Understanding & Interpretation of Fetal Cardiotocograph.

PROMPT teaching.
Arrowe Park.
2014/15
AIMS

• **Update** New NICE Guidelines
  • Clinical Guideline 190. Intrapartum Care: Care of healthy women and their babies during childbirth. 3/12/14
  • Changes to CTG interpretation and management

• **At the end of this session you will be able to:**
  • Identify risk factors.
  • Be aware of the 4 features of the CTG.
  • Classify the features
  • Categorise the CTG
  • Develop a plan
  • Relate the basic physiology of the fetal heart and hypoxia to manifestations on the CTG.
Intrapartum care (CG190)

• New (updated) guideline
• Main Changes:
  – Place of Birth advice
  – CTG interpretation

  – Covers 37+0 – 41+6 weeks
  – ‘Low risk women’ at onset of labour
    • 90% of women - single baby, > 37 weeks, cephalic
    • 2/3 labour spontaneously.
Risk Factors: lots (including)

- Previous C/S.
- Pre-eclampsia.
- Post term pregnancy (>42 weeks)
- PROM.
- Induced labour.
- Diabetes.
- APH.
- Other maternal medical diseases
- IUGR.
- Prematurity.
- Oligohydramnios.
- Abnormal doppler.
- Multiple pregnancy.
- Meconium stained liquor
- Malpresentation.
Risk Factors – how to document

Millennium changes:
Once the risk factor is entered, it will automatically be there when the field is opened again.

Also – once completed these risks are present on the whiteboards.
CTG features

• 4 Features
  • Baseline
  • Variability
  • Accelerations
  • Decelerations

• Individual features of a CTG can be:
  • Normal / Reassuring
  • Non reassuring
  • Abnormal
Overall Interpretation of CTGs (in labour)

• All CTGs should have assessment of the features and THEN be categorised and interpreted.
• There are ONLY 3 categories:
  – NORMAL
  – NON RE-ASSURING
    (Change from suspicious)
  – ABNORMAL
    (Change from pathological)
## Standards for continuous EFM

### AUDITABLE STANDARDS – b. Continuous Electronic Fetal Monitoring

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>All women who undergo continuous EFM should have the following recorded on the CTG – name, date, time, hospital number, mode, time of delivery and signature of delivery personnel</td>
</tr>
<tr>
<td>2.</td>
<td>All intrapartum events should be recorded at the time of event, <strong>signed and time noted on the CTG</strong></td>
</tr>
<tr>
<td>3.</td>
<td>All practitioners must document a <strong>systematic assessment</strong> of the trace in the patient’s health care records <strong>every hour</strong></td>
</tr>
<tr>
<td>4.</td>
<td>In the event where an opinion is sought this must be recorded on the CTG and within the health care records</td>
</tr>
<tr>
<td>5.</td>
<td>In all women where a suspicious or pathological trace is identified the resuscitation measures and actions (delivery / FBS) should be documented in the health care records</td>
</tr>
<tr>
<td>6.</td>
<td>In all women an <strong>hourly ‘Fresh Eyes’ review</strong> is completed, assessment documented on the CTG and health care records, dated and signed by the health care professional</td>
</tr>
</tbody>
</table>
Develop a plan

• The plan needs to take into account
  • Risk factors
  • Interpretation of CTG
  • Progress of labour

• It should include:
  • When the CTG is planned to be formally assessed again
  • Minimum of hourly review

• Plan should be documented: in Millennium
- Category on CTG (AND Sign and write name)
- In Millennium
<table>
<thead>
<tr>
<th>Description</th>
<th>Feature</th>
<th>Baseline variability (beats/minute)</th>
<th>Baseline (beats/minute)</th>
<th>Decelerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal/reassuring</td>
<td>100–160</td>
<td>5 or more</td>
<td>100–160</td>
<td>None or early</td>
</tr>
<tr>
<td>Non-reassuring</td>
<td>161–180</td>
<td>less than 5 for 30–90 minutes</td>
<td>Above 180 or below 100</td>
<td>Variable decelerations:</td>
</tr>
<tr>
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<td>- dropping from baseline by 60 beats/minute or less and taking 60 seconds or less to recover.</td>
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<td>- present for over 90 minutes</td>
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<td></td>
<td>- occurring with over 50% of contractions</td>
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<td>OR</td>
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<td></td>
<td>Late decelerations:</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- present for up to 30 minutes</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td>- occurring with over 50% of contractions</td>
</tr>
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<td></td>
<td></td>
<td>OR</td>
</tr>
<tr>
<td>Abnormal</td>
<td>Above 180 or below 100</td>
<td>Less than 5 for over 90 minutes</td>
<td>100–160</td>
<td>Non-reassuring variable decelerations (see row above):</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- still observed 30 minutes after starting conservative measures</td>
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<td></td>
<td></td>
<td></td>
<td>- occurring with over 50% of contractions</td>
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<td></td>
<td>OR</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>Late decelerations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- present for over 30 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- do not improve with conservative measures</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>- occurring with over 50% of contractions</td>
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<td></td>
<td></td>
<td>OR</td>
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<td></td>
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<td></td>
<td>Bradycardia or a single prolonged deceleration lasting 3 minutes or more</td>
</tr>
</tbody>
</table>

