Maternity - Fetal Heart Rate Monitoring

Summary This Guideline provides guidance for antenatal and intrapartum fetal heart rate (FHR) monitoring as a fetal welfare assessment tool. The document provides background on electronic fetal heart rate monitoring (EFM), definitions of fetal heart rate (FHR) features, criteria for intermittent auscultation, criteria for continuous EFM, algorithms for the interpretation of antenatal and intrapartum FHR patterns, and a guide for clinical management including consultation and escalation.

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MATURENITY - FETAL HEART RATE MONITORING

PURPOSE

This Guideline provides guidance for antenatal and intrapartum fetal heart rate (FHR) monitoring as a fetal welfare assessment tool. The document provides background on electronic fetal heart rate monitoring (EFM), definitions of fetal heart rate (FHR) features, criteria for intermittent auscultation, criteria for continuous EFM, algorithms for the interpretation of antenatal and intrapartum FHR patterns, and a guide for clinical management including consultation and escalation.

KEY PRINCIPLES

This Guideline applies to all NSW Public Health Organisations (PHOs) providing maternity services. All NSW PHOs should have local guidelines to oversee the practice of antenatal and intrapartum fetal heart rate monitoring and related issues including:

- Antenatal and intrapartum intermittent auscultation
- Antenatal and intrapartum continuous electronic fetal heart rate monitoring
- Fetal scalp blood sampling
- Documentation
- Education and training
- Service capability.

USE OF THE GUIDELINE

The Chief Executives of NSW PHOs are responsible for the implementation of this Guideline within their services/facilities to ensure that local protocols or operating procedures are in place, aligned and consistent with the Guideline. All maternity services staff should be aware of the Guideline and actively participate in its implementation.

Office of Kids and Families will take responsibility for:

- Contractual arrangements with K2MS
- Provision of access to the K2MS Perinatal Training Program.

REVISION HISTORY

<table>
<thead>
<tr>
<th>Version</th>
<th>Approved by</th>
<th>Amendment notes</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
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<td>(PD2010_040)</td>
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ATTACHMENTS

1. Maternity - Fetal Heart Rate Monitoring: Guideline.
1 BACKGROUND

1.1 About this document

Electronic fetal heart rate monitoring (EFM), as a tool for fetal welfare assessment, has been in use since the early 1980’s. The electronic recording of the fetal heart rate (FHR) using a cardiotocograph (CTG) is a screening test that should be considered for use in the antenatal period, when there is a change in the maternal condition that has the potential to affect fetal wellbeing or, in the intrapartum period, when there are identified antenatal and/or intrapartum risk factors that may affect fetal wellbeing.

A FHR pattern with reassuring features is indicative of fetal wellbeing. However, a FHR pattern with non-reassuring and/or abnormal features requires further assessment of fetal welfare. During the antenatal period further assessment may include ultrasound examination and in the intrapartum period a fetal scalp blood sampling for pH or lactate is recommended.

Prior to the commencement of EFM, verbal consent should be obtained from the woman following an explanation of the reasons why EFM is being recommended and the associated risks and benefits of the procedure. The commencement of FHR monitoring should only be considered at a gestation where birth of the baby will be considered as an alternative to intrauterine life.

1.2 Purpose

This Guideline is to assist NSW Health maternity clinicians to:

- Identify the appropriate application and use of fetal welfare assessment tools
- Identify those pregnancies that would benefit from antenatal and/or intrapartum EFM to assess fetal welfare
- Utilise algorithms to assist in the interpretation and documentation of the FHR pattern and
- Appropriately escalate and develop management plans to improve neonatal outcomes.

1.3 Scope

This Guideline applies to all NSW Health maternity clinicians including: Obstetricians, GP Obstetricians, Trainees in Obstetrics and Gynaecology, Registered Midwives and Midwifery Students under the direct supervision of a Registered Midwife.

1.4 Definitions

**Baseline FHR:** The heart rate occurring between fetal movement and/or uterine activity where there is no stimulation to the fetus. Baseline FHR is measured between the areas of accelerations and/or decelerations averaged over a 10 minute period.

**Baseline Variability:** The moment-to-moment FHR changes from one beat to the next above and below the baseline averaged over one minute.
**Accelerations**: An increase in the FHR greater than 15 beats per minute (bpm) above the baseline for longer than 15 seconds.

**Reactivity**: A component of antenatal FHR assessment. For reactivity to be present two accelerations are required in any given 10 minute period.

**Decelerations**: A decrease in the FHR below the baseline of more than 15bpm lasting longer than 15 seconds. Decelerations can be classified as:

- **Early Decelerations**: Uniform, repetitive, periodic slowing of the FHR with onset early in the contraction and return to baseline at the end of the contraction.

- **Late Decelerations**: Uniform, repetitive, periodic slowing of the FHR with onset at the mid to end of the contraction and deepest point 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 less than 5bpm the definition would include decelerations less than 15bpm.

- **Variable Decelerations**: Variable, intermittent periodic slowing of FHR with rapid onset and recovery. Time relationships of the deceleration with the contraction cycle are variable and they may occur in isolation. Sometimes they resemble other types of deceleration patterns in timing and shape. Variable decelerations can be *Typical* or *Atypical variables*.

