MATERNITY UNIT
GUIDELINE:

FETAL HEART RATE ASSESSMENT AND MONITORING – ANTENATAL AND INTRAPARTUM

AUTHOR:
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SCOPE:
All midwives and obstetricians working in maternity and antenatal clinic

PURPOSE:
To provide guidance on the recommended ways of fetal monitoring to highlight national evidence based practice in order to maximise the safety of the fetus in utero during the antenatal period, labour and childbirth.

DEFINITIONS:
- EFM = Electronic fetal monitoring
- FHR = Fetal heart rate
- CTG = Cardiotocograph
- IA = Intermittent auscultation
- FSE = Fetal Scalp Electrode

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1. Antenatal (antepartum) Fetal Monitoring

There is no evidence to support routine antenatal electronic assessment in uncomplicated pregnancies. If such monitoring is indicated, it should not be performed below the age of viability, normally before 24 weeks gestation. However, antepartum FHR monitoring is recommended where the risk of fetal compromise is increased: see Appendix 1.

CTG monitoring is performed and documented in the prescribed method whether for antepartum or intrapartum monitoring (see section 2)
Parameters of an antepartum CTG
FH baseline = 110 – 160. At 20 weeks gestation the average FHR is 155 bpm, while at 30 weeks it is 144 bpm.

Accelerations = advancing gestational age is associated with increased frequency and amplitude of FHR accelerations. Before 30 weeks the accelerations are typically only 10 beats per minute for 10 seconds rather than 15 beats for 15 seconds as is normally seen by fetuses>30 weeks. Fifty percent of fetuses will demonstrate accelerations with fetal movements at 24 weeks. By 30 weeks >95% of fetus’s will demonstrate accelerations with fetal movements. Accelerations are a reassuring component of EFM.

Variability = variability is rarely present before 24 weeks. Loss of variability is an abnormal finding after 28 weeks gestation. Variability is a reassuring component of EFM.

Decelerations = short, sharp decelerations typically reflect a mild reduction in fetal oxygen tension. Repetitive, deep, prolonged decelerations reflect a more severe abnormality that eventually may become associated with metabolic acidosis and fetal compromise.

Contractions = are not normally present, though some mild uterine activity may be recorded due to ‘Braxton Hicks’. The antenatal CTG should have a fetal movement counter so that accelerations and decelerations are seen as a response to fetal movements as the ‘stressor’ rather than uterine activity.

A high baseline rate, loss of variability, or deep prolonged decelerations, are usually signs of fetal compromise and the obstetrician must be informed immediately and a management plan documented in consultation with the woman and her LMC.

If there are no accelerations over a 40 minute period, this could be due to fetal immaturity, quiet fetal sleep, maternal smoking, fetal neurological or cardiac anomalies, sepsis, or maternal ingestion of drugs with cardiac effects. However, it could also represent fetal hypoxaemia or acidosis. If no accelerations are present then consult with an obstetrician and a management plan can be formulated.
2. Procedure for use of a CTG

Informed consent should be obtained from the woman prior to the CTG. The woman should be asked if she wishes to empty her bladder prior to the fetal monitoring. Obtain a specimen if required. A fetal movement event marker should be available for antenatal fetal monitoring and the woman instructed on its use. The CTG paper speed should be set at 1cm per minute.

Prior to performing a CTG, an abdominal palpation should be performed in order to assess the position and lie of the fetus. Telemetry fetal monitoring may be used to enable the woman to move around or go to the toilet during an antenatal or intrapartum tracing, unless her condition requires her to be immobile.

The following details must be written clearly onto the start of the CTG:

- Name and NHI (patient label may be used or printed correct information from the new CTG monitors)
- Date and time of commencement (and this MUST be checked on the monitor as being correct)
- The maternal pulse and any other relevant observations taken
- The gestation of the pregnancy
- The reasons for the CTG
- Signature and printed name of the midwife commencing the CTG

Any significant events should be recorded by hand or electronically using ‘note entry’ onto the CTG during the tracing, including change of maternal position, medication administered, vaginal examination, obstetrician present, membrane rupture, insertion of epidural, etc. and the midwife/ O & G should sign their name on the entry on the trace. All entries should be signed.

