FETAL HEALTH SURVEILLANCE IN LABOUR

In an effort to improve the health of newborn babies, the last 30 years has seen a steady increase in the use of continuous electronic monitoring in labour. The introduction of Electronic Fetal heart rate Monitoring (EFM) was undertaken with the best of intentions, but before the efficacy of electronic heart rate monitoring had been evaluated. There is now clear evidence that EFM in labour leads to higher incidence of interventions without increased benefit to the fetus when compared to intermittent auscultation. A comprehensive review of all randomized controlled trials performed to date on electronic fetal monitoring (EFM) has demonstrated that EFM, with or without fetal scalp blood sampling, is more likely to result in a caesarean birth, an operative birth and administration of general anaesthesia.1

Recommendations
Abstracted from SOGC Practice Guideline No.197, September 2007

Intrapartum Fetal Assessment
1. Women in active labour should receive continuous close support from an appropriately trained professional. One-to-one nursing/midwifery care is recommended during the active phase of labour, recognizing the presence of two patients, the woman and her baby.

2. Intermittent auscultation following an established protocol of surveillance and response is the preferred method of fetal surveillance in healthy term women in spontaneous labour in the absence of risk factors for adverse perinatal outcome.

3. Intermittent auscultation may be used to monitor the baby when epidural analgesia is used during labour provided that a protocol is in place for frequent IA (e.g., every 5 minutes for 30 minutes after epidural initiation and after bolus top-ups as long as maternal vital signs are normal).

4. Admission fetal heart rate tracings are not recommended for healthy women at term in labour in the absence of risk factors for adverse perinatal outcome, as there is no evidence of benefit.

5. Admission fetal heart rate tracings are recommended for women with risk factors for adverse perinatal outcome.

6. Continuous EFM is recommended for pregnancies at risk of adverse perinatal outcome.

7. When a normal tracing is identified, it may be appropriate to interrupt the EFM tracing for up to 30 minutes to facilitate periods of ambulation, bathing or position change, providing that (1) the maternal-fetal condition is stable and (2) if oxytocin is being administered, the infusion rate is not increased.

8. Digital fetal scalp stimulation is recommended in response to atypical electronic heart rate tracings.

9. In the absence of a positive acceleratory response with digital fetal scalp stimulation,
   - Fetal scalp blood sampling is recommended when available
   - If fetal scalp blood sampling is not available, consideration should be given to prompt delivery, depending on the overall clinical situation.

10. Where facilities and expertise exist, fetal scalp blood sampling for assessment of fetal acid-base status is recommended in women with 'atypical/abnormal' fetal heart tracings at gestations > 34 weeks when delivery is not imminent, or if digital fetal scalp stimulation does not result in an acceleratory fetal heart rate response.

11. Ideally, cord blood sampling of both umbilical arterial and umbilical venous blood is recommended for ALL births, for quality assurance and improvement purposes. If only one sample is possible it should preferably be arterial.

12. When risk factors for adverse perinatal outcome exist, or when intervention for fetal indications occurs, sampling of arterial and venous cord gases is strongly recommended.

13. Regular updating of fetal surveillance skills is required. Each facility should ensure that updates are interprofessional to ensure common
terminology and shared understanding and to develop the concept of team responsibility.

**Recommended Frequency of Auscultation:**
- Every 15 minutes in active phase of first stage of labour, before active pushing
- Every 5 minutes in second stage of labour with pushing

<table>
<thead>
<tr>
<th>Assess FHR before:</th>
<th>Assess FHR after:</th>
</tr>
</thead>
<tbody>
<tr>
<td>initiation of labour-enhancing procedures (eg. amniotomy)</td>
<td>admission of patient</td>
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<tr>
<td>ambulation of patient</td>
<td>artificial or spontaneous rupture of membranes</td>
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<tr>
<td>administration of medications</td>
<td>vaginal examinations</td>
</tr>
<tr>
<td>transfer or discharge of patient</td>
<td>initiation of oxytocin</td>
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<tr>
<td></td>
<td>initiation of analgesia/anaesthesia</td>
</tr>
</tbody>
</table>

