours

Benitz, 2015
1 per 1000

~12,000 with chorio

396,586 live births at 16 university-based centers

396,197 newborns without early-onset infections

389 newborns with early-onset infections

157 newborns with no documented maternal chorioamnionitis

232 newborns with early-onset infections and maternal chorioamnionitis

3 with records unavailable

229 newborns with early-onset infections and maternal chorioamnionitis included in study

148 (65%) preterm

142 (96%) symptomatic at birth

6 (4%) asymptomatic at birth

3 (50%) remained asymptomatic during first 72 h

3 (50%) developed symptoms within 72 h

81 (35%) term

58 (72%) symptomatic at birth

23 (28%) asymptomatic at birth

18 (78%) remained asymptomatic during first 72 h

5 (22%) developed symptoms within 72 h

28% asymptomatic

No deaths if asymptomatic

Wortham, 2016
Adjunct Tests for Sepsis

- Sepsis is low incidence & high severity
- Desire adjunct tests with
  - High sensitivity (miss as few as possible cases)
  - High negative predictive value (to convincingly rule out disease)
- Primary role will be decisions to start antibiotics & determine length of treatment
- Not to diagnosis sepsis
Adjunct Tests for Sepsis

- **CBC with differential and platelets**
  - Timing: 1st sample at 6-12 hours; if desired, repeat at 24 - 36 hours
  - White cell parameters – use newborn “normals” (next slide)
    - Absolute neutrophil count (ANC)
    - Immature/Total Neutrophil (I/T) ratio

- **C-Reactive Protein**
  - Timing: 1st at 8-24 hrs; 2nd ~24 hrs after 1st (=32–48 hrs)
  - “Normal” values: Lab references=0.8-1 mg/dL or 8-10 mg/L
    - “Normal” newborn values used in studies vary: 1, 2, or 5 mg/dL (10, 20, or 50 mg/L)
  - Trend may be more important– increasing or decreasing
“Manroe” Ranges for Neutrophils

Neutrophils per mL of blood during the first 72 h after the birth of term and near-term (>36 weeks gestation) neonates. (n=12,149 values)

Timing of sample significantly influences normal range.

# Predictive Values of WBC parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>+ PV</th>
<th>- PV</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANC &lt; 10%ile</td>
<td>48%</td>
<td>73%</td>
<td>4%</td>
<td>98%</td>
</tr>
<tr>
<td>I:T ratio &gt; 0.25 cutoff</td>
<td>45%</td>
<td>84%</td>
<td>6%</td>
<td>98%</td>
</tr>
<tr>
<td>I:T ratio &gt; 0.3 cutoff</td>
<td>35%</td>
<td>89%</td>
<td>7%</td>
<td>98%</td>
</tr>
</tbody>
</table>

Use of C-reactive protein (CRP)

- We do not recommend measuring CRP for evaluation of infants who remain totally asymptomatic, but receive antibiotics for a history of maternal chorioamnionitis.
- If measured at 8 to 48 hours, we recommend that an abnormal CRP be defined as ≥ 5 mg/dL (or ≥ 50 mg/L).

