Beyond the Basics: The Art and Science of Tracing Interpretation

Session 5: December 7, 2016
Wisconsin Association for Perinatal Care (WAPC)

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No conflicts to disclose.
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No conflicts to disclose.
Notice of disclosures

- Notice of requirements for successful completion
  - Registrants must attend full session and complete evaluation to receive contact hours
- Conflicts of Interest
  - None to report
- Financial Disclosures
  - None
- Sponsorship or commercial support
  - None
- Non-endorsement of products
  - The speaker does not endorse the use of any particular medications or products as part of this educational session
- Off-label use
  - The speaker may discuss the off-label use of misoprostol and terbutaline as they relate to labor and delivery.
Before we begin...

• Listen-only mode

• Questions – please ask, please answer!
  – Raise your hand
  – Type into the Question Pane
  – Out of time? Email wapc@perinatalweb.org

• Technical problems: Email Barb Wienholtz
  at wienholtz@perinatalweb.org or call at
  608-285-5858, ext. 201
Before we begin...

The content presented today is a case study. Components of this case were chosen based on their applicability to achieve learning objectives for this presentation. Do not assume the patient featured in the case was cared for by the instructor or at the facility at which the instructor is employed.

The discussion will focus on interpretation of the electronic fetal monitoring (EFM) tracings for the purpose of education. At times, the discussion may lead to the care decisions made based on EFM interpretation.

IF the instructor shares details regarding actual or potential care decisions, please note those decisions do not necessarily reflect the opinions of the instructor, a particular provider, the standard of care for any particular institution or facility, or of WAPC.
Objectives

At the conclusion of the session, participants will be able to:

1. Systematically review the fetal monitoring data to identify the fetal heart rate pattern classification (category).

2. Identify the physiology and pathophysiology related to the tracing patterns.

3. Discuss interventions/management of the fetal heart rate patterns.
2008 NICHD Report

The 2008 National Institute of Child Health and Human Development (NICHD) Report of Fetal Heart Rate Monitoring

- Defined standard fetal heart rate nomenclature
- Identified three categories for fetal heart rate interpretation
- Proposed future research
2008 NICHD Report

• Report endorsed by:


  – AWHONN-endorsed and incorporated in fetal monitoring curriculum

  – American College of Nurse Midwives

  – American Academy of Family Practice

"Management of Intrapartum Fetal Heart Rate Tracings"

- Reviewed:
  - Nomenclature
  - Fetal Heart Rate Interpretation (categories)

- Provided framework for evaluation and management of intrapartum patterns based on categories

- Assessment algorithm for fetal heart rate patterns

- Intrapartum resuscitative measures

- Management of uterine tachysystole

The following questions are used to evaluate every tracing, followed by specific questions:

1. What is the contraction pattern? (interval, duration, resting tone if appropriate)
2. What is the baseline fetal heart rate?
3. What is the baseline variability?
4. Are there any periodic changes present?
5. Are there any episodic changes present?
6. What are the probable causes of the changes present?
7. When was the last reassuring sign of fetal well-being?
• Interpretation
• Interventions/Communication
• Documentation in chart
• **SBAR**
  – **Situation**
  – **Background**
  – **Assessment**
  – **Recommendation**
Case History

- 25 YO
- G2 P1
- Medical History non-contributory
- Pregnancy History non-contributory
- Currently @30 3/7 weeks
- Presents for routine prenatal visit
  - BP 140/92, 150/96
  - No proteinuria
  - Denies HA, blurred vision, upper R quadrant tenderness
  - Transferred to Labor and Delivery for further evaluation of BP, labs and 24 hour urine
Poll Question 1

What is the definition of hypertension?

A. Systolic blood pressure ≥140 mm Hg or diastolic blood pressure ≥90 mm Hg on two occasions, four hours apart

B. Systolic blood pressure ≥140 mm Hg and diastolic blood pressure ≥90 mm Hg on two occasions, four hours apart
Definition of Hypertension

• Systolic blood pressure $\geq 140$ mm Hg OR diastolic blood pressure $\geq 90$ mm Hg on two occasions, four hours apart

• Included the definition in the RF slide presentations

• Pre-/Post-test, including question on definition
  – Pre-test: 66% knew the correct definition
  – Post-test: 78% knew the correct definition

• Follow-up surveys on definition of hypertension
  – 73% knew the correct definition
Low amplitude, high frequency contractions (LAHF) are common before term.

A. True
B. False
Poll Question 3

What is the category of the tracing?

