Standardisation of multidisciplinary obstetric emergency training nationally.
Intrapartum fetal monitoring

Professor Declan Devane
Professor of Midwifery
NUI Galway & West, North-West Hospitals Group
Aim

• This session is for practitioners who want to update their knowledge on the fundamental concepts related to fetal monitoring in labour. It is designed for:
  1. Practitioners new to the provision of intrapartum care
  2. Practitioners with clinical experience who have not attended a programme recently, and
  3. Experienced practitioners and those responsible for teaching others who want a resource for sharing with others.
Clinical practice guideline
Institute of Obstetricians and Gynaecologists,
Intrapartum Fetal Heart Rate Monitoring, June 2012
Evidence (low-risk women)

- Continuous cardiotocography (CTG) versus intermittent auscultation
  - Women with continuous CTG are more likely to have:
    - A caesarean for abnormal fetal heart rate pattern (RR 2.31 [95%CI 1.49 to 3.59])
    - Instrumental vaginal birth (RR 1.29 [95%CI 1.02 to 1.62])
    - Babies admitted to neonatal units (RR 1.37 [95%CI 1.01 to 1.87])
  - Women with continuous CTG are less likely to have:
    - Babies with neonatal seizures (RR 0.36 [95%CI 0.16 to 0.81])
    - No evidence of difference in perinatal mortality (RR 1.02 [95%CI 0.31 to 3.31]).
      - (Alfrevic, Devane & Gyte 2013)
Evidence (low-risk women)

• Recommendations
  ▫ ‘For a woman who is healthy and has an uncomplicated pregnancy (low risk), intermittent auscultation should be offered and recommended in labour using either a Doppler ultrasound or a Pinard stethoscope.’
    • (Institute of Obstetricians and Gynaecologists, Intrapartum Fetal Heart Rate Monitoring, June 2012:5)
Evidence (women with risk factors)

- Continuous cardiotocography (CTG) versus intermittent auscultation
  - Women with continuous CTG are more likely to have:
    - Have a caesarean for abnormal fetal heart rate pattern (RR 2.46 [95%CI 1.69 to 3.59])
    - Not achieve spontaneous vaginal birth (RR 1.33 [95%CI 1.11 to 1.59])
    - An increase in cerebral palsy in the continuous CTG group (RR 2.54 [95%CI 1.10 to 5.86])
      - Data on cerebral palsy are heavily influenced by one small trial
  - No evidence of difference in perinatal mortality (RR 1.02 [95%CI 0.31 to 3.31]) or neonatal seizures (RR 0.66 [95%CI 0.36 to 1.22])
    - (Alfrevic, Devane & Gyte 2013)
Evidence (women with risk factors)

- Recommendations
  - ‘Intermittent auscultation may be used for low risk women and electronic fetal monitoring (EFM) for women when an increase in risk has been identified.’
    - (Institute of Obstetricians and Gynaecologists, Intrapartum Fetal Heart Rate Monitoring, June 2012)
Admission CTG

• Evidence
  ▫ Women with an admission CTG were more likely to have
    • caesarean section (RR 1.20, 95%CI 1.00 to 1.44)
    • continuous electronic fetal monitoring during labour (RR 1.30, 95% CI 1.14 to 1.48)
    • fetal blood sampling (RR 1.28, 95% CI 1.13 to 1.45)
  ▫ No evidence of differences in
    • instrumental vaginal birth (RR 1.10, 95% CI 0.95 to 1.27)
    • fetal and neonatal deaths (RR 1.01, 95% CI 0.30 to 3.47)
    • or other secondary outcome measures.
      • (Devane et al 2012)
Admission CTG

• Recommendations
  ▫ ‘The current evidence base does not support the use of the admission CTG in low risk pregnancies and is, therefore, not recommended as a routine.’
    • (Institute of Obstetricians and Gynaecologists, Intrapartum Fetal Heart Rate Monitoring, June 2012:9)
When to use continuous cardiotocography
Appendices

Appendix 1

Risk factors requiring Electronic Fetal Monitoring (EFM)

### Admission Assessment

- **Are any of the following risk factors present?**
  - (this list is not exhaustive)