**Recommended Procedure for FHR Auscultation**

**The procedure is as follows:**
- palpate the maternal abdomen to identify fetal position (Leopold’s maneuvers)
- place the Doppler over the area of maximum intensity of fetal heart sounds (usually over the fetal back)
- place a finger on mother’s radial pulse to differentiate maternal from fetal heart rate
- palpate for uterine contractions during period of FHR auscultation in order to clarify relationship between FHR and uterine contraction
- count FHR between uterine contractions for at least 60 seconds to identify average baseline rate
- to identify fetal response to active labour count FHR after a uterine contraction for 60 seconds every 15 minutes during the active phase until pushing and every 5 minutes in second stage after pushing begins.
## Interpretation

<table>
<thead>
<tr>
<th></th>
<th>Normal Tracing Previously &quot;Reassuring&quot;</th>
<th>Atypical Tracing Previously &quot;Non-reassuring&quot;</th>
<th>Abnormal Tracing Previously &quot;Non-reassuring&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td>110–160 bpm</td>
<td>Bradycardia 100–110 bpm</td>
<td>Bradycardia &lt; 100 bpm</td>
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<tr>
<td></td>
<td></td>
<td>Tachycardia &gt; 160 for &gt; 30 min to &lt; 90 min.</td>
<td>Tachycardia &gt; 180 for &lt; 80 min.</td>
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<tr>
<td></td>
<td></td>
<td>Rising baseline</td>
<td>Erratic baseline</td>
</tr>
<tr>
<td><strong>Variability</strong></td>
<td>6–25 bpm</td>
<td>≤ 5 bpm for 40–80 min.</td>
<td>≤ 5 bpm for &gt; 80 min.</td>
</tr>
<tr>
<td></td>
<td>≤ 5 bpm for &lt; 40 min.</td>
<td></td>
<td>&gt; 25 bpm for &gt; 10 min.</td>
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<td></td>
<td></td>
<td></td>
<td>Sinusoidal</td>
</tr>
<tr>
<td><strong>Decelerations</strong></td>
<td>None or occasional uncomplicated variables or early decelerations</td>
<td>Repetitive (≥ 3) uncomplicated variable decelerations</td>
<td>Repetitive (≥ 3) complicated variables:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Occasional late decelerations</td>
<td>deceleration to &lt; 70 bpm for &gt; 30 secs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Single prolonged deceleration &gt; 2 min. but &lt; 3 min.</td>
<td>loss of variability in trough or in baseline</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>biphasic decelerations</td>
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<td></td>
<td></td>
<td>overshoots</td>
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<td></td>
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<td></td>
<td>slow return to baseline</td>
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<td></td>
<td></td>
<td></td>
<td>baseline lower after deceleration</td>
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<td></td>
<td></td>
<td></td>
<td>baseline tachycardia or bradycardia</td>
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<td></td>
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<td></td>
<td>Late decelerations &gt; 50% of contractions</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Single prolonged deceleration &gt; 3 min. but &lt; 10 min.</td>
</tr>
<tr>
<td><strong>Accelerations</strong></td>
<td>Spontaneous accelerations present</td>
<td>Absence of acceleration with fetal scalp stimulation</td>
<td>Usually absent*</td>
</tr>
<tr>
<td></td>
<td>(FHR increases &gt; 15 bpm lasting &gt; 15 seconds)</td>
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<tr>
<td></td>
<td>(&lt; 32 weeks’ gestation increase in the FHR &gt; 10 bpm lasting &gt;10 seconds)</td>
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<tr>
<td></td>
<td>Accelerations present with fetal scalp stimulation</td>
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<td></td>
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</tbody>
</table>
| **ACTION**          | EFM may be interrupted for periods up to 30 min. if maternal-fetal condition stable &/or oxytocin infusion rate stable. | Further vigilant assessment required, especially when combined features present. | ACTION REQUIRED
|                     |                                      |                                              | Review overall clinical situation, obtain scalp pH if appropriate/prepare for delivery. |

*Usually absent, but if accelerations are present, this does not change the classification of tracing.*
Management

Admission assessment: are any of the following risk factors present?