The Mnemonic DR C BRAVADO (ALSO 2008) is recommended to be used for any method of fetal monitoring:

<table>
<thead>
<tr>
<th>Determine Risk</th>
<th>Contractions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline RAtE</td>
<td>Variability</td>
</tr>
<tr>
<td>Accelerations</td>
<td>Decelerations</td>
</tr>
<tr>
<td>Overall assessment and plan</td>
<td></td>
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</tbody>
</table>

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Authorised By: HOD Obstetrics
Clinical Care Manager WCY

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Date last review completed: March 2016
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However, if a CTG is performed, please enter details into the woman’s Maternity Clinical Information System (MCIS) records which are found under Tests and procedures/CTG monitoring or within the labour assessment note.

If a consultation is warranted, **this would normally be with an obstetrician.** If the consultation is with another midwife, it is imperative that the advice given is documented in MCIS.

The FHR should always be assessed following:
- Artificial rupture of the membranes (ARM) or spontaneous ROM
- Vaginal examination
- Abnormal uterine activity
- External cephalic version

At the end of the CTG, the midwife stopping the trace MUST record the time, sign her name, state whether the tracing is normal or abnormal and what action will be taken & complete record in MCIS. The CTG is to be filed securely in the hospital records, using the designated envelope and numbered to match the number on the envelope including the date and time.

3. **Intrapartum Fetal Monitoring**

   a. **Initial Risk Assessment**
   b. **Intermittent Auscultation**
   c. **Intermittent EFM**
   d. **Continuous EFM**
   e. **Management of Abnormal FHR patterns suggestive of fetal compromise**
   f. **Use of Fetal Scalp Electrode (FSE)**

   a. **Initial risk assessment for intrapartum fetal monitoring**

   Women coming into the maternity unit in labour should have the FHR assessed during the initial abdominal palpation. The maternal pulse should be palpated simultaneously with the FHR auscultation in order to differentiate between maternal and fetal heart rates. All women should also have an initial risk assessment and consideration of the most appropriate method of fetal monitoring required. The risk assessments used on this unit are those developed by RANZCOG (see Appendix 2, 3 & 4).

   Understanding of the fetal physiology is crucial for recognizing a normal or abnormal fetal heart rate pattern during labour and birth (See Appendix 5).

   **Continuous monitoring or intermittent auscultation:**

   Decisions regarding the use of either continuous EFM or IA in low risk pregnancies should balance the potential increased risks of intervention (caesarean section and instrumental vaginal
delivery) against possible neonatal benefits in a small number of labours. Informed consent for IA or EFM should be obtained from the woman, clearly explaining the rational and evidence for each method, obtaining verbal consent, and documenting the reasons for the management plan.

Continuous EFM is recommended at Hauora Tairawhiti maternity unit for labouring women with certain antenatal or intrapartum risk factors see Appendix 1, 2 & 3.

Admission CTG
There is insufficient evidence to confidently guide routine practice regarding the use of admission CTG in low risk women. Women and their LMCS should decide whether or not to use admission CTG after considering risk factors (Appendix 1, 2 & 3).

b. Intermittent auscultation:
IA is recommended as a minimum for women who, at the onset of labour, are identified as having a low risk of developing fetal compromise. It should be performed using a hand held Doppler and not a pinnard. An abdominal palpation should be performed to determine the position of the fetus and the maternal HR should be differentiated from the FHR.

Auscultation of the fetal heart rate in labour should occur during the contraction and for at least 30 seconds after the contraction has finished. Only in this way do we have any chance of hearing decelerations. In the absence of any identifiable risk factor, IA should occur:

- at least every 30 minutes in the active phase of the first stage (i.e. after 4cm dilation
- at least every 5 minutes in the second stage
- during and for at least 30 seconds after each contraction in active second stage

Documentation should be completed in the woman’s MCIS records and include:
- When the FH was listened to in relation to the contraction;
- The baseline rate;
- How long the FH was auscultated;
- Whether any accelerations were heard;
- Whether any decelerations were heard.