# Time to Positive Cultures

## Table 2: Microorganisms Identified From 455 Blood Cultures During the Study Period

<table>
<thead>
<tr>
<th>Microorganisms</th>
<th>Number of Isolates</th>
<th>Hours of Incubation to Positivity</th>
<th>0-12</th>
<th>&gt;12-24</th>
<th>&gt;24-36</th>
<th>&gt;36-48</th>
<th>&gt;48-72</th>
<th>&gt;72</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gram-positive bacteria</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staphylococcus epidermidis</td>
<td>232</td>
<td></td>
<td>7 (6)</td>
<td>92 (66)</td>
<td>25 (14)</td>
<td>4 (6)</td>
<td>4 (3)</td>
<td>3 (2)</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>56</td>
<td></td>
<td>10 (10)</td>
<td>15 (17)</td>
<td>1 (2)</td>
<td>0</td>
<td>0 (1)</td>
<td>0</td>
</tr>
<tr>
<td>Enterococcus sp</td>
<td>37</td>
<td></td>
<td>13 (9)</td>
<td>3 (6)</td>
<td>0 (3)</td>
<td>0 (1)</td>
<td>0</td>
<td>0 (2)</td>
</tr>
<tr>
<td>Streptococcus agalactiae</td>
<td>24</td>
<td></td>
<td>21</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>α-Streptococcus</td>
<td>7</td>
<td></td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Bacillus cereus</td>
<td>5</td>
<td></td>
<td>2 (3)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Listeria monocytogenes</td>
<td>3</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Streptococcus pyogenes</td>
<td>2</td>
<td></td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>366</td>
<td></td>
<td>57 (28)</td>
<td>118 (89)</td>
<td>28 (19)</td>
<td>4 (7)</td>
<td>4 (4)</td>
<td>4 (4)</td>
</tr>
<tr>
<td><strong>Gram-negative bacteria</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>24</td>
<td></td>
<td>18 (6)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Morganella morganii</td>
<td>5</td>
<td></td>
<td>1 (1)</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (2)</td>
</tr>
<tr>
<td>Corynebacterium sp</td>
<td>5</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2 (1)</td>
<td>1</td>
</tr>
<tr>
<td>Klebsiella pneumoniae</td>
<td>4</td>
<td></td>
<td>2 (1)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Serratia marcescens</td>
<td>4</td>
<td></td>
<td>1</td>
<td>0 (1)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (2)</td>
</tr>
<tr>
<td>Pseudomonas cepacia</td>
<td>3</td>
<td></td>
<td>0 (1)</td>
<td>2 (0)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Propionibacterium sp</td>
<td>1</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Enterobacter cloacae</td>
<td>1</td>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>1</td>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>48</td>
<td></td>
<td>24 (9)</td>
<td>3 (1)</td>
<td>0</td>
<td>1</td>
<td>2 (1)</td>
<td>3 (4)</td>
</tr>
</tbody>
</table>

“To LP or not to LP”

- Incidence of bacterial meningitis in early-onset sepsis is < 25%
- ~30% have a negative blood culture
- > 99% have symptoms of meningitis

- **Recommend LP in newborns with:**
  - positive blood culture
  - symptoms strongly suggesting bacterial sepsis or meningitis (abnormal tone, seizures, lethargy, septic shock)
  - Continued deterioration on antibiotics
  - Infants receiving ≥ 7 days of antibiotics for presumed sepsis
Disadvantages of 2-day course of antibiotics to newborn

- May interfere with maternal-infant bonding
- May disrupt establishment of breast feeding
- Pain and distress from starting IVs
- Alters neonatal microbiome
  - Long term health risks?
  - Higher incidence of NEC in preterm
- Annual cost of 2-day hospital stay in US
  - 120,000 newborns x $5000 = $600 million?
Essential and timely communication to pediatric providers

- **From OB providers:**
  - Accurate gestational age
  - Maternal GBS status
  - Highest maternal temperature during labor
  - Duration ROM before delivery
  - Type and duration of antibiotics before delivery
  - Less emphasis on diagnosis of “chorio”

- **From nursery nurses:**
  - Assessment of newborn as “ill” or “equivocal”
Problems with “chorio” guideline

- If your hospital plans to follow CDC/AAP guidelines:
  - Are the obstetricians all using a consistent, strict definition of chorioamnionitis?
  - Who informs the parents of the implications of that diagnosis on their baby’s management and length of hospital stay?
  - What do you do when the pediatric provider doesn’t want to follow the plan of the previous provider?
Liability issues of not following CDC and AAP guidelines on chorioamnionitis

- Hospitals are not allowed by law to require antibiotics for chorioamnionitis; instead they should:
  - Develop policies around accurate and timely communication of obstetrical and neonatal information to the newborn’s provider
  - Ensure careful monitoring of newborns at increased risk for sepsis
- Successful malpractice suits require injury caused by failure to follow “standard of care”:
  - Definition: “What would a reasonably prudent physician do?”
  - Use best, current information—not outdated guidelines
  - AAP guideline says that it “is not an exclusive approach to management; variation that incorporates individual circumstances or institutional preferences may be appropriate.”
- Involve parents in the decision as appropriate
- Document your rationale in the medical record
  - Consider documenting estimated risk of sepsis from calculator
References

Conclusion

THANK YOU!