Abbreviation: CTG, cardiotocography.

Intrapartum care: NICE guideline CG190 (December 2014).

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<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
<th>Interpretation</th>
<th>Management</th>
</tr>
</thead>
</table>
| CTG is normal/reassuring | All 3 features are normal/reassuring | Normal CTG, no non-reassuring or abnormal features, healthy fetus | • Continue CTG and normal care.  
• If CTG was started because of concerns arising from intermittent auscultation, remove CTG after 20 minutes if there are no non-reassuring or abnormal features and no ongoing risk factors. |
| CTG is non-reassuring and suggests need for conservative measures | 1 non-reassuring feature AND 2 normal/reassuring features | Combination of features that may be associated with increased risk of fetal acidosis; if accelerations are present, acidosis is unlikely | • Think about possible underlying causes.  
• If the baseline fetal heart rate is over 160 beats/minute, check the woman’s temperature and pulse. If either are raised, offer fluids and paracetamol.  
• Start 1 or more conservative measures:  
  - encourage the woman to mobilise or adopt a left-lateral position, and in particular to avoid being supine  
  - offer oral or intravenous fluids  
  - reduce contraction frequency by stopping oxytocin if being used and/or offering tocolysis  
• Inform coordinating midwife and obstetrician. |
| CTG is abnormal and indicates need for conservative measures AND further testing | 1 abnormal feature OR 2 non-reassuring features | Combination of features that is more likely to be associated with fetal acidosis | • Think about possible underlying causes.  
• If the baseline fetal heart rate is over 180 beats/minute, check the woman’s temperature and pulse. If either are raised, offer fluids and paracetamol.  
• Start 1 or more conservative measures (see ‘CTG is non-reassuring…’ row for details).  
• Inform coordinating midwife and obstetrician.  
• Offer to take a FBS (for lactate or pH) after implementing conservative measures, or expedite birth if an FBS cannot be obtained and no accelerations are seen as a result of scalp stimulation  
• Take action sooner than 30 minutes if late decelerations are accompanied by tachycardia and/or reduced baseline variability.  
• Inform the consultant obstetrician if any FBS result is abnormal.  
• Discuss with the consultant obstetrician if an FBS cannot be obtained or a third FBS is thought to be needed. |

Intrapartum care: NICE guideline CG190 (December 2014)

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Implementation discussion points

• Difficult to classify all decels within NICE
  – What if decelerations are greater than 60bpm AND longer than 60s? How long can you observe these?

• What if conservative measures are commenced early?
  – Eg: If conservative measures started after 10min of decelerations greater than 60seconds, is there an abnormal feature at 40min after they started or can you wait until 60min?

• How can we easily describe them?
  – Very confusing to discuss greater than 60, less than 60 etc….

• This is all part of implementing a new guideline and comments are welcome
A suggested way forward.....

<table>
<thead>
<tr>
<th>INTRAPARTUM CTG</th>
<th>Reassuring features</th>
<th>Non-reassuring features</th>
<th>Abnormal features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline Rate</td>
<td>100-160.</td>
<td>161-180.</td>
<td>Less than 100.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>More than 180.</td>
</tr>
<tr>
<td>NB. Rising baseline rate even within normal range may be of concern if other non-reassuring or abnormal features are present</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variability (bpm)</td>
<td>5bpm or more</td>
<td>Less than 5bpm for 30-90 min</td>
<td>Less than 5bpm for 90 min</td>
</tr>
<tr>
<td>Accelerations</td>
<td>Present</td>
<td>Absent (uncertain significance)</td>
<td></td>
</tr>
<tr>
<td>Decelerations</td>
<td>None</td>
<td>Variable &gt;50% contractions &lt;60bpm AND &lt;60s &gt;90min</td>
<td>Variable &gt;50% contractions &lt;60bpm AND &lt;60s &gt;90min+30min conserv. measures</td>
</tr>
<tr>
<td></td>
<td>Decels present, but not abnormal or non-reassuring</td>
<td>Variable &gt;50% contractions &gt;60bpm OR &gt;60s up to 30min</td>
<td>Variable &gt;50% contractions &gt;60bpm OR &gt;60s. up to 30min + 30min conserv. measures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Variable &gt;50% contractions &gt;60bpm AND &gt;60s up to 30min</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Late decels &gt;50% contractions &lt;30min</td>
<td>Late decels &gt;50% contractions &gt;30min</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Single prolonged decel &lt;3min</td>
<td>Single prolonged decel &gt;3min</td>
</tr>
</tbody>
</table>