A. Category I
B. Category II
C. Category III
The preterm fetus may have minimal variability as a result of:

A. An immature autonomic nervous system.
B. Maturation of the autonomic nervous system.
C. The autonomic nervous system has no effect on variability.
Challenges In Monitoring the Preterm Fetus

• Baseline rate frequently at higher end of normal FHR range
• Minimal variability may be observed in extremely preterm fetuses
• Lower frequency and amplitude of accelerations with a peak of at least 10 bpm above the baseline and a duration of at least 10 seconds until approximately 32 weeks gestation
• Variable decelerations with shorter depth and duration often unrelated to uterine contractions or periods of hypoxemia
Three principles of electronic fetal heart rate monitoring (EFM) interpretation

**Environment**
- Lungs
- Heart
- Vasculature
- Uterus
- Placenta
- Cord

**Fetus**
- Hypoxemia
- Hypoxia
- Metabolic acidosis
- **Metabolic acidemia**

**Potential injury**

**Principle #1**
All clinically significant FHR decelerations (variable, late, or prolonged) reflect interruption of the pathway of oxygen transfer from the environment to the fetus at one or more points.

**Principle #2**
Moderate variability and/or accelerations reliably predict the absence of fetal metabolic acidemia at the time they are observed.

**Principle #3**
Intrapartum interruption of fetal oxygenation does not result in neurologic injury (cerebral palsy) unless the fetal response progresses to the stage of significant fetal metabolic acidemia (umbilical artery pH <7.0 and base deficit ≥12 mmol/L).

FHR, fetal heart rate.

Courtesy of David A. Miller, MD.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>AGE OF DEVELOPMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tone</td>
<td>7.5-8.5 weeks</td>
</tr>
<tr>
<td>Movement</td>
<td>~ 9 weeks</td>
</tr>
<tr>
<td>Breathing</td>
<td>20-21 weeks</td>
</tr>
<tr>
<td>Fetal Heart Rate</td>
<td>28-32 weeks</td>
</tr>
</tbody>
</table>
Poll Question 5

During a Biophysical Profile if the fetus has two episodes of discrete movement, the fetus is scored.

A. No points for movement
B. One point for movement
C. Two points for movement
<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>SCORE</th>
<th>2</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonstress Test</td>
<td>Reactive NST</td>
<td>Nonreactive NST</td>
<td></td>
</tr>
<tr>
<td>- may be omitted if all 4 US scores are “2”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amniotic Fluid Volume</td>
<td>Single vertical pocket of $\geq 2$cm w/o umbilical cord</td>
<td>No pocket $&gt; 2$cm or oligohydramnios</td>
<td></td>
</tr>
<tr>
<td>Fetal Movement</td>
<td>3 or $&gt;$ discrete body or limb movements within 30 min</td>
<td>2 or less episodes of movement</td>
<td></td>
</tr>
<tr>
<td>Fetal Tone</td>
<td>1 or $&gt;$ episodes of extension &amp; flexion of extremity or opening &amp; closing of hand</td>
<td>Extremities in extension of no opening/closing of hand</td>
<td></td>
</tr>
<tr>
<td>Fetal Breathing</td>
<td>1 or $&gt;$ episodes of breathing of $\geq 30$ sec within 30 mins</td>
<td>Absence of respiratory effort</td>
<td></td>
</tr>
</tbody>
</table>
• Result of BPP
  – Fetal Breathing Movement-0/2
  – Gross Body Movement-0/2
  – Fetal Tone-0/2
  – Amniotic Fluid-0/2
0/8
Case (Cont)

- Repeat BPP
  - Fetal Breathing Movement-0/2
  - Gross Body Movement-0/2
  - Fetal Tone-0/2
  - Amniotic Fluid-0/2

0/8
<table>
<thead>
<tr>
<th>Score</th>
<th>Interpretation</th>
<th>Mortality within 1 week without intervention</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/10 8/10</td>
<td>Normal, low risk, risk of asphyxia rare</td>
<td>1/1000</td>
<td>Deliver for obstetric or maternal factors</td>
</tr>
<tr>
<td>8/10</td>
<td>Normal fluid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8/10</td>
<td>NST not done</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8/10-abnormal fluid</td>
<td>Possible chronic fetal compromise</td>
<td>89/1000</td>
<td>Check for ROM, functioning renal tissue. Deliver for fetal indications</td>
</tr>
<tr>
<td>6/10-normal fluid</td>
<td>Equivocal test</td>
<td>Variable</td>
<td>Mature fetus-deliver Immature fetus-repeat 24 hours If &lt; 6, deliver</td>
</tr>
<tr>
<td>6/10-abnormal fluid</td>
<td>Probably fetal asphyxia</td>
<td>89/1000</td>
<td>Deliver for fetal indications</td>
</tr>
<tr>
<td>4/10</td>
<td>High probability of fetal asphyxia</td>
<td>91/1000</td>
<td>Deliver for fetal indications</td>
</tr>
<tr>
<td>2/10</td>
<td>Fetal asphyxia almost certain</td>
<td>125/1000</td>
<td>Deliver for fetal indications</td>
</tr>
<tr>
<td>0/10</td>
<td>Fetal asphyxia</td>
<td>600/1000</td>
<td>Delivery for fetal indications</td>
</tr>
</tbody>
</table>
Poll Question 6

Does your hospital have policies, procedures and protocols for a Maternal Early Warning System?