  - **Typical Variable Decelerations**:
    - Two shoulders: one preceding the deceleration and one following
    - Sudden fall and rapid return to baseline
    - Commonly look like a V.

  - **Atypical Variable Decelerations**: Variable decelerations with any of the following additional components:
    - Loss of primary or secondary rise in baseline rate
    - Slow return to baseline FHR after the end of the contraction
    - Prolonged secondary rise in baseline rate
    - Biphasic deceleration
    - Loss of variability during the deceleration
    - Continuation of the baseline rate at a lower level.

- **Prolonged Decelerations**: A sudden fall in the FHR for longer than 3 minutes.

- **Shallow Decelerations**: Repetitive decelerations that can occur in the antenatal FHR pattern. They are less than 15bpm in depth occurring in association with absent reactivity and reduced variability.

- **Sinusoidal FHR Pattern**: A regular oscillation of the baseline long-term variability resembling a sine wave. This smooth, undulating pattern, lasting at least 10 minutes, has a relatively fixed period of 3–5 cycles per minute and an amplitude of 5-15bpm above and below the baseline. Baseline variability is absent.
1.5 Expected outcomes

It is expected that this Guideline will:

- Develop consistency of practice for antenatal and intrapartum monitoring of the FHR either by auscultation or electronically using the CTG as a tool for fetal welfare assessment
- Define an expected level of EFM monitoring in pregnancies with identified risk factors
- Provide guidance for the performance and interpretation of fetal scalp blood sampling for the assessment of intrapartum fetal wellbeing.

2 ANTENATAL FHR MONITORING

2.1 Auscultation

Auscultation of the FHR at each antenatal visit provides little information other than demonstrating that the fetus is alive, and has no positive predictive value of fetal wellbeing\(^1\,^2\). However, listening to the fetal heart at each antenatal visit may provide reassurance to the woman and her family. It is therefore recommended that the woman be offered the opportunity to hear her baby's heart beat at each antenatal visit. This should be performed with a Pinard stethoscope or hand held Doppler device where available.

2.2 Antenatal EFM

There is no evidence to support the use of routine antenatal EFM in women with uncomplicated pregnancies\(^1\,^2\). Antenatal EFM from 26\(^{w0}\) weeks gestation should be commenced if:

- Risk factors develop throughout pregnancy
- There is a change in the maternal condition or
- There is any suspicion of inutero fetal compromise.

Antenatal EFM may be considered at gestations below 26\(^{w0}\) weeks following a multidisciplinary discussion with the woman regarding birth and neonatal management.

Situations where EFM should be considered:

- From 41\(^{w0}\) weeks (twice weekly)\(^3\)
- Amniotic fluid index (AFI) <5cm or >25cm
- Abnormal Doppler waveform studies
- A sudden elevation of blood pressure (BP) at a gestation where birth is considered as a treatment option
- Uncontrolled or progressing pre-eclampsia or hypertension\(^4\)
- Antepartum haemorrhage (APH)
- Pre and post administration of Prostaglandin\(^5\)
- Unstable gestational or insulin dependent diabetes
- Preterm rupture of the membranes <37\(^{w0}\) weeks
- Preterm uterine activity
- Intrauterine growth restriction (IUGR)
- Decreased fetal movements
- Prior to and following an attempted external cephalic version, or
- Any other obstetric conditions or procedures that increase the risk of fetal compromise.

*Note: This list is not exhaustive and should not replace clinical judgement.*

When performing antenatal FHR monitoring, constant surveillance, review and regular documentation is required.

Antenatal EFM episodes can be discontinued when:
- All features of the FHR pattern are reassuring, and
- The maternal condition stabilises e.g. bleeding subsides or contractions stop.

### 2.3 Frequency of Monitoring

The frequency of antenatal EFM is dependent on both the maternal and fetal condition. There are very few instances where regular routine antenatal EFM is warranted.

Frequent assessment of fetal condition using a CTG, should only be performed when there is significant risk to fetal welfare. For example where:
- Rupture of the membranes has occurred and liquor continues to drain
- There are abnormal Doppler waveform studies
- Pre-eclampsia is uncontrolled, or
- Gestational or insulin dependent diabetes is unstable.

Daily assessment of a fetal condition using a CTG is usually only performed antenatally on women who are inpatients with a significant maternal/fetal condition.

*Note: This list is not exhaustive and should not replace clinical judgement. EFM should only be repeated on the day if there is a change in the maternal condition. If concerns exist regarding fetal wellbeing, ultrasound assessment should be considered.*

### 2.4 Antenatal Evaluation of the FHR

There are no published guidelines to guide the interpretation of an antenatal FHR pattern. The Fetal Welfare, Obstetric emergencies and Neonatal resuscitation Training (FONT) Expert Advisory Group, comprised of experienced midwifery and obstetric clinicians from across NSW, therefore developed an antenatal algorithm to differentiate antenatal from intrapartum fetal heart rate pattern interpretation, based on contemporary literature and consensus from the members of this Expert Advisory Group. Table 1 demonstrates the range of findings for each FHR feature, colour coded to meet principles of the [Clinical Excellence Commission’s (CEC) Between the Flags](https://www.nsw.gov.au/health/practitioners-and-employees/nsw-cancer-guidelines-and-clinical-guidelines) safety program.
Rescinded