#### Maternal Problems
- Previous caesarean section
- Pre-eclampsia
- Post-term pregnancy (> 42 weeks)
- Prolonged membrane rupture (> 24 hours)
- Induced labour
- Diabetes
- Antepartum haemorrhage
- Other maternal medical disease

#### Fetal Problems
- Fetal growth restriction
- Prematurity
- Oligohydramnios
- Abnormal Doppler artery velocimetry
- Multiple pregnancies
- Significant meconium-stained liquor
- Consider if light meconium-stained liquor
- Breech presentation

### Intrapartum risk factors

- **Oxytocin augmentation**
- Epidural analgesia (for 30 minutes during establishment and after administration of each bolus of 10 ml or more)
- Maternal pyrexia (37.5°C X two occasions, 2 hours apart or > 38°C)
- Significant meconium-stained liquor
- Fresh vaginal bleeding in labour
- Maternal request

### NO

- Offer intermittent auscultation using either Doppler or Pinard stethoscope
- Always listen for a full minute after contractions, at least every 15 minutes in the first stage and 5 minutes in the second stage

### Abnormal FHR on auscultation?

- Baseline <110bpm or
- >160bpm
- Any decelerations after contraction

### YES

- Offer and recommend continuous EFM

Note: Individual units may choose to adapt these indications for EFM

Appendix 1: Adapted from Admission assessment and options for fetal monitoring in labour (based on NICE guidelines 2001 – 2007)
Intermittent auscultation

- Frequency of auscultation
  - At least for one full minute immediately after a contraction
  - At least every 15 mins in first stage of labour
  - At least every 5 mins in the second stage of labour

- Record maternal heart rate hourly
The Cardiotocograph

• Systematic Interpretation
  ▫ Baseline Rate
  ▫ Baseline Variability
  ▫ Accelerations
  ▫ Decelerations
  ▫ Uterine activity
  ▫ Plan of care

• Systematic assessment should be undertaken and documented every hour
Baseline rate

- Mean level of the Fetal Heart Rate (FHR) when stable excluding accelerations and decelerations
- Determined over 5-10 minutes
- Expressed in beats per minute (bpm)
  - 110-160 bpm = Reassuring
  - 100-109 bpm = Non-reassuring
  - 161-180 bpm = Non-reassuring
  - < 100 or >180 = Abnormal
Baseline variability

- Variability is the degree to which the baseline varies within a one minute period excluding accelerations and decelerations;

- Measured by analysing a 1 minute portion of a CTG and assessing the amplitude of change in the heart rate during this period (i.e., the difference in the number of bpm between the highest and lowest rate)

  - 5 or more bpm = Reassuring
  - <5 bpm for 40 to 90mins = Non-reassuring
  - < 5 bpm for 90mins or more = Abnormal
Baseline variability
Accelerations

- Transient increase in the FHR of 15 bpm or more lasting for 15 seconds or more;
- Recording of two or more accelerations in a 20 minute period is termed ‘reactive’;
- Excellent indicator of fetal well-being;
- If repeated accelerations are present with reduced variability, the FHR trace should be regarded as reassuring;

For classification:
- Present = reassuring
- None for 40mins = Non-reassuring
- Absence of accelerations on an otherwise abnormal trace is of unknown significance
Decelerations

- Transient decrease in the FHR of 15 bpm or more lasting for 15 seconds or more

- Classified into four types
  - Early decelerations
  - Late decelerations
  - Variable decelerations
  - Prolonged decelerations
Early Decelerations

- Gradual decrease and return to baseline
- The onset of the deceleration is at the onset of the contraction;
- FHR reaches lowest point at peak of contraction
- Recovery of FHR to baseline by end of contraction;
- Most commonly due to head compression;
- Appear in late 1st stage, 2nd stage and on vaginal examination;
- True, uniform early decelerations are rare;
- Not associated with fetal hypoxia, acidosis or low Apgar score;
- If persistent, pattern should be reassessed frequently;
- Classified as ‘non-reassuring’.
Late Decelerations

- Gradual decrease and return to baseline
- Late decelerations begin late in the contraction
- Onset at or after the peak of contraction
- Recovery occurs after the contraction has subsided
- Usually proportional to contractions
- Usually pathological when repetitive
- Persistent late decelerations of any magnitude are ominous

- Classification: Abnormal
Variable Decelerations

- Sudden decrease and rapid return to baseline
- Occur anytime during the contraction phase
- Vary in intensity and duration
- Most decelerations in labour are variable
- Associated with umbilical cord compression
- Typical variable decelerations for less than 90 minutes should be regarded as reassuring
- Baseline and variability between the decelerations should also be assessed
Atypical variable decelerations

- Atypical variable decelerations may indicate that the fetus is less able to cope with the cord compression;

- If atypical variable decelerations occur with more than 50% of contractions for over 30 minutes, they should be defined as abnormal indicating that further action is required.