- Maternal
  - Hypertensive disorders of pregnancy
  - Pre-existing diabetes mellitus/Gestational diabetes
  - Post-term pregnancy (> 42 weeks)
  - Maternal medical disease
  - Maternal MYA/trauma
  - Vaginal bleeding
  - Prolonged membrane rupture > 24 hours at term
  - Intrauterine infection/inchoramintis
  - Previous Caesarean section
  - Antepartum hemorrhage
  - Preterm labour
  - Hypertonic uterus
  - Induced/augmented labour
  - Previous poor obstetric outcome

- Fetal
  - Intrauterine growth restriction
  - Meconium stained AF
  - Abnormal FHR on auscultation
  - Prematurity
  - Abnormal umbilical artery Doppler
  - Ischemization
  - Multiple pregnancy
  - Breach presentation
  - Oligohydramnios
  - Decreased fetal activity

- NO
- Intermittent Auscultation
  - For one full min after a contraction, q 15–30 min in first stage, and q 5 min in active second stage.

- YES
- Abnormal IA
  - Meconium
  - Vaginal bleeding
  - Dystocia
  - Abnormal VS
  - PCEA top-ups

- Electronic Fetal Monitoring
  1. Ensure interpretable fetal heart tracing
  2. Classify tracing as normal, atypical, abnormal (p. 336)

- Normal EFM Tracing
  - Continue with EFM.
  - EFM may be interrupted for periods up to 30 min, if maternal-fetal condition stable and/or oxytocin infusion rate stable.

- Atypical EFM Tracing
  - Institute intrauterine resuscitation
  - Determine cause of atypical pattern (See Table 16)
  - Determine the duration of effect and reserve tolerance of the fetus
  - Perform fetal scalp stimulation and/or obtain fetal blood sampling (>34 weeks)
  - Evaluate total clinical picture: gestational age, estimated fetal weight, stage of labour
  - Continue with close ongoing fetal surveillance
  - Consider transfer/delivery if pattern persists or deteriorates.

- Abnormal EFM Tracing
  - Institute intrauterine resuscitation
  - Determine cause of abnormal pattern (See Table 18)
  - Obtain fetal blood sampling (>34 weeks, prolonged deceleration < 3 minutes)
  - Evaluate total clinical picture: gestational age, estimated fetal weight, stage of labour
  - Undertake transfer/operative delivery promptly UNLESS:
    - Fetal scalp pH ≥ 7.25
    - Spontaneous delivery is imminent
## Perinatal Outreach Program of Southwestern Ontario

### PERINATAL MANUAL CHAPTER 17 – FETAL HEALTH SURVEILLANCE IN LABOUR

**Revised February 2008**

### Pattern definition | Association or potential causes | Additional clinical actions
---|---|---
**Bradycardia** | Maternal: Hypotension Drug responses Maternal position Connective tissue diseases with congenital heart block (e.g., systemic lupus erythematosus) Fetal: Umbilical cord occlusion Fetal hypoxia/acidosis Vagal stimulation such as with chronic head compression or with ventouse presentation, occiput posterior or transverse position Fetal cardiac conduction or structural defect | 1. Assess maternal pulse 2. Differentiate fetal from maternal heart rate 3. Vaginal exams (evaluate presenting part if cord prolapse) 4. If cause is not obvious or correctable, consider intrapartum US to evaluate dysrhythmia 5. If < 100 bpm, obtain fetal scalp pH if clinically appropriate/prepare for delivery.\(\)

**Tachycardia** | Maternal: Fever Infection Dehydration Hyperpyrexia Endogenous adrenaline or anxiety Medication or drug response Anemia Fetal: Infection Prolonged fetal activity or stimulation Chronic hypoxemia Cardiac abnormalities Congenital anomalies Anemia | 1. Assess maternal temperature 2. Decrease maternal temperature (if elevated) 3. Assess medications or drugs 4. Readiness for duration of rupture of membranes (ROM), positive vaginal culture, especially group B streptococcus (GBS) 5. If cause is not obvious or correctable, consider intrapartum US to evaluate arrhythmia 6. If >180 bpm for > 30 minutes, consider expedited delivery.