Continuous EFM should be offered and recommended if:
- there is evidence on IA of a baseline <110bpm or >160bpm
- there is evidence of any decelerations
- any intrapartum risk factors develop
c. Intermittent EFM:
EFM is useful to assess ‘baseline variability’ which cannot be assessed with IA, however, there is insufficient evidence to confidently guide routine practice regarding the use of intermittent EFM in low risk women. When using intermittent EFM in the first stage of labour it should be performed as follows:
• EFM should be undertaken for a minimum of 15 minutes at least every 2 hours.
• The episode of EFM should only be discontinued if the CTG is normal.
• IA should be undertaken as recommended under IA between episodes of EFM.
Please refer to Appendix 2.

d. Continuous EFM:
Hauora Tairawhiti maternity unit has cordless CTG monitors available. These should be used for all mobile women requiring continuous fetal monitoring during labour and in particular on women having a vaginal birth after caesarean section as they may have a higher chance of success if they mobilise during their labour. The cordless CTG transducers are waterproof so can be used for women using the pool.

Any midwife or obstetrician asked to provide an opinion on a CTG trace should note their findings on both the trace and MCIS.

All women with continuous EFM should be reviewed at least every 15 – 30 minutes and a record made of this in the notes.

There is reported to be a 50% false positive rate with intrapartum EFM. However, a normal trace is reassuring – especially a normal baseline with normal variability.

Both the cardio AND the toco MUST be monitored in EFM in order to accurately interpret the trace and straps adjusted to ensure a clear trace is obtained.

e. Management of Abnormal FHR patterns suggestive of fetal compromise
Fetal compromise in labour may be due to a variety of pathologies including placental insufficiency, uterine tachysystole or hypertonus, maternal hypotension, cord compression, infection and placental abruption.

Identification and management of reversible abnormalities may prevent unnecessary intervention and may include:
• Woman’s position – advise to adopt a change in position if concerns re FHR
• Woman is hypotensive (note if an epidural is in situ, stop the epidural infusion, move to left lateral, increase intravenous fluids, administer ephedrine and contact the anaesthetist urgently)
• Woman has just had a vaginal examination
• Woman has just emptied her bladder or bowels
• Woman has just had regional analgesia inserted or topped up
• Maternal hyperthermia/tachycardia (be aware maternal smoking increases HR)
• Hypertonic contractions
• ROM
• Rapid descent of the head
• APH
• Cord prolapse

If an abnormal trace occurs, consider:
• Conservative management (maternal position change, correct reversible causes, oxygen via face mask for woman, alert senior midwife/obstetrician)
• Stopping or reducing the syntocinon infusion (and notify O & G)
• Using tocolysis

However, if significant abnormalities persist, the obstetrician should be notified immediately.
During the second stage of labour, the Valsalva manoeuvre (forced pushing, chin on the chest, deep breath, etc) is NOT recommended as this has been shown to increase fetal hypoxia. Open glottis pushing is recommended by RANZCOG.

Also be aware of descent of the presenting part and therefore the placement of the cardio monitor. Be aware of inadvertently monitoring the maternal heart rate instead of the FHR. It is not normal to have accelerations with contractions in the second stage of labour, and if this happens it is likely that the maternal heart rate is being recorded not fetal – palpate the maternal pulse or apply the maternal ECG electrodes one just under each of the clavicles to confirm if the HR is maternal or fetal.

f. Use of Fetal Scalp Electrode
A fetal scalp electrode may be used when accurate external monitoring is not felt to be possible, (such as in extreme maternal obesity or a woman who is moving about uncontrollably) or if a more precise recording of the fetal heart rate pattern is desirable. It is an intervention, so should be used with informed consent from the woman. Please enter in a labour assessment note when the FSE has been applied.

FSE is contraindicated for use in the following cases:
• Hepatitis B positive women
• HIV positive women
• Women with active herpes infection
FSE should be used with caution in women who are GBS positive. If an FSE is used in these cases, the paediatrician should be informed following the birth. If a ventouse birth is contemplated, inform the obstetrician if a FSE application has been attempted but failed and how many times.

Post birth
If there has been an abnormal FHR, umbilical cord blood gas analysis should be performed and the results communicated to the obstetrician and paediatrician as indicated and documented in the records.

Following the birth, it is good practice for the midwife to sign and note the date, time and mode of birth on the EFM trace.

All CTG’s are to be filed securely in the hospital records, using an appropriate envelope.

If an FSE has been used, this should be noted on the office white board so that any appropriate observations may be done on the site.