A. Yes

B. No
<table>
<thead>
<tr>
<th>Maternal Early Warning Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Systolic BP (mm Hg)</strong></td>
</tr>
<tr>
<td><strong>Diastolic BP (mm Hg)</strong></td>
</tr>
<tr>
<td><strong>Heart rate (beats/min)</strong></td>
</tr>
<tr>
<td><strong>Respiratory rate (breaths/min)</strong></td>
</tr>
<tr>
<td><strong>Oxygen saturation on room air, at sea level, %</strong></td>
</tr>
<tr>
<td><strong>Oliguria, ml/hr for ≥2 hrs</strong></td>
</tr>
<tr>
<td><strong>Maternal agitation, confusion, or unresponsiveness</strong></td>
</tr>
<tr>
<td><strong>Patient with preeclampsia reporting a non-remitting headache or shortness of breath</strong></td>
</tr>
</tbody>
</table>

Mhyre et al., 2014
Maternal Early Warning Criteria

• Prompt bedside evaluation by clinician able to initiate emergency diagnostic/therapeutic interventions

• Effective communication policy
  – Who to notify
  – How to notify them
  – When and how to activate the clinical chain of command

Mhyre et al., 2014
Poll Question 7

What effect does Magnesium Sulfate have on the FHR?

A. Variability increases, baseline increases.
B. Variability decreases, insignificant decrease in baseline.
C. There are no appreciable changes in the FHR.
### Effect of Medications on Fetal Heart Rate

<table>
<thead>
<tr>
<th>Medication</th>
<th>Effect on Fetal Heart Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narcotics</td>
<td>Decrease in variability; decrease in frequency of accelerations</td>
</tr>
<tr>
<td>Butorphanol</td>
<td>Transient sinusoidal FHR pattern; slight increase in mean heart rate</td>
</tr>
<tr>
<td>Cocaine</td>
<td>Decrease in variability</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>Decrease in variability with betamethasone, not with dexamethasone</td>
</tr>
<tr>
<td>Magnesium Sulfate</td>
<td>Decrease in FHR variability, clinically insignificant decrease in the baseline rate, inhibition of increasing accelerations as gestational age advances</td>
</tr>
<tr>
<td>Terbutaline</td>
<td>Increase in baseline rate</td>
</tr>
<tr>
<td>Zidovudine</td>
<td>No change</td>
</tr>
</tbody>
</table>
ACOG Practice Bulletin #116-Management of Intrapartum Fetal Heart Rate Tracings

Figure 1. Management algorithm of intrapartum fetal heart rate tracings based on three-tiered category system. Abbreviation: FHR, fetal heart rate.

*Given the wide variation of FHR tracings in Category II, this algorithm is not meant to represent assessment and management of all potential FHR tracings, but provide an action template for common clinical situations.