Maternity - Fetal Heart Rate Monitoring

Table 1. Antenatal FHR features

<table>
<thead>
<tr>
<th>Features</th>
<th>Contractions</th>
<th>Baseline Rate</th>
<th>Variability (bpm)</th>
<th>Reactivity (accelerations 2:10)</th>
<th>Decelerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reassuring</td>
<td>Nil</td>
<td>110–160</td>
<td>≥ 5</td>
<td>Present</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Present ≥37/40</td>
<td></td>
<td></td>
<td></td>
<td>Single isolated</td>
</tr>
<tr>
<td>Non-reassuring</td>
<td>Present &lt;37/40</td>
<td>100-109 or 161-179</td>
<td>≤ 5 for &gt; 30 mins</td>
<td>Absent &gt;30 mins</td>
<td>Repetitive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 25 for &gt; 15 mins</td>
<td></td>
<td>Shallow</td>
</tr>
<tr>
<td>Abnormal</td>
<td>Tonic &gt;2min</td>
<td>&lt; 100 or</td>
<td>≤ 5 bpm &gt; 40mins</td>
<td>Absent &gt;60mins</td>
<td>Prolonged &gt; 3 mins</td>
</tr>
<tr>
<td></td>
<td>≥6:10</td>
<td>&gt;180</td>
<td>Sinusoidal ≥ 10mins</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The subsequent management plan and clinical response are based directly on the evaluation of the individual FHR features. The management plan should be clearly documented in the woman’s clinical notes and may, on occasion, include changes to the calling criteria. Any changes to the calling criteria should only be made by an obstetrician or GP obstetrician and should be reviewed daily.

Table 2 outlines the recommended management plan and clinical response colour coded to assist with consultation and escalation. The complete algorithm developed for the evaluation and management of antenatal FHR patterns can be found in Appendix 1.

Table 2. Antenatal management plan and clinical response

<table>
<thead>
<tr>
<th>Features</th>
<th>Management Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reassuring features</td>
<td>Cease monitoring. All features of the fetal heart rate pattern are reassuring, and/or there is no perceived risk of fetal compromise as the maternal condition stabilises, e.g. bleeding placenta praevia.</td>
</tr>
<tr>
<td>Non-reassuring features</td>
<td>Keep monitoring with ongoing assessment. Escalate to the midwife in charge (Team Leader) or medical officer for review within 30 mins (do not give food or oral fluids).</td>
</tr>
<tr>
<td>Abnormal features</td>
<td>Escalate to a Rapid Response as per local CERS*, this should involve notifying a medical officer for immediate review. Consider further fetal welfare assessment and/or expediting birth.</td>
</tr>
</tbody>
</table>

*Clinical Emergency Response Systems (CERS)

3 INTRAPARTUM FHR MONITORING

Once established in labour, a full clinical assessment of the woman and her pregnancy should be undertaken. Some method of fetal welfare assessment is required during every labour. Where the pregnancy is assessed as normal risk Intermittent Auscultation (IA) is sufficient. Where there are identified antenatal or intrapartum risk factors, continuous EFM should be commenced (see Section 3.3.1 Table 3).

3.1 Admission CTGs

For women with no risk factors, there is no evidence to support the use of routine EFM on admission in labour and therefore, cardiotocography for low-risk women in established labour should not be performed. A Cochrane review found:

“no evidence of benefit for the use of the admission CTG for low-risk women on admission in labour. Furthermore, the probability is that admission CTG increases the caesarean section rate by approximately 20%. The data lacked power to detect possible important differences in perinatal mortality. However, it is unlikely that any trial, or meta-analysis, will be adequately powered to detect
such differences. The findings of this review support recommendations that the admission CTG not be used for women who are low risk on admission in labour. Women should be informed that admission CTG is likely associated with an increase in the incidence of caesarean section without evidence of benefit\textsuperscript{7}.

3.2 Intermittent Auscultation

For pregnancies assessed as having normal risk, and where labour is uncomplicated, the FHR should be monitored by Intermittent Auscultation (IA). In the first instance a Pinard stethoscope or binaural stethoscope should be used to identify the FHR. Auscultation of the fetal heart with a Pinard stethoscope helps to clearly identify the position of the fetus and the true presence of the fetal heart as distinguished from maternal heart rate. All further auscultation can be performed using a hand help Doppler\textsuperscript{8}.

IA during active labour should be performed towards the end and after a contraction for at least 60 seconds. It is recommended that the frequency of IA is:

- First stage: every 15 minutes
- Second stage:
  - Passive second stage (i.e. if the woman is not pushing): every 5 minutes
  - Active second stage (i.e. when woman is pushing): after each contraction.

Continuous EFM is recommended if, during IA, any of the following characteristics are identified:

- A baseline <110 or >160bpm
- Any decelerations in the FHR, and / or
- The development of any intrapartum risk factors.

“If continuous cardiotocography has been used because of concerns arising from intermittent auscultation but there are no non-reassuring or abnormal features on the cardiotocograph trace after 20 minutes, remove the cardiotocograph and return to intermittent auscultation”\textsuperscript{8}.

3.3 Continuous EFM

Prior to the commencement of continuous EFM the fetal heart should be auscultated with a Pinard stethoscope to confirm the true presence of the fetal heart as distinguished from maternal heart rate. At the commencement of continuous EFM the following information should be documented on the CTG trace:

- The woman’s name
- The woman’s medical record number
- Estimated gestation
- Maternal pulse rate
- Clinical indications for performing the EFM
- Time and date of commencement.

