Triple I (chorioamnionitis)- Keeping Mothers and Babies Together

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Disclosures

• We have nothing to disclose
Objectives

1. Define Triple I and its impact on the mother-baby dyad
2. Rationale for keeping mothers and babies together during treatment of Triple I and the impact of separation on breastfeeding
3. Address ways to keep mothers and babies together and safety issues
4. Discuss implications on cost savings, customer satisfaction and staff engagement
Background

- Chorioamnionitis complicates 2-3% of term pregnancies in the US.
- Up to 40-70% of preterm pregnancies
- In term and near term infants the incidence of sepsis is extremely low (0.14%-0.3%)
- Currently ALL infants are recommended to receive antibiotics (CDC, 2010)
Chorioamnionitis

- Fever PLUS 1 or 2 of the following:
  - Maternal leukocytosis (>15,000)
  - Fetal tachycardia
  - Foul smelling amniotic fluid
  - Maternal tachycardia
  - Uterine tenderness

- Practitioner to practitioner variation in making diagnosis
“Triple I”

- “Intrauterine Infection, Inflammation or both”
- Chorioamnionitis is ambiguous
- Known risk factor for EOS (Early Onset Sepsis), therefore standardization is needed
- Isolated maternal fever is NOT synonymous with chorioamnionitis
Diagnosing Triple I

- **Isolated fever**, taken ORALLY
  - >39 C (102.2 F) once, OR
  - >38 C (100.4 F) on two occasions **30 minutes** apart

- **Suspected Triple I**: Fever plus any of
  - Maternal leukocytosis (>15,000)
  - Fetal tachycardia (baseline >160)
  - Purulent fluid from the cervical os

- **Confirmed Triple I**: pathology proven

ACOG Committee Opinion #712 (2017)
<table>
<thead>
<tr>
<th>Terminology</th>
<th>Features and Comments</th>
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<tbody>
<tr>
<td>Isolated maternal fever</td>
<td>Maternal oral temperature 39.0°C or greater (102.2°F) on any one occasion is documented fever. If the oral temperature is between 38.0°C (100.4°F) and 39.0°C (102.2°F), repeat the measurement in 30 minutes; if the repeat value remains at least 38.0°C (100.4°F), it is documented fever</td>
</tr>
<tr>
<td>(“documented” fever)</td>
<td></td>
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<tr>
<td>Suspected Triple I</td>
<td>Fever without a clear source plus any of the following: 1) baseline fetal tachycardia (greater than 160 beats per min for 10 min or longer, excluding accelerations, decelerations, and periods of marked variability) 2) maternal white blood cell count greater than 15,000 per mm³ in the absence of corticosteroids 3) definite purulent fluid from the cervical os</td>
</tr>
<tr>
<td>Confirmed Triple I</td>
<td>All of the above plus: 1) amniocentesis-proven infection through a positive Gram stain 2) low glucose or positive amniotic fluid culture 3) placental pathology revealing diagnostic features of infection</td>
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* Discontinue the use of the term “Chorioamnionitis.” See the text for discussion.
Chorioamnionitis

• Fever PLUS 1 or 2 of the following:
  – Maternal leukocytosis (>15,000)
  – Fetal tachycardia
  – Foul smelling amniotic fluid
  – Maternal tachycardia
  – Uterine tenderness
Suspected Triple I

• Fever PLUS ANY of the following:
  – Maternal leukocytosis (>15,000)
  – Fetal tachycardia (>160 BPM)
  – Purulent fluid from the cervical os
  – Maternal tachycardia
  – Uterine tenderness

• Temperature is assessed twice **30 min** apart allowing for earlier recognition and treatment
Isolated Maternal Fever
Potential Causes

- Epidural anesthesia
- Room temperature
- Prostaglandin use
- Hyperthyroidism
- Dehydration
Treatment

• Isolated fever
  – Monitor for other signs
  – Treat underlying cause as appropriate

• Suspected Triple I
  – Antibiotics are indicated
  – Ampicillin and Gentamicin are a frequently used combination
QI Project
Problem

• All newborns born to mothers with a diagnosis of chorioamnionitis at delivery are being separated from mothers and admitted to the NICU for IV antibiotic therapy
• Can we identify those who could safely stay with moms?
Effects of mother-baby dyad separation