1 See Table 2 for list of various intrauterine resuscitative measures
2 Timing and mode of delivery based on feasibility and maternal-fetal status
<table>
<thead>
<tr>
<th><strong>“ABCD”</strong></th>
<th><strong>Consider these steps and implement if clinically indicated</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>“A”</strong></td>
<td><strong>Assess Oxygen Pathway</strong></td>
</tr>
<tr>
<td>Lungs</td>
<td>Airway and breathing &amp; Pulmonary function or ABG</td>
</tr>
<tr>
<td>Heart</td>
<td>Heart rate and rhythm &amp; Cardiac output</td>
</tr>
<tr>
<td>Vasculature</td>
<td>Blood pressure &amp; Volume status</td>
</tr>
<tr>
<td>Uterus</td>
<td>Contraction strength &amp; Contraction frequency</td>
</tr>
<tr>
<td>Placenta</td>
<td>Placental separation &amp; Bleeding vasovasostomy</td>
</tr>
<tr>
<td>Cord</td>
<td>Vaginal exam &amp; Excluding cord prolapse</td>
</tr>
<tr>
<td><strong>“B”</strong></td>
<td><strong>Begin Corrective Measures</strong></td>
</tr>
<tr>
<td>Lungs</td>
<td>Supplemental oxygen &amp; Treat pulmonary disorders</td>
</tr>
<tr>
<td>Heart</td>
<td>Intravenous fluid bolus &amp; Treat arrhythmia</td>
</tr>
<tr>
<td>Vasculature</td>
<td>Maternal position changes &amp; Correct hypotension</td>
</tr>
<tr>
<td>Uterus</td>
<td>Skip or reduce uterine stimulants &amp; Consider IUPC</td>
</tr>
<tr>
<td>Placenta</td>
<td>Placental separation &amp; Bleeding vasovasostomy</td>
</tr>
<tr>
<td>Cord</td>
<td>Consider amnioreduction &amp; Consider elevating fetal head</td>
</tr>
<tr>
<td><strong>“C”</strong></td>
<td><strong>Clear for Delivery</strong></td>
</tr>
<tr>
<td>Facility</td>
<td>OR availability &amp; Instruments &amp; Equipment</td>
</tr>
<tr>
<td>Staff</td>
<td>Notify &amp; Blood products &amp; IV access &amp; Urinary catheter &amp; Abdominal prep &amp; Transfer to OR</td>
</tr>
<tr>
<td>Mother</td>
<td>Informed consent &amp; Laboratory tests &amp; Blood products</td>
</tr>
<tr>
<td>Fetus</td>
<td>Confirm &amp; Estimated fetal weight &amp; Gestational age &amp; Presentation &amp; Position</td>
</tr>
<tr>
<td>Labor</td>
<td>Consider tocolytic &amp; Consider IUPC</td>
</tr>
<tr>
<td><strong>“D”</strong></td>
<td><strong>Decision to Delivery Time</strong></td>
</tr>
<tr>
<td>Facility</td>
<td>Realistic estimate of facility response time</td>
</tr>
<tr>
<td>Staff</td>
<td>Availability &amp; Training &amp; Experience</td>
</tr>
<tr>
<td>Mother</td>
<td>Surgical considerations (prior abdominal or uterine surgery, uterine fibroids)</td>
</tr>
<tr>
<td>Fetus</td>
<td>Medical considerations (fetal growth restriction, macrosomia)</td>
</tr>
<tr>
<td>Labor</td>
<td>Obstetric considerations (parity, pelvicmetry, placental location, preclampsia)</td>
</tr>
<tr>
<td><strong>Consider factors such as:</strong></td>
<td>Baseline FHR changes &amp; Loss of variability &amp; Loss of accelerations &amp; Repurrent decelerations &amp; Growth restriction &amp; Macrosomia &amp; Prematurity, infection &amp; Meconium</td>
</tr>
</tbody>
</table>

© David A. Miller, M.I
Emergency Cesarean Section

- 1, 1, 1
- pH not done
- Male
- 1000 grams
- Transferred to Level III Center
Strategies to Improve Outcomes and Reduce Risk

- Communication
  - SBAR, CUS
  - Brief
  - Huddles
  - Debriefs
Debrief

• Learning opportunity
• 3-5 minutes
• Involve all members of the team
• Format:
  – Acknowledge feelings
  – Summary of case or situation
  – What went well?
  – What was challenging?
  – What did you take away that will help you in the future?

Adapted from AHRQ-TeamStepps 2.0 Essential Course
Strategies to Improve Outcomes and Reduce Risk

- Fetal Monitoring
  - Standardization of fetal assessments and language
  - Accurately monitor FHR and uterine activity
  - Identify and interpret EFM/IA accurately
  - Implement intrauterine resuscitation measures appropriately
  - Communicate, Communicate, Communicate
  - Continue fetal assessments until birth including cesarean birth
  - Continuing education in fetal monitoring
    - Certification in fetal monitoring
### WAPC Levels of Care Self-Assessment Survey

**Title:**
WAPC Levels of Care Self-Assessment Survey

**Table:**

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Basic Care</td>
</tr>
<tr>
<td>2</td>
<td>Intermediate Care</td>
</tr>
<tr>
<td>3</td>
<td>Advanced Care</td>
</tr>
</tbody>
</table>

**Diagram:**

- [Diagram representing levels of care assessment](image)

**Instructions:**

- Complete the assessment form to evaluate the level of care provided.
- Submit the form to assess the effectiveness of care delivery.

**Additional Information:**

- This assessment is designed to ensure quality care is provided to all patients.
- It includes self-assessment questions to identify areas of strength and improvement.

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**Note:**

- Use the self-assessment tool to evaluate the level of care provided to patients.
- Regularly update the assessment to reflect any changes in care delivery.

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**Partners:**

- Wisconsin Association for Perinatal Care
- American College of Obstetricians and Gynecologists
- ACCO

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**Contact:**

- For more information, contact your local WAPC representative.
References

Questions?

Comments?
Remember

• Fax or email attendance list to WAPC
  – fax: 608-285-5004
  – email: wapc@perinatalweb.org

• Evaluation will be sent via email from WAPC. Please complete to receive Continuing Education Credit.

• Continuing Education Certificate will be sent via email upon completion of evaluation.

• Archived version

• 2017 Lunch & Learn schedule

• 2017 WAPC Annual Conference – April 30-May 2, 2017, Kalahari Resort, WI Dells
  – Fetal Monitoring Certification Prep Course

• Become a member of WAPC! Join online: https://www.perinatalweb.org/n-pay/membership.asp
Thank-you