In situations where it is not possible to get a good quality FHR pattern with an external electrode, an internal electrode may be considered. Contraindications to the use of an internal electrode include:
3.3.1 Risk Factors requiring Intrapartum continuous EFM

There are a number of antenatal and intrapartum risk factors that guide the use of intrapartum continuous EFM. These risk factors are listed below in Table 3.

<table>
<thead>
<tr>
<th>Antenatal Risk Factors Requiring Intrapartum EFM</th>
<th>Intrapartum Risk Factors Requiring Intrapartum EFM</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;42³⁷ weeks</td>
<td>Induction or augmentation with oxytocin⁵</td>
</tr>
<tr>
<td>Amniotic fluid index (AFI) &lt;5cm or &gt;25cm</td>
<td>Significant meconium stained liquor (see section 5.1)</td>
</tr>
<tr>
<td>Abnormal Doppler waveform studies</td>
<td>EFM may be considered when light meconium staining is present following a full clinical assessment</td>
</tr>
<tr>
<td>A sudden elevation of BP &gt;25⁺⁰ weeks gestation</td>
<td>Any non-reassuring FHR feature heard on auscultation</td>
</tr>
<tr>
<td>Uncontrolled or progressing pre-eclampsia or hypertension⁴</td>
<td>Breech presentation</td>
</tr>
<tr>
<td>Antepartum haemorrhage (APH)</td>
<td>Multiple pregnancy</td>
</tr>
<tr>
<td>Unstable gestational or insulin dependent diabetes</td>
<td>Prolonged labour &gt;12 hours</td>
</tr>
<tr>
<td>Preterm rupture of the membranes &lt;37⁺⁰ weeks</td>
<td>Prolonged second stage &gt;2 hours</td>
</tr>
<tr>
<td>Preterm uterine activity</td>
<td>Vaginal birth after any previous caesarean section (VBAC)⁹</td>
</tr>
<tr>
<td>Intrauterine growth restriction (IUGR)</td>
<td>Prolonged rupture of membranes &gt;24 hours</td>
</tr>
<tr>
<td>Decreased fetal movements</td>
<td>Regional analgesia</td>
</tr>
<tr>
<td>Any other obstetric conditions that increases the risk of fetal compromise</td>
<td>Fresh vaginal bleeding that develops in labour.</td>
</tr>
</tbody>
</table>

Note: This list is not exhaustive and should not replace clinical judgement.

3.4 Promoting mobility in labour

Throughout the intrapartum period there will be women with identified risk factors requiring EFM where the FHR pattern is normal and the woman's progress in labour would benefit from ambulation. For this group of women intermittent EFM could be considered.

3.4.1 Procedure for Intermittent EFM

When intermittent EFM is planned:

- EFM should be attended for at least 15-20 mins every two hours through at least three contractions.

- The FHR pattern should be normal prior to ceasing continuous EFM and moving to intermittent EFM.

- IA should be performed every 15 mins according to the recommendations for IA (section 3.2) and the continuous EFM recommenced if any non-reassuring feature is heard on auscultation.
3.5 Intrapartum Evaluation of the FHR

An algorithm has been developed to assist clinicians to use a consistent approach in the interpretation, escalation, management, and documentation of intrapartum FHR patterns. The algorithm is colour coded in line with the principles of the CEC Between the Flags safety program. The complete algorithm can be found in Appendix 2.

3.5.1 Intrapartum FHR features

Table 4 demonstrates the range of findings for each FHR feature.

<table>
<thead>
<tr>
<th>Features</th>
<th>Contractions</th>
<th>Baseline Rate</th>
<th>Variability</th>
<th>Accelerations</th>
<th>Decelerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reassuring</td>
<td>≤5:10</td>
<td>110–160</td>
<td>≥ 5</td>
<td>Present or Absent ('the absence of accelerations with otherwise normal trace is of uncertain significance' and is therefore not of concern)</td>
<td>None or Early</td>
</tr>
<tr>
<td>Non-reassuring</td>
<td>6-7:10</td>
<td>100–109 or 161–179</td>
<td>&lt;5 for &gt;40 mins or &gt;25 for &gt;15mins</td>
<td></td>
<td>Typical variable &gt; 50% contractions &gt;90mins</td>
</tr>
<tr>
<td>Abnormal</td>
<td>&gt;7:10 or Tonic &gt;2mins</td>
<td>&lt;100 or &gt;180</td>
<td>&lt;5 for 90 mins or Sinusoidal ≥10 mins</td>
<td></td>
<td>Atypical variable &gt;50% for &gt;30 mins</td>
</tr>
</tbody>
</table>

3.5.2 Classification of an Intrapartum FHR pattern

The classification of an intrapartum FHR pattern is outlined in Table 5.