ASSOCIATED DOCUMENTS:
Maternity unit guideline – Intrapartum fever
Maternity unit guideline – Umbilical cord blood gas analysis
Maternity unit guideline – Hepatitis B – Reducing the risk of mother-baby transmission
Maternity unit guideline - The management of pregnant and labouring women with HIV infection, and the care of the neonate
Maternity unit guideline – Management of infants born with meconium stained amniotic fluid and meconium aspiration
Maternity unit guideline – External Cephalic Version

REFERENCES:


Sponsor: Woman, Child and Youth

National Institute of Clinical Excellence (2015). NICE Clinical Guideline CG 190- Intrapartum care: Care of healthy women and their babies during childbirth


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Next Review Date: 06/04/2019
APPENDIX ONE

RANZCOG Clinical Guideline - Algorithm (2014)

Disclaimer: This algorithm is for general guidance only and is subject to a clinician’s expert judgement. The algorithm should not be relied on as a substitute for clinical advice.

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APPENDIX TWO

RANZCOG Risk factors indicating continuous intrapartum CTG

<table>
<thead>
<tr>
<th>Recommendations</th>
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</thead>
<tbody>
<tr>
<td>Antenatal and intrapartum risk factors that increase risk of fetal compromise. Intrapartum cardiotocography is recommended.</td>
</tr>
</tbody>
</table>

### Antenatal risk factors
- abnormal antenatal CTG
- abnormal Doppler umbilical artery velocimetry
- suspected or confirmed intrauterine growth restriction
- oligohydramnios or polyhydramnios
- prolonged pregnancy ≥ 42 weeks
- multiple pregnancy
- breech presentation
- antepartum haemorrhage
- prolonged rupture of membranes (≥ 24 hours)
- known fetal abnormality which requires monitoring
- uterine scar (e.g. previous caesarean section)
- essential hypertension or pre-eclampsia
- diabetes where medication is indicated or poorly controlled, or with fetal macrosomia
- other current or previous obstetric or medical conditions which constitute a significant risk of fetal compromise (e.g. cholestasis, isoimmunisation, substance abuse)
- fetal movements reduced (within the week preceding labour)
- morbid obesity (BMI ≥ 40)
- maternal age ≥ 42
- abnormalities of maternal serum screening associated with an increased risk of poor perinatal outcomes (e.g. low PAPP-A < 0.4MoM)

<table>
<thead>
<tr>
<th>Intrapartum risk factors</th>
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</thead>
<tbody>
<tr>
<td>induction of labour with prostaglandin/oxytocin</td>
</tr>
<tr>
<td>abnormal auscultation or CTG</td>
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<tr>
<td>oxytocin augmentation</td>
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<tr>
<td>regional anaesthesia (e.g. epidural or spinal)* and paracervical block</td>
</tr>
<tr>
<td>abnormal vaginal bleeding in labour</td>
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<tr>
<td>maternal pyrexia ≥ 38°C</td>
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<tr>
<td>meconium or blood stained liquor</td>
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<tr>
<td>absent liquor following amniotomy</td>
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<tr>
<td>prolonged first stage as defined by referral guidelines</td>
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<tr>
<td>prolonged second stage as defined by referral guidelines</td>
</tr>
<tr>
<td>pre-term labour less than 37 completed weeks</td>
</tr>
<tr>
<td>tachysystole (more than five active labour contractions in ten minutes without fetal heart rate abnormalities)</td>
</tr>
<tr>
<td>uterine hypertonus (contractions lasting more than two minutes in duration or contractions occurring within 60 seconds of each other, without fetal heart rate abnormalities)</td>
</tr>
<tr>
<td>uterine hyperstimulation (either tachysystole or uterine hypertonus with fetal heart rate abnormalities)</td>
</tr>
</tbody>
</table>

*Following a decision to insert an epidural block, a CTG should be commenced to establish baseline features prior to the block's insertion.
### APPENDIX THREE

**Conditions where intrapartum CTG is not indicated if in isolation**

Conditions where intrapartum cardiocotography is not indicated when the condition occurs in isolation, but if multiple conditions are present, intrapartum cardiocotography should be considered.