NB. If CTG has any non-reassuring or abnormal features present from commencement, it may not be appropriate to wait 30 or 90 minutes before requesting review.

| OPINION | Normal CTG (all 4 features reassuring) | Non reassuring CTG (1 non-reassuring feature) | Abnormal CTG (2 or more non-reassuring features or 1 or more abnormal feature) |

- The wording has been deliberately kept brief, so it can directly correspond with wording on Millennium.
- These reference charts can be available on your person, and at computer stations as a guide.
- Although initial changes have been made in Millennium, there are some additional things suggested here, which will be added if agreed.
CTG Features
Features: FH Baseline

- 100-160bpm – Reassuring
  - Change from 110bpm

- 161-180bpm - Non-reassuring

- <100bpm; >180bpm - Abnormal
Baseline rate
Features: Variability

- ≥5bpm - Reassuring.
- <5bpm for more than 30 minutes, but less than 90 minutes – Non-reassuring
  
  Change from 40 mins to 30min

- <5bpm for 90 minutes or more - Abnormal.
Variability

![Variability Graph]
Variability (continued)

- Indicates integrity of the autonomic nervous system.
  - Sympathetic and parasympathetic nervous system mature at different rates
    - Preterm fetus – higher baseline rate
    - Sympathetic – accelerations
    - Parasympathetic – if suppressed causes decreased variability

- Common reasons for reduced variability
  - Sleep phase.
  - Hypoxia.
  - Prematurity.
  - Tachycardia.
  - Drugs (sedatives, anti-hypertensives acting on CNS & anaesthetics).
  - Local anaesthetic.
  - Congenital malformation (CNS more than CVS)
  - Cardiac arrhythmias.
  - Fetal anaemia.
  - Fetal Infection.
Features: Decelerations.

- Definition
  - Drop from baseline rate by 15 beats or more, for 15 seconds or more

- Early
- Variable
  - Removed typical and atypical (!!!!!!!)

- Late
Features: Decelerations (Early)

- Early decelerations
  - Commonly due to fetal head compression
    - A rise in intracranial pressure stimulates vagal nerve = bradycardia.
  - Occur with uterine contractions,
  - Are symmetrical in shape
  - Recover to the baseline as contraction ends.

- True early decelerations are RARE
  - They only occur in late stage of labour, during VE & ARM when the fetal head is under pressure.
  - Do not indicate hypoxia; so are a Reassuring feature
Features: Decelerations (Late)

- Late decels, more than 50% of contractions, for less than 30 min
  - Non-reassuring feature
- Late decels, more than 50% of contractions, for more than 30 min
  - Abnormal feature.

To be considered late decelerations they must be:
- Repetitive
- Similar in shape and timing

Pathophysiology
- There is a reservoir of oxygenated blood in the retroplacental space.
- As the contraction begins the FHR remains stable because 02 in the reservoir is utilised.
- This reserve runs out & the uteroplacental flow is restricted by the peak of the contraction. Therefore, the hypoxic late deceleration begins.
- It does not recover until after the end of the contraction when full oxygenation is resumed.
Late decelerations

Figure 5.5 Late decelerations
Features: Decelerations (Variable)

- Vary in shape, duration & depth.

- Are associated with cord compression.
  - Normal well grown fetuses can tolerate cord compression for a period of time before they become hypoxic.
  - Growth restricted fetuses do not have the same resilience.