<table>
<thead>
<tr>
<th>Normal</th>
<th>A FHR pattern where all features are reassuring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspicious</td>
<td>A pattern where there is 1 non-reassuring feature</td>
</tr>
<tr>
<td>Pathological</td>
<td>A pattern where there are 2 or more non-reassuring or 1 or more Abnormal features</td>
</tr>
</tbody>
</table>

3.5.3 Intrapartum clinical response and management plan

The recommended clinical response for an intrapartum FHR pattern is provided in Table 6. Each time a FHR pattern is reviewed a management plan should be clearly documented in the woman’s clinical notes. This management plan may, on occasion, include changes to the calling criteria. Any changes to the calling criteria should only be made by an obstetrician or GP obstetrician and should be reviewed regularly during labour.

<table>
<thead>
<tr>
<th>Normal</th>
<th>Keep monitoring if maternal or fetal risks are unchanged. Consider intermittent electronic FHR monitoring if the woman needs to ambulate.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspicious</td>
<td>Keep monitoring with ongoing assessment. Escalate to the midwife in charge/Team Leader or medical officer for clinical review within 30mins.</td>
</tr>
<tr>
<td>Pathological</td>
<td>Consider further fetal welfare assessment (fetal blood sampling) and/or expediting birth. Escalate to a Rapid Response as per local CERS, this should involve notifying a medical officer for immediate review.</td>
</tr>
</tbody>
</table>
In the presence of a FHR pattern which is suspicious or pathological, strategies should be implemented to improve the maternal / placental blood flow and fetal oxygenation and thereby improve fetal wellbeing whilst awaiting medical review. These include the following:

- Cease oxytocics if in use
- In the presence of pathological FHR patterns and uterine hypercontractility (tachysystole) that does not reduce with the ceasing of IV oxytocics, tocolysis should be considered e.g. subcutaneous terbutaline 0.25 mg
- Increase hydration or IV fluids to avoid dehydration
- Change the maternal position (roll the woman onto her left side)
- Continue EFM
- Stay with the woman until FHR pattern returns to normal or a management plan has been defined.

In response to a suspicious or pathological FHR pattern, without maternal compromise, provision of maternal facial oxygen is not recommended. Prolonged use of maternal facial oxygen therapy may be harmful to the baby and should be avoided. There is no research evidence evaluating the benefits or risks associated with the short-term use of maternal facial oxygen therapy in cases of suspected fetal compromise.

Any decision about changes to a woman's care in labour when she is on a cardiotocograph monitor should also take into account the following:

- The woman's report of how she is feeling
- The woman's report of the baby's movements
- Assessment of the woman's wellbeing and behaviour
- The woman's temperature, pulse and blood pressure
- Whether there is meconium or blood in the amniotic fluid
- Any signs of vaginal bleeding
- Any medication the woman is taking
- The frequency of contractions
- The stage and progress of labour
- The woman's parity
- The results of fetal blood sampling if undertaken.

If fetal scalp stimulation leads to an acceleration in fetal heart rate, regard this as a reassuring feature. Take this into account when reviewing the whole clinical picture.

4 FETAL SCALP BLOOD SAMPLING

The positive predictive value of FHR pattern interpretation is poor and diagnosis of fetal compromise is best made by fetal scalp blood sampling (FBS). FBS (when available) should be performed in the presence of a pathological FHR pattern, unless there is very clear evidence of acute fetal compromise for example, a prolonged deceleration >3mins in duration. In this instance, time should not be wasted on FBS as an alternative to expediting birth.
4.1 Performing and interpreting FBS

FBS should be performed with the woman lying in the left lateral position. The decision to use either pH or lactate will be a local decision based on the availability of equipment and experience of staff. Table 7 provides guidance for the interpretation of FBS and suggested management.

Table 7. FBS interpretation and suggested management

<table>
<thead>
<tr>
<th></th>
<th>Normal</th>
<th>Suspicious</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>≥7.25</td>
<td>7.21-7.24</td>
<td>&lt; 7.20</td>
</tr>
<tr>
<td>Lactate</td>
<td>&lt;4.2</td>
<td>4.2 - 4.8</td>
<td>&gt; 4.8</td>
</tr>
<tr>
<td>Action</td>
<td>Repeat within one hour if the FHR abnormality persists</td>
<td>Repeat within 30mins if FHR abnormality persists</td>
<td>Expedite birth by most appropriate method</td>
</tr>
</tbody>
</table>

Interpretation of FBS results should take into account previous pH/lactate results, rate of progress in labour and clinical information.

4.2 Contraindications to FBS

There are a number of contraindications to FBS, these include:

- Maternal infection (for example, HIV, hepatitis viruses and herpes simplex virus)
- Fetal bleeding disorders (for example, haemophilia)
- Prematurity (less than 34 weeks)
- Malpresentation, including breech.

4.3 Response to Fetal Scalp Stimulation

Any acceleration in the fetal heart rate in response to fetal scalp stimulation should be interpreted as reassuring. If FBS is unsuccessful or contraindicated, use the fetal heart rate response after fetal scalp stimulation during a vaginal examination to elicit information about fetal wellbeing.

5 SPECIAL CONSIDERATIONS

5.1 FHR monitoring in the presence of meconium

EFM should be commenced in the presence of meconium stained liquor. The decision to commence continuous or intermittent EFM should be based on the clinical circumstances at that time, and made in consultation with the multidisciplinary team providing care for that woman.

The NICE Intrapartum Care Clinical Guideline (2014) recommends continuous EFM during labour in the presence of significant meconium only. This should be interpreted as either dark green or black amniotic fluid that is thick or tenacious, or any meconium-stained amniotic fluid containing lumps of meconium.