- ...room for confusion here and criticism of dichotomizing variable decelerations
Prolonged decelerations

- Deceleration duration of at least 2 minutes;
- Abrupt onset;
- Usually drops at least 30 bpm from baseline;
- Variable in relation to contractions;
- Gradual recovery to baseline;

- If lasts for less than 3mins = non-reassuring;
- If lasts for more than 3mi = abnormal.
Tachycardia

- Baseline FHR >160bpm
- Cause should be identified
  - prematurity
  - fetal movement
  - maternal infection and/or pyrexia
  - fetal hypoxia
  - Dehydration
- Elevation in FHR by 20bpm above baseline, even if still normal, plus other non-reassuring features should raise concern.

- Uncomplicated tachycardia is reassuring
Bradycardia

- Baseline FHR < 110 bpm
- In association with loss of variability and decelerations a bradycardia is an ominous sign
- With variability > 5 bpm and no decelerations may be benign e.g., post term
Contraction assessment

- 4 Essential Characteristics
  - Frequency
  - Duration
  - Intensity
  - Resting Tone
# Categorisation of fetal heart rate traces

<table>
<thead>
<tr>
<th>Feature</th>
<th>Baseline (bpm)</th>
<th>Variability (bpm)</th>
<th>Decelerations</th>
<th>Accelerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reassuring</td>
<td>110-160</td>
<td>= &gt;5</td>
<td>None</td>
<td>Present</td>
</tr>
<tr>
<td>Non-reassuring</td>
<td>100-109</td>
<td>&lt; 5 for</td>
<td>Early deceleration</td>
<td>The absence of accelerations with an otherwise normal cardiotocograph is of uncertain significance</td>
</tr>
<tr>
<td></td>
<td>161-180</td>
<td>= &gt;40 but less than 90 minutes</td>
<td>Variable deceleration</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Single prolonged deceleration up to 3 minutes</td>
<td></td>
</tr>
<tr>
<td>Abnormal</td>
<td>&lt; 100</td>
<td>&lt; 5 for = &gt;90 minutes</td>
<td>Atypical variable decelerations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 180</td>
<td>Sinusoidal</td>
<td>Late decelerations</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>significance</td>
<td>Single prolonged deceleration &gt; 3 minutes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>pattern = &gt;10 minutes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Categorisation of fetal heart rate traces

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>A cardiotocograph where all four features fall into the reassuring category</td>
</tr>
<tr>
<td>Suspicious</td>
<td>A cardiotocograph whose features fall into one of the non-reassuring categories and the remainder of the features are reassuring</td>
</tr>
<tr>
<td>Pathological</td>
<td>A cardiotocograph whose features fall into two or more non-reassuring categories or one or more abnormal categories</td>
</tr>
</tbody>
</table>
Classification

- 4 Essential Characteristics
  - Frequency
  - Duration
  - Intensity
  - Resting Tone
Summary

- Intermittent auscultation for low-risk women;
- Continuous cardiotocography for women with risk factors ***;
- Admission CTG not recommended as routine;
- Frequency of intermittent auscultation;
- Systematic interpretation of CTG;
- Classification of tracings is a blunt instrument;
- Documented plan of care.
Looking forward

• If you do only one thing when you return to your unit

• .....adopt a genuine multidisciplinary approach to fetal monitoring education;

• ....ok, two things.....cardiotocography is not innocuous; consider carefully its benefits and harms and inform women.
References


This tracing is from a 28 year old gravida 2, para 1. No relevant past history. Normal antenatal period. Admitted at 41 weeks gestation for induction of labour. 06:00hrs, Cervical os 4-5cm dilates, cephalic presentation -1 to ischial spines, clear liquor, syntocinon infusing. 06.40hrs, CTG as below.