The Golden Hours of FHT Interpretation: The First Hour

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First Hour Checklist

1. Adequate FHR tracing
2. Maternal/fetal risk factors
3. Current fetal acid/base status
4. Fetal heart rate decelerations
5. Plan of care & team dynamics
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Adequate Fetal Tracing

- No missing data
  - Continuous – (>70% present)
- Sufficient for interpretation
  - Able to determine
    - baseline
    - variability
    - presence of accels or decels
- Accurate tocography to assess contractions
Adequate Fetal Tracing

• Ensure a fetal not maternal tracing
  • Very low (<110 bpm)
  • Acceleration with >50% of contractions
  • Deceleration to the maternal range without recovery

• Use ultrasound, pulse ox or FSE to confirm and address as needed
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Maternal & Fetal Risk Factors

- Immediate maternal status/risk factors
  - Fever
  - Tachycardia
  - Hypertension
  - Vaginal bleeding
  - Ruptured membranes
  - Duration of pre-hospital labor/symptoms
  - Fetal activity
Maternal & Fetal Risk Factors

- Pregnancy Complications
  - Fetal growth restriction
  - Hypertensive disorders
  - Maternal diabetes
  - Allo-immunization
  - GBS+ status
Maternal & Fetal Risk Factors

- Obstetrical history
  - Prior cesarean(s)
  - Prior shoulder dystocia
  - Prior postpartum hemorrhage

- Maternal medical history
  - Exposures (medications, substance abuse)

- Fetal factors
  - Anomalies, IUGR, polyhydramnios
Risk Stratification

Can we identify those women at higher risk for adverse neonatal outcome based on admission maternal/fetal risk factors?
Risk Stratification Study

• 52,584 women

• Divided randomly into two groups
  • Derivation Group
  • Tested 31 variables for association with adverse neonatal outcome
  • Validation Group
  • Used to test a multivariate risk model based on selected variables

Holmgren et al, J Perinatol, Oct 2013
Ten Key Variables

<table>
<thead>
<tr>
<th>Variables Included in Risk Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal Age</td>
</tr>
<tr>
<td>Current BMI</td>
</tr>
<tr>
<td>Gestational age</td>
</tr>
<tr>
<td>Parity</td>
</tr>
<tr>
<td>Induction</td>
</tr>
<tr>
<td>Diabetes</td>
</tr>
<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>Preeclampsia</td>
</tr>
<tr>
<td>Abruption</td>
</tr>
<tr>
<td>Category II tracing in the first hour</td>
</tr>
</tbody>
</table>
Risk Stratification Study

- An initial risk score of 1-14 assigned based on 10 antepartum variables

<table>
<thead>
<tr>
<th>Initial Risk Score</th>
<th>Risk Category</th>
<th>N</th>
<th>Percent of Original Cohort</th>
<th>Incidence of Adverse Neonatal Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>Low</td>
<td>6,511</td>
<td>21.2%</td>
<td>0.23%</td>
</tr>
<tr>
<td>4-6</td>
<td>Moderate</td>
<td>15,676</td>
<td>51.1%</td>
<td>0.57%</td>
</tr>
<tr>
<td>7-14</td>
<td>High</td>
<td>8,515</td>
<td>27.7%</td>
<td>1.83%</td>
</tr>
</tbody>
</table>

Holmgren et al, J Perinatol, Oct 2013
Risk Score and Outcomes

- Risk Score 7-14 on admission
  - 60% of all adverse neonatal outcomes
- Risk Score 9-14 on admission
  - 77% of all adverse neonatal outcomes
- This high risk subset used to further delineate *intrapartum* risk

Holmgren et al, J Perinatol, Oct 2013
### Risk Stratification Study

<table>
<thead>
<tr>
<th>Intrapartum Risk Score*</th>
<th>Risk Category</th>
<th>N</th>
<th>Percent of Initial High-Risk Cohort</th>
<th>Incidence of Adverse Neonatal Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>Low</td>
<td>3853</td>
<td>45%</td>
<td>1.0%</td>
</tr>
<tr>
<td>2-6</td>
<td>Moderate</td>
<td>4378</td>
<td>51%</td>
<td>1.9%</td>
</tr>
<tr>
<td>7-14</td>
<td>High</td>
<td>284</td>
<td>3%</td>
<td>11.3%</td>
</tr>
</tbody>
</table>

*A second score based on the presence of additional *intrapartum* variables among those found to be “high risk” by labor admission score

Holmgren et al, J Perinatol, Oct 2013
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Fetal Acid-Base Status

- Arterial blood gases
  - pH 7.20 - 7.32
  - base deficit $-1.0$ mmol/L - $-6.5$ mmol/L
- Reflects bicarbonate buffer status

\[ H_2O + CO_2 \rightleftharpoons H_2CO_3 \rightleftharpoons H^+ + HCO_3^- \]
The Big Picture

Admit Delivery

Fetal BD
On admit
-1 to -2 mmol/L

-1 mmol/L every 3-6 hours
In first stage

-1 mmol/L every hour
In second stage

Variability and accels tell you where you are with respect to pH/BD

Permanent Fetal injury does not occur until BD < -12 mmol/L
Factors that determine risk of fetal injury

- Fetal BD On admit
- Rate of BD decline in labor
- Permanent Fetal injury does not occur until BD < -12 mmol/L

Graph showing factors affecting fetal injury risk:
- Admit
- Delivery
- Fetal BD
- Rate of BD decline in labor
- Length of labor