5.2 FHR monitoring in the presence of oxytocin

For all women receiving intravenous oxytocics, continuous EFM should be performed and the intrapartum algorithm should be used to interpret the FHR pattern.
If the FHR pattern is normal, oxytocin may be continued and increased until the woman is experiencing 4 or 5 contractions every 10 minutes. Oxytocin should be reduced if contractions occur more frequently than 5 contractions in 10 minutes.

If the FHR pattern is classified as suspicious, a clinical review by the team leader or a medical officer should be undertaken within 30 minutes.

If the FHR pattern is classified as pathological, oxytocin should be stopped and an immediate review by a medical officer should be requested. Further fetal welfare assessment e.g. fetal scalp blood sampling (if available), and/or expediting birth, should be considered at this point.

### 5.3 EFM <26+0 weeks gestation

In an otherwise normal neonate born between 23\(^{+0}\) and 25\(^{+6}\) weeks’ gestation, there is an increasing obligation to treat. However, following appropriate counselling, it is acceptable medical practice not to initiate intensive care if the parents wish. The decision for antenatal EFM should be made in conjunction with the parents’ wishes for initiation of intensive care. Ongoing consultation with the parents should occur as the gestation increases. In rural settings this consultation may occur by phone with the designated Level 6 facility.

Between 24\(^{+0}\) and 24\(^{+6}\) weeks, antenatal transfer to a tertiary centre for fetal reasons is indicated. The option of non-initiation of intensive care/resuscitation should be offered and decisions around antenatal EFM should be made in the context of the parents’ decisions regarding intensive care.

Between 25\(^{+0}\) and 25\(^{+6}\) weeks, antenatal transfer to a tertiary centre for active treatment is usually offered. However, the option of non-initiation of intensive care/resuscitation particularly in the presence of adverse fetal factors such as twin-to-twin transfusion, intrauterine growth restriction or chorioamnionitis, should also be discussed. Decisions about antenatal EFM should be made in the context of the parents’ decisions regarding care.

In those cases where decisions are made these need to be clearly articulated in the woman’s medical record and updated as decisions change or are confirmed over time.

### 5.4 EFM and Multiple Pregnancies

When EFM is required in a multiple pregnancy, all fetuses should be monitored simultaneously. Either a twin monitor or multiple machines should be used to ensure that each FHR is monitored and recorded.

### 6 DOCUMENTATION OF EFM

The accurate documentation of EFM interpretation and subsequent management plan are key to the provision of high quality maternity care. The FONT Expert Advisory Group have developed FHR labels to assist clinicians in the interpretation, escalation and documentation of antenatal and intrapartum FHR patterns. These labels have been developed in line with the ‘Between the Flags’ program and are recommended for use in all NSW Public Health Organisations. The FHR labels can be ordered via the Stream Solutions online ordering system for state forms (all Local Health Districts are registered...
to order via this system) and an example of the labels can be found in Appendix 3 and 4.

There are a number of requirements that clinicians should undertake with regards to the documentation, these include:

- The date and time on the CTG machine should be checked and correctly set prior to commencing the procedure.
- All FHR patterns should be labelled with the mother’s name, date and medical record number, estimated gestation, maternal pulse rate, clinical indications for performing the EFM, time and date of commencement.
- Any antenatal or intrapartum events that may affect the FHR pattern should be noted at the time on the FHR pattern, and should be signed and the date and time noted (for example, vaginal examination, FBS or epidural insertion).
- Antenatal FHR patterns are to be reviewed by two clinicians prior to ceasing the FHR pattern.
- A full interpretation of an antenatal FHR pattern is to be recorded in the clinical notes. The NSW Antenatal FHR label can be used for this documentation (Appendix 3).
- An intrapartum FHR pattern should be reviewed and signed every 15 minutes.
- A full interpretation of an intrapartum FHR pattern is to be recorded in the clinical notes every hour. The NSW Intrapartum FHR label can be used for this documentation (Appendix 4).
- Any member of staff who is asked to provide an opinion of a FHR pattern should note their findings along with the date, time and their signature either on the label or in the woman’s clinical notes.
- Following removal of the CTG, the ongoing management plan and the discussion that has occurred with the woman should be documented in the woman’s clinical notes.
- Following birth, the healthcare professional should sign and note the date, time and mode of birth on the FHR pattern.
- The FHR pattern should be stored securely with the woman’s medical record.

7 EDUCATION OF CLINICAL STAFF

NSW Health Information Bulletin IB2012_042 Fetal welfare assessment, Obstetric emergencies and Neonatal resuscitation Training (FONT) Program outlines the mandatory education and training requirements for all maternity clinician’s employed by NSW Health and includes a component related to fetal heart rate monitoring.

8 SERVICE CAPABILITY

Service Capability describes the level of planned activity and clinical complexity that a facility is capable of providing based on the ‘arrangement and mix of a suite of factors that enables the management of the level of acuity matched for that service’10. These
factors include: workforce, clinical policy, capability of the clinical support services available in each facility (e.g. pathology, diagnostic imaging) and the integration of the service within a wider health care network. Increasing the level of a service should not occur solely based on available human resources, in particular, clinical expertise.

Table 7 describes the levels of maternity service capability with reference to FHR monitoring requirements.