• Bonding immediately after birth is critical, as lack of it may lead to:
  – Increase in stress levels
  – Thermoregulation issues
  – Delayed initiation of breastfeeding
  – Increased cost of care
  – Utilization of NICU beds by healthy newborns

• In the setting of triple I separations may additionally lead to feelings of guilt and contribute to PPD
Inclusion criteria

- Maternal diagnosis of chorioamnionitis
- Gestational age >35 weeks
- Newborn weight of >1800 grams
- All pregnant women in labor who meet the criteria are included
Project Measures

• We measure rate of exclusive breastfeeding at discharge from the Newborn Family Care Center

• Additionally, adherence to antibiotic use guidelines, rates of utilization of appropriate order sets and documentation are monitored
Description of Project

• Risk of EOS is calculated based on 5 maternal factors:
  - Gestational age of baby at delivery
  - Rupture of membranes duration
  - Highest degree of maternal fever
  - GBS status
  - Timing of prophylactic antibiotics while in labor

• Numerical score is assigned based on the algorithm
Infants with EOS score of **1.54 or less** (with **WELL** exam) or **0.64 or less** (with **EQUIVOCAL** exam) would be admitted to the NFCC

Puopolo et al, Pediatrics, 2011
Please enter details below.

**Predictor**
- Incidence of Early-Onset Sepsis: 0.6/1000 live births
- Gestational age: 39 weeks, 5 days
- Highest maternal antepartum temperature: 101.4°F
- ROM (Hours): 12
- Maternal GBS status: Negative

**Type of intrapartum antibiotics**
- Broad spectrum antibiotics > 4 hrs prior to birth
- Broad spectrum antibiotics 2-3.9 hrs prior to birth
- GBS specific antibiotics > 2 hrs prior to birth
- No antibiotics or any antibiotics < 2 hrs prior to birth

**Risk per 1000/births**
- EOS Risk @ Birth: 1.99
- EOS Risk after Clinical Exam:
  - Well Appearing: 0.82
    - Clinical Recommendation: No culture, no antibiotics
    - Vitals: Every 4 hours for 24 hours
  - Equivocal: 9.88
    - Clinical Recommendation: Empiric antibiotics
    - Vitals: Per NICU
  - Clinical Illness: 40.60
    - Clinical Recommendation: Empiric antibiotics
    - Vitals: Per NICU

Classification of Infant's Clinical Presentation
- Clinical Illness
- Equivocal
- Well Appearing

https://neonatalsepsiscalculator.kaiserpermanente.org/
Newborn Early Onset Sepsis Process

Mother's provider makes maternal diagnosis of chorioamnionitis in infant ≥35 weeks

L&D RN calculates initial Sepsis Risk Score and reports to NICU ASAP

NICU Delivery team called for delivery

L&D RN reports updated Sepsis Risk Score to NNP as part of SBAR

Critical
Determinants

Sepsis Risk Assessment Score

- Mild: < 0.65
- Moderate: 0.65-1.54
- Severe: > 1.54

Is infant vigorous at delivery?

- Yes
  - Delayed cord clamping
  - NNP examines infant on mother's chest or radiant warmer, per preference

- No
  - Defer delayed cord clamping infant to radiant warmer for assessment by NICU teams

What is infant's exam?

- Weight < 1800g?
  - Yes
    - Admit infant to NICU after delivery room stabilization
  - No
    - What is infant's exam?

Well appearing

What is infant's adjusted Sepsis Risk Score?

- < 0.65
- 0.65-1.54
- > 1.54

Initial VS and birth weight recorded in chart immediately
NICU team to enter Newborn Sepsis Prevention order set

Continue observation in L&D/NEPC
Obtain blood culture and start PIV
Start antibiotics within one hour of birth
Initiate breastfeeding

Do not discharge before 48 hours of observation and blood culture negative
Draw C/BC at 24-48 hours of life with NAC. Hearing screen after antibiotics are infused.

Infectious Antimicrobials
- For GBS: penicillin, ampicillin, clindamycin, erythromycin, cefazolin, vancomycin
- Broad-spectrum antibiotics: other cephalosporins, fluoroquinolones, extended spectrum beta-lactam, or any IAP antibiotic plus an amminoglycoside
What does nursing need to know?