Permanent Fetal injury does not occur until BD < -12 mmol/L
BD on Admission

• Normally $-1 - -2$ mmol/L at onset of labor

• Risk factors for a lower admission base deficit
  • Post term fetus (start 1-2 points lower)
  • Preeclampsia
  • Fetal IUGR
  • Oligohydramnios
  • Maternal diabetes
  • Abruption
  • Protracted pre-admission labor
Factors that determine risk of fetal injury

Permanent Fetal injury does not occur until
BD < -12 mmol/L
Assessing Current pH Status

- Absence of fetal tachycardia
- Moderate variability predicts pH > 7.15
  - Negative predictive value 98%
- Accelerations
  - If present, pH very likely > 7.15
  - “accels” within a decel do not count

FHR Tracings and Acidemia

- Minimal/absent variability AND decels associated with pH< 7.15
  - Though predictive value still poor (23%)
- Likelihood of acidemia increases with depth of recurrent decelerations
  - Especially late decels with min/absent variability

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Evaluate FHR Decelerations

- **Type**
  - Early, Variable, Late, Prolonged

- **Frequency**
  - Recurrent
    - Occurring with >50% of contractions
  - Intermittent
“Significant” Decelerations

- **Variables***
  
  Last > 60” nadir > 60 bpm below baseline
  Last > 60” nadir FHR < 60 bpm

- *Late decelerations of any depth*

- Any prolonged deceleration (NICHD)
  
  ≥ 15 bpm below baseline for > 2’ but < 10’

** Note this is NOT part of the NICHD nomenclature **

Rate of BD Decline

- “Normal” labor drops BD by ~3 mmol/L
  - First stage drop ~1 mmol/L every 3-6 hours
  - Second stage drop ~1 mmol/L every 1 hour

- Recurrent decelerations (every 2.5-5 min)
  - BD drops ~1 mmol/L for every 2 min of decel

- Prolonged decelerations
  - **BD drops ~1 mmol/L every 2 min of decel**
    - So, a 15 minute deceleration drops BD by ~7.5 mmol/L
Permanent Fetal injury does not occur until BD < -12 mmol/L
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## Establish Team Members

### Who is “The Team”?

- Patient
- partner
- Primary RN
- Attending Caregiver(s)
- CNM, OBGYN, MFM
- Anesthesiologist

### Who else is on The Team?

- “Second” RN
- Emergency backup provider(s)
- in-house MD
- Charge RN
- Peds/NICU staff
- *Birth Attendants*
- family, doula, direct entry midwife
Develop a Care Plan

• Acknowledge and address risk factors
  • OB history (parity, prior CS, prior complications)
  • Current risk factors (GBS, DM, HTN)
  • Anticipated neonatal needs (mat antibodies, exposures)

• Discuss current fetal status
  • NICHD nomenclature
  • Describe significant decelerations specifically

• Discuss labor management plan
  • Fetal monitoring interval, modality (internal/external)
  • Guidelines for augmentation/induction
  • Pain management
  • Responsible provider, availability, backup
Team Dynamics

Teams work together better when each member takes into account the goals, intentions and beliefs of other team members.

• Shared Mental Model
  • A perception/understanding/knowledge about a situation that is shared among team members through communication

• Therapeutic Alliance
  • Relationship between patient and care provider aligned to the same goals

TeamSTEPPS program AHRQ.gov
Patient centered team

- Acknowledge cultural context
- Use shared mental models
- Build/sustain therapeutic alliance
- Maintain situational awareness

All of these depend on good communication

- Medical
- Social
Culture of communication

- Communication is a social process
  - more than simply sending and receiving technical information
- Each party in the interaction brings their
  - History
  - Assumptions
  - Expectations of others
Effective Communication

- Critical Features
  - Respectful – recognizes the values of each party
  - Clear – organized and focused
  - Direct – Clearly directs action – who, what, when
  - Explicit – No implied meanings

- It conveys
  - The level of urgency in the situation
  - The rationale underlying the requested action
  - Openness to alternatives

- Allows team members to quickly develop a shared understanding of the situation and present differing interpretations as needed
Metacommunication

- The non-verbal cues that carry meaning and either enhance or disallow what we say in words
  - tone of voice
  - body language/touch
  - gestures
  - facial expressions
- Verbal or non-verbal communication about communication
Social Contract in Medicine

**Providers**
- will listen, explain, provide anticipatory guidance, obtain informed consent, and encourage questions to promote patient involvement in their own care
- has confidence in “the medical system” and will entrust us with their care
- trusts us to do what is right even if we don’t have time for a lengthy explanation in an emergency
Culture and Therapeutic Alliance

• When we share common cultural context, therapeutic alliance is natural

• When we don’t, it can be very challenging.

• Recognizing cultural differences and acknowledging them is critical

• Failure to recognize and acknowledge cultural context can derail team-based care
SITUATIONAL AWARENESS
Needs improvement.

https://i.pinimg.com/originals/71/56/f1/7156f18a346aaddb84042a0893c29759.jpg
Culture among OB Patients

- Planned hospital birth
  - Prenatal care from a licensed provider
- “No prenatal care”
  - Barriers to access (socioeconomic)
  - Avoidance (substance abuse, legal trouble)
  - Cultural differences in perceived value of prenatal care
- Intrapartum transport from home/birth center
  - Differential perception of risk
  - Inherent suspicion of medical “establishment”
Maintaining Situational Awareness

- Recognize and explore the patient’s cultural context
- Emphasize patient’s central role on the TEAM
- Actively build a shared mental model with the patient/family
- Anticipate the likelihood of resisting intervention
  - Account for anticipated time to gain trust and obtain consent for interventions
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