### Table 7: Levels of Maternity Service Capability and FHR Monitoring Requirements

<table>
<thead>
<tr>
<th>Level of maternity service capability</th>
<th>Description</th>
<th>FHR monitoring requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ambulatory antenatal care and postnatal care</td>
<td>Antenatal FHR monitoring can be considered at the request of, and in collaboration with, a clinician at a higher role delineated facility in situations where staff have met FONT requirements as outlined in NSW Health IB2012_042 Fetal welfare assessment, Obstetric emergencies and Neonatal resuscitation Training (FONT) Program</td>
</tr>
<tr>
<td>2</td>
<td>A Level 2 maternity service should plan to provide antenatal, intrapartum and postnatal care to women with no identified risks and those identified as category A1. May provide care to women with risks identified as category B following consultation and development of a management plan, with the relevant Tiered Maternity and Neonatal Network.</td>
<td>Antenatal FHR monitoring as per Level 1 above. Normal risk pregnancies require intermittent auscultation. Women should be referred to a higher-level hospital if electronic antenatal or intrapartum FHR monitoring is required. If during a normal labour, a non-reassuring FHR is heard a short FHR pattern using a CTG will inform ongoing clinical management.</td>
</tr>
<tr>
<td>3</td>
<td>As for Level 2. In addition can provide antenatal, intrapartum (&gt;37+0 weeks gestation) and postnatal care with risks identified as category B following consultation and development of a management plan, with the relevant Tiered Maternity and Neonatal Network.</td>
<td>Can perform antenatal and intrapartum electronic FHR monitoring as a means of fetal welfare assessment.</td>
</tr>
<tr>
<td>4</td>
<td>As for Level 3. In addition antenatal, intrapartum (&gt;34+0 weeks gestation) and postnatal care for women with no identified risk factors or those identified as category A1 and B1. Many women identified as category C1 should be able to access care at these facilities however for some conditions consideration should be given to consulting with the specialist obstetrician or maternal-fetal specialist within the tiered maternity network.</td>
<td>Can perform antenatal and intrapartum electronic FHR monitoring as a means of fetal welfare assessment.</td>
</tr>
<tr>
<td>5</td>
<td>As for Level 4 in addition antenatal, intrapartum (&gt;32+6 weeks gestation) and postnatal care for women with no identified risk factors; those with risks identified as category A1 and B1, and the majority of women identified as category C1.</td>
<td>As above.</td>
</tr>
<tr>
<td>6</td>
<td>May provide care for all women regardless of clinical risk.</td>
<td>As above.</td>
</tr>
</tbody>
</table>

1. **Level of consultation and referral.** The Australian College of Midwives, National Midwifery Guidelines for Consultation and Referral1 provides guidance in an evidence-based framework for collaborative maternity care to assist clinicians in decision making for consultation, referral and transfer based on women’s individual clinical needs. The consultation and referral guidelines are mandated in NSW Health Policy Directive PD2010_022 Maternity - National Midwifery Guidelines for Consultation and Referral.

When a variance from normal is identified in a woman’s care, the level of consultation requires one or more actions from across the following three categories:

- Category A- Discussion with a colleague; midwife, medical practitioner and/or other health care provider, and/or
- Category B- Consultation with a medical practitioner and/or other health care provider, and/or
- Category C- Referral of the woman or her baby to a medical practitioner for specialist care.
9 REFERENCES


5. NSW Health (2011) Guideline GL2011_075 Oxytocin for the Induction of Labour at or Beyond Term, NSW Health, Sydney.


### 10 APPENDICES

10.1 Appendix 1: Antenatal Fetal Heart Rate Pattern Algorithm

#### Antenatal Fetal Heart Rate Pattern Interpretation and Management Algorithm

<table>
<thead>
<tr>
<th>Identified Risk for Antenatal FHR Monitoring</th>
<th>Maternal</th>
<th>Any change in maternal condition where you consider there may be compromise to fetal welfare. Conditions may include those covered in NSW Health 2014 GL Maternity – Fetal Heart Rate Monitoring, e.g.:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal</td>
<td>Uncontrolled hypertension</td>
<td></td>
</tr>
<tr>
<td></td>
<td>APH</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Any obstetric condition that increases the risk of fetal compromise</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Features</th>
<th>Contractions</th>
<th>Baseline Rate (bpm)</th>
<th>Variability (bpm)</th>
<th>Reactivity (Two accelerations present in 10 mins)</th>
<th>Decelerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reassuring</td>
<td>● Nil</td>
<td>110–160</td>
<td>≥ 5</td>
<td>Present</td>
<td>● None</td>
</tr>
<tr>
<td></td>
<td>● Present 237/40</td>
<td></td>
<td></td>
<td></td>
<td>● Single isolated</td>
</tr>
<tr>
<td>Non-reassuring</td>
<td>● Present &lt;37/40</td>
<td>100-109</td>
<td>● &lt;5 for &gt;30 mins</td>
<td>Absent &gt;30 mins</td>
<td>● Repetitive</td>
</tr>
<tr>
<td></td>
<td>161-179</td>
<td>● ≥5 for &gt;15 mins</td>
<td></td>
<td></td>
<td>● Shallow</td>
</tr>
<tr>
<td>Abnormal</td>
<td>● Tonic &gt;2min</td>
<td>&lt;100</td>
<td>● &lt;5 for &gt;40 mins</td>
<td>Absent &gt;60 mins</td>
<td>● Prolonged &lt;3 mins</td>
</tr>
<tr>
<td></td>
<td>≥8:10</td>
<td>&gt;180</td>
<td>Sinusoidal ≥ 10 mins</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Management Plan - Clinical Response

- **Reassuring features**: Cease monitoring. All features of the fetal heart rate pattern are reassuring, and/or there is no perceived risk of fetal compromise as the maternal condition stabilises, i.e., bleeding placenta previa.