<table>
<thead>
<tr>
<th>Antenatal risk factors</th>
<th>Intrapartum risk factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>• pregnancy gestation 41.0 – 41.6 weeks’ gestation\textsuperscript{22,29,31}</td>
<td>• maternal pyrexia ≥ 37.8 and &lt; 38 degrees\textsuperscript{33}</td>
</tr>
<tr>
<td>• gestational hypertension\textsuperscript{35}</td>
<td></td>
</tr>
<tr>
<td>• gestational diabetes mellitus without complicating factors</td>
<td></td>
</tr>
<tr>
<td>• obesity (BMI 30-40)</td>
<td></td>
</tr>
<tr>
<td>• maternal age ≥ 40 and &lt; 42 years</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX FOUR

Descriptions of FHR patterns

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline fetal heart rate</td>
<td>The mean level of the fetal heart rate when this is stable, excluding accelerations and decelerations and contractions. It is determined over a time period of five or 10 minutes and expressed in bpm. Premature fetuses tend to have values towards the upper end of this range. A progressive rise in the baseline is important as well as the absolute values.</td>
</tr>
<tr>
<td>Normal Baseline</td>
<td>FHR 110-160 bpm</td>
</tr>
<tr>
<td>Baseline Bradycardia</td>
<td>&lt;110 bpm</td>
</tr>
<tr>
<td>Baseline Tachycardia</td>
<td>&gt;160 bpm</td>
</tr>
<tr>
<td>Baseline variability</td>
<td>The minor fluctuations in baseline FHR. It is assessed by estimating the difference in beats per minute between the highest peak and lowest trough of fluctuation in one minute segments of the trace between contractions.</td>
</tr>
<tr>
<td>Normal baseline variability</td>
<td>6-25 bpm at the baseline fetal heart rate</td>
</tr>
<tr>
<td>Reduced baseline variability</td>
<td>3-5 bpm*</td>
</tr>
<tr>
<td></td>
<td>*Caution should be exercised in interpreting variability in the presence of an external transducer.</td>
</tr>
<tr>
<td>Absent baseline variability</td>
<td>&lt;3 bpm</td>
</tr>
<tr>
<td>Increased baseline variability</td>
<td>&gt;25 bpm</td>
</tr>
<tr>
<td>Sinusoidal</td>
<td>A regular oscillation of the baseline FHR resembling a sine wave. This smooth, undulating pattern is persistent, has a relatively fixed period of 2-5 cycles per minute and an amplitude of 5-15 bpm above and below the baseline. Baseline variability is absent and there are no accelerations.</td>
</tr>
<tr>
<td><strong>Accelerations</strong></td>
<td>Transient increases in FHR of 15 bpm or more above the baseline and lasting 15 seconds. Accelerations in the preterm fetus may be of lesser amplitude and shorter duration. The significance of no accelerations on an otherwise normal CTG is unclear.</td>
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</tr>
<tr>
<td><strong>Decelerations</strong></td>
<td>Transient episodes of decrease of FHR below the baseline of more than 15 bpm lasting at least 15 seconds, conforming to one of the patterns below:</td>
</tr>
<tr>
<td><strong>Early decelerations</strong></td>
<td>Uniform, repetitive decrease of FHR with slow onset early in the contraction and slow return to baseline by the end of the contraction.</td>
</tr>
<tr>
<td><strong>Variable decelerations</strong></td>
<td>Repetitive or intermittent decreasing of FHR with rapid onset and recovery. Time relationships with contraction cycle may be variable but most commonly occur simultaneously with contractions.</td>
</tr>
</tbody>
</table>
| **Complicated variable decelerations** | The following additional features increase the likelihood of fetal hypoxia:  
  • Rising baseline rate or fetal tachycardia.  
  • Reducing baseline variability.  
  • Slow return to baseline FHR after the end of the contraction.  
  • Large amplitude (by 60 bpm or to 60 bpm) and/or long duration (60 seconds).  
  • Presence of smooth post deceleration overshoots (temporary smooth increase in FHR above baseline). |
| **Prolonged decelerations** | Decrease of FHR below the baseline for longer than 90 seconds but less than five minutes. |
| **Late decelerations** | Uniform, repetitive decreasing of FHR with, usually, slow onset mid to end of the contraction and nadir more than 20 seconds after the peak of the contraction and ending after the contraction. In the presence of a non-accelerative trace with baseline variability <5 bpm, the definition would include decelerations of <15 bpm. |