• Is this baby well enough (i.e., “Escobar” is low enough) to stay with mom?
• What are the signs and symptoms of EOS?
• Care and assessments for newborn IV therapy?
• What are the assessments for newborns at risk for EOS?
• Early Onset Sepsis order set
Care of the Newborn-education needs

- Newborn IV management
- Antibiotic administration
- Increase in infant assessments
  - Early Onset Sepsis signs and symptoms
  - Central capillary refill and blood pressure assessments- mean cuff pressure
  - Pulse oximetry- assessed with vital signs
Newborn Management Highlights

<table>
<thead>
<tr>
<th>Vitals (frequency)</th>
<th>Other Vital Signs/Assessments</th>
<th>Provider Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>At birth x1</td>
<td>BP, mean BP, central cap refill:</td>
<td>If newborn vitals fall outside of order set parameters, contact the hospitalist for newborn evaluation.</td>
</tr>
<tr>
<td>q15” x4</td>
<td>• x1 in L&amp;D</td>
<td></td>
</tr>
<tr>
<td>q30” x4</td>
<td>• w/ all VS after</td>
<td></td>
</tr>
<tr>
<td>q2° x4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>q3-4° until 48°</td>
<td></td>
<td></td>
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<tr>
<td>then unit routine</td>
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</tbody>
</table>

- CBC drawn at 24h
- Blood culture at birth (placenta or peripheral)
- Antibiotics for 48 hours
Safety Measures

• Initiation of IV Ampicillin within 1 hour of life
• Thorough hand off from Labor and Delivery staff
• Assessment of mother and baby on arrival
• Pediatric notification of newborn on the unit
• PIV site assessments with vital signs
• Proper hand hygiene
• Proper lighting when assessing baby
• Utilizing the family as another pair of eyes
Safety Measures

• Discharge timing- the newborn should not be discharged sooner than 48 hours after birth due to antibiotic therapy

• Additional discharge education aimed at recognizing signs of sepsis

• Who to contact in case of an emergency or questions
All infants were appropriately dispositioned.
35 in NFCC
19 in NICU (15 were transferred to NFCC once stable)
65% decrease in NICU utilization (not counting transfers)

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<thead>
<tr>
<th>Measure</th>
<th>Target, %</th>
<th>Actual, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accurate documentation of Escobar stratification</td>
<td>100</td>
<td>75</td>
</tr>
<tr>
<td>Percentage of eligible newborns born to mothers with Triple I who were managed on NFCC</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>Antibiotic started within 60 and 90 min of birth</td>
<td>100</td>
<td>39 @ 60 min</td>
</tr>
<tr>
<td></td>
<td></td>
<td>83 @ 90 min</td>
</tr>
<tr>
<td>Newborn EOS order set entered by APP at delivery</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td><strong>Exclusive breastfeeding at discharge (those babies who were admitted directly to the NFCC)</strong></td>
<td>95</td>
<td>71 (69-82 NFCC)</td>
</tr>
<tr>
<td>Missed identification of sepsis or delay in NICU transfer of baby with adverse change in condition</td>
<td>0</td>
<td>0</td>
</tr>
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</table>
Patient Experience

♥ “I felt so comfortable having my baby in my room with me and knowing that we both had the same nurse, put me at ease.”
♥ “I am so thankful to have my baby with me. I can hold her and breastfeed anytime I want.”
♥ “Thank you for letting my baby stay with me.”
♥ “I love that I have the same nurse caring for me and my baby”
What we do!
Staff Engagement

• Staff excited about opportunity to learn new skills
• Proud of their accomplishments
• Love being a part of keeping mom and baby together
• Enjoy supporting mother with breastfeeding
• Normalizing the placement of the newborn on the NFCC, using their assessments to promote patient safety
• Supporting and educating the family unit in preparation for the beginning of their new life
Cost Savings

- Soft cost savings to hospital
- Proper utilization of NICU beds
- Decreased cost of care to families due to not having NICU bill
Sharing our experience

• Local AWHONN conference
• AWHONN National conference – Tampa
• 2017 Nurse Midwife conference – Minneapolis
• 2018 PAS conference- Toronto
• 2018 MN Chapter of SHM presentation
• 2018 MHA Award for Innovation of the Year
• MHealth QI Alumni presentations
• 2018 MN Perinatal Organization conference
• Roll out at Fairview Ridges
• Roll out at the University of Chicago
• 2019 Minnesota Breastfeeding Coalition Summit
Contact Information

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Questions?