**Minimal/absent Variability** | Fetal sleep Prematurity Medications (analgesia, sedatives) Hypoxic acidemia | If < 5 bpm for > 60 minutes, ≥ 25 bpm for >10 minutes or sinusoidal: 1. Attach fetal scalp electrode if not already done 2. Obtain fetal scalp pH if clinically appropriate/prepare for delivery.

**Masked Variability** | Mild hypoxia Fetal gasping Unknown | 1. Attach fetal scalp electrode if clinically appropriate 2. Obtain fetal scalp pH if clinically appropriate/prepare for delivery.

**Sinusoidal pattern** | Severe fetal anemia (Hb < 70) Tissue hypoxia in fetal brain stem | 1. Attach fetal scalp electrode if clinically appropriate 2. Consider AFT test or Kleihauer Bettie 3. Prepare for delivery.

**Absent accelerations with fetal scalp stimulation or absent accelerations** | Hypoxic acidemia Possible fetal abnormality | 1. Attach fetal scalp electrode if not already done 2. Obtain fetal scalp pH if clinically appropriate/prepare for delivery.

### Pattern definition | Association or potential causes | Additional clinical actions
---|---|---
**Variable decelerations** | Associated with vagal stimulation due to cord compression. Complicated variable decelerations may be associated with fetal acidemia. | 1. Observe in early first stage and observe for development of combined patterns or complicated variables. 2. Very common in late first stage and occur in more than half of second stages. No action, as a normal response. Complicated Varieties: 1. Amnioinfusion may ameliorate 2. Confirm fetal well-being, directly or indirectly (fetal scalp stimulation, fetal blood scalp sampling) 3. Obtain fetal scalp pH if clinically appropriate/prepare for delivery.

**Late decelerations** | Fetal chormepectorovagol result due to decreased PO\(_2\) Altered maternal blood flow to the placenta (e.g., maternal hypotension) Reduced maternal arterial oxygen saturation Placental changes altering maternal-fetal gas exchange (e.g., placental insufficiency, uterine hypertonus or tachyhydrosis) May be associated with fetal acidemia | When occasional, ensure mother in left lateral, check maternal vital signs, and continue observing. When repetitive, it is mandatory to act upon this pattern: 1. Obtain fetal scalp pH if clinically appropriate/prepare for delivery.

**Prolonged deceleration** | Associated with fetal baroreceptor and chormeceptor responses to profound changes in the fetal environment due to uterine hypertonus, unresolved umbilical cord compression, maternal hypotension, maternal seizure, rapid fetal descent. | 1. Vaginal exam to rule out cord prolapse 2. Prepare for delivery.
Documentation

1. Fetal Heart Rate (FHR) data:
   - numerical baseline rate (in bpm)
   - rhythm (regular or irregular)
   - nature of the changes (gradual or abrupt decelerations)

2. Uterine activity characteristics obtained by palpation:
   - frequency
   - duration
   - intensity
   - relaxation between contractions

3. Specific actions taken when changes in FHR occur

4. Other maternal observations and assessments

5. Maternal and fetal responses to interventions

6. Subsequent return to normal findings

NOTE: When FHR data is obtained via EFM, there are descriptive terms assigned to specific, observed FHR changes. Given the absence of validated correlations between auditory FHR changes and specific, named FHR patterns, practitioners are limited in their ability to use those terms in documenting auscultated FHR changes. The lack of research-validated experience coupled with legal risk management concerns make it inadvisable to use EFM terms in documenting subjective observations from auscultated findings. Furthermore, terms such as “asphyxia”, “hypoxia”, and “fetal distress” should not be applied to auscultation or electronic fetal monitoring; they are imprecise and nonspecific, and have little positive predictive value. It is advised that FHR changes be recorded in a descriptive manner.

Electronic Fetal Monitoring

1. Paper Speed
   It is suggested that each institution run their monitors ordinarily at one paper speed to facilitate pattern recognition. We are most familiar with 3 cm/min and suggest 3 cm/minute.

2. Recording the Findings
   In documentation of fetal heart rate monitoring, describe the event being observed eg. baseline heart rate, presence or absence of variability, presence or absence of accelerations or decelerations. Avoid conclusions like “normal”, “abnormal”, or “possible asphyxia”.

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