- **One or more non-reassuring features**: Keep monitoring with ongoing assessment. Escalate to the midwife in charge (Team Leader) or medical officer for a clinical review within 30 mins (do not give food or oral fluids).

- **One or more abnormal features**: Escalate to a Rapid Response as per local CERS. This should involve notifying a medical officer for immediate review. Consider further fetal welfare assessment and/or expedited birth.

* A clinician may call for a clinical review at any time if they are concerned or unsure.
10.2 Appendix 2: Intrapartum Fetal Heart Rate Pattern Algorithm

Intrapartum Fetal Heart Rate Pattern Interpretation and Management Algorithm

<table>
<thead>
<tr>
<th>Features</th>
<th>C</th>
<th>B</th>
<th>R</th>
<th>A</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reassuring</td>
<td>≥5 in 10 mins</td>
<td>130–190</td>
<td>≤5</td>
<td>Present</td>
<td>None or Early</td>
</tr>
<tr>
<td>Non-reassuring</td>
<td>6–7 in 10 mins</td>
<td>100–195</td>
<td>≤5</td>
<td>&gt;8 for 30 mins</td>
<td>The absence of accelerations or the presence of abnormal baseline rate suggests non-reassuring and is therefore not of concern</td>
</tr>
<tr>
<td>Abnormal</td>
<td>≥7 in 10 mins</td>
<td>&lt;100</td>
<td>&gt;100</td>
<td>&lt;5 for 30 mins</td>
<td>Typical variable decelerations with ≥50% of contractions, occurring for ≥30 mins</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;160</td>
<td></td>
<td></td>
<td>Suspicious variable decelerations with ≤50% of contractions, occurring for ≥30 mins</td>
</tr>
</tbody>
</table>

O = Overall Assessment

<table>
<thead>
<tr>
<th>Classification</th>
<th>Definition</th>
<th>Fetal Blood Sampling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>A pattern where all features are reassuring</td>
<td>Normal</td>
</tr>
<tr>
<td>Suspicious</td>
<td>A pattern where there is 1 Non-Reassuring feature</td>
<td>Suspicious</td>
</tr>
<tr>
<td>Pathological</td>
<td>A pattern where there are 2 or more Non-Reassuring or 1 or more Abnormal features</td>
<td>Abnormal</td>
</tr>
</tbody>
</table>

Management Plan - Clinical Response

<table>
<thead>
<tr>
<th>Classification</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Keep monitoring if the maternal or fetal risks are unchanged. Consider intermittent electronic FHR monitoring if the woman needs to ambulate</td>
</tr>
<tr>
<td>Suspicious</td>
<td>Keep monitoring with ongoing assessment. Escalate to the midwife in charge/Team Leader or medical officer for clinical review within 30 mins</td>
</tr>
<tr>
<td>Pathological</td>
<td>Consider further Fetal Heart Rate Monitoring and/another obstetrician to review the case and to inform midwife in charge. This should include notifying a medical officer for immediate review</td>
</tr>
</tbody>
</table>

* A clinician may call for a clinical review at any time if they are concerned or unsure |

(based on the RCOG and NICE Guidelines 2007)

10.3 Appendix 3: NSW Antenatal FHR Label

![Antenatal Fetal Heart Rate Monitoring Table](image-url)
### 10.4 Appendix 4: NSW Intrapartum FHR Label

<table>
<thead>
<tr>
<th>Determine Risk:</th>
<th>Features</th>
<th>Contraction Pattern</th>
<th>Baseline Rate</th>
<th>Variability (bpm)</th>
<th>Accelerations</th>
<th>Decelerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reassuring</td>
<td>≤ 5:10</td>
<td>110-160</td>
<td>≥ 5</td>
<td>Present or Absent</td>
<td>None or Early</td>
<td></td>
</tr>
<tr>
<td>Non-reassuring</td>
<td>6-7:10</td>
<td>100-109 or 161-179</td>
<td>&lt; 5 for &gt; 40mins or &gt; 25 for &gt; 15mins</td>
<td>Typical variable &gt; 50% contractions &gt; 90mins or Atypical variable or Late for &gt; 3 contractions or Single prolonged for up to 3 mins</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abnormal</td>
<td>&gt; 7:10 or Tonic &gt; 2min</td>
<td>&lt; 100 or &gt;180</td>
<td>&lt; 5 for 90mins or Sinusoidal ≥ 10mins</td>
<td>Typical variable for &gt; 30 mins or Latent for &gt; 30 mins or Prolonged more than 3 mins</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Normal</th>
<th>Suspicious</th>
<th>Pathological</th>
</tr>
</thead>
</table>

**Management Plan:**

**Signature (s):** Name(s): Designation(s):