- Classification of feature depend on frequency AND duration
Features: Variable Decelerations

- Occurring less than 50% contractions - Reassuring feature

- Drop <60 bpm <60s to recover, >50% contractions, >90min. Non-reassuring feature

- Drop >60 bpm, OR >60s to recover, >50% contractions, <30min. Non-reassuring feature

- Drop <60 bpm <60s to recover, >50% contractions, >90min. Continuing after 30min conservative measure, ie 120min. Abnormal feature

- Drop >60 bpm, OR >60s to recover, >50% contractions, >30min. Continuing after 30min conservative measure, ie 60min. Abnormal feature
Variable decelerations <60bpm / <60s – (previously these were typical decelerations)
Variable decelerations - >60bpm / >60s
(previously these were atypical)
CTG Categorisation
Case discussion
Case

- T+3
- Primip
- Normal AN course
- Long latent phase
  - In labour 17.30. 4cm
- Epidural
  - CTG commenced
  - Epidural resited (20.45)

- ARM 21.30 (4cm). Synto commenced
Normal

Categorisation?
- Baseline
  - 100-160 (145) Reassuring (but rising)
- Variability
  - >5bpm Reassuring
- Accelerations
  - Present Reassuring
- Decelerations
  - (Occasional <50%) Reassuring
Non-reassuring
Plan: Conservative measures

Categorisation?
- Baseline
  - 161-180 (165) Non-reassuring
- Variability
  - >5bpm Reassuring
- Accelerations
  - Absent Significance unknown
- Decelerations
  - Present
  - <60bpm<60s >50% <90min ‘Reassuring’

Previous (Pathological)
- Baseline
  - Non-reassuring
- Variability
  - Reassuring
- Accelerations
  - Significance unknown
- Decelerations
  - Typical >50% <90min
  - Atypical>50% <30min
  - Non-reassuring
- FBS 7.298, 7.302
**Abnormal**

**Plan:** FBS (and conservative measures)

FBS 7.28, 7.29

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**Categorisation?**
- Baseline
  - 161-180 (170) Non reassuring
- Variability
  - <5bpm Non-reassuring
  - 30-90min Non-reassuring
- Accelerations
  - Absent Significance unknown
- Decelerations
  - Present Abnormal
  - <60bpm, <60s, >50%, >90min +30
  - Occasional >60bpm, >60s

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**Previous (Pathological)**
- Baseline
  - Non reassuring
- Variability
  - <5bpm Non-reassuring
  - 40-90min
- Accelerations
  - Absent Significance unknown
- Decelerations
  - Atypical >50% >30min Abnormal
Abnormal

Plan: FBS (and conservative measures)

Categorisation?
Baseline
- 161-180 (170) Non-reassuring
Variability
- ?>5bpm Reassuring
Accelerations
- Absent Significance unknown
Decelerations
- Present Abnormal
  - <60bpm, <60s, >50%, >90min+30
  - Occasional >60bpm, >60s

Previous (Pathological)
- Baseline
  - Non-reassuring
- Variability
  - Reassuring
- Accelerations
  - Significance unknown
- Decelerations
  - Atypical & typical
    - >50% >30min Abnormal
- FBS not done at this stage as 2 normal and CTG no change
Abnormal

Plan:
NVD.
Apgars 8(1), 10(5)

Categorisation?
• Baseline
  • 161-180 (170) Non-reassuring
• Variability
  • >5bpm Reassuring
• Accelerations
  • ?Absent Significance unknown
• Decelerations
  • Present
    • <60bpm, <60s, >50%, >90min +30 Abnormal

Previous (Pathological)
• Baseline
  • Non-reassuring
• Variability
  • Reassuring
• Accelerations
  • Significance unknown
• Decelerations
  • Atypical >50% >30min
  • Abnormal
Classification of fetal blood sample results

<table>
<thead>
<tr>
<th>pH</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 7.25</td>
<td>Normal</td>
</tr>
<tr>
<td>7.21–7.24</td>
<td>Borderline</td>
</tr>
<tr>
<td>≤ 7.20</td>
<td>Abnormal</td>
</tr>
</tbody>
</table>

NICE also made a recommendation on use of lactate (if available), but this is not in use.
• CTG teaching
  • Wednesday morning 08.00
  • Room 17 Delivery Suite (Tweetching room)
  • Bring interesting cases (or ones that have caused debate!!)
Group Work.

- Identify Risks Factors.
  - Review the ante-natal / labour history.
- Categorise them.
- Develop a plan
  - Does it need senior review?
  - When does it need to be reviewed again?
- Can you apply the physiology to them?
- Any Questions?
References.

- PROMPT manual. Version 2
- Dr. C. Bravado. Advanced Life Support in Obstetrics. A.L.S.O.