

## Summary of recommendations and good practice notes

Recommendations	
Antenatal and Intrapartum risk factors that increase risk of fetal compromise. Intrapartum cardiotocography is recommended.	
<p><b>Antenatal risk factors</b></p> <ul style="list-style-type: none"> <li>• abnormal antenatal CTG</li> <li>• abnormal Doppler umbilical artery velocimetry</li> <li>• suspected or confirmed intrauterine growth restriction</li> <li>• oligohydramnios or polyhydramnios</li> <li>• prolonged pregnancy <math>\geq 42</math> weeks<sup>22</sup></li> <li>• multiple pregnancy<sup>23</sup></li> <li>• breech presentation<sup>24, 25</sup></li> <li>• antepartum haemorrhage</li> <li>• prolonged rupture of membranes (<math>\geq 24</math> hours)<sup>24</sup></li> <li>• known fetal abnormality which requires monitoring</li> <li>• uterine scar (e.g. previous caesarean section)</li> <li>• essential hypertension or pre-eclampsia</li> <li>• diabetes where medication is indicated<sup>26</sup> or poorly controlled, or with fetal macrosomia</li> <li>• other current or previous obstetric or medical conditions which constitute a significant risk of fetal compromise (e.g. cholestasis, isoimmunisation, substance abuse)</li> <li>• fetal movements reduced (within the week preceding labour)<sup>102,103</sup></li> <li>• morbid obesity (BMI <math>\geq 40</math>)<sup>27, 28</sup></li> <li>• maternal age <math>\geq 42</math><sup>29-31</sup></li> <li>• abnormalities of maternal serum screening associated with an increased risk of poor perinatal outcomes (e.g. low PAPP-A <math>&lt;0.4</math>MoM)<sup>32</sup></li> </ul>	<p><b>Intrapartum risk factors</b></p> <ul style="list-style-type: none"> <li>• induction of labour with prostaglandin/oxytocin</li> <li>• abnormal auscultation or CTG</li> <li>• oxytocin augmentation</li> <li>• regional anaesthesia (e.g. epidural or spinal)* and paracervical block</li> <li>• abnormal vaginal bleeding in labour</li> <li>• maternal pyrexia: <math>\geq 38^{\circ}\text{C}</math><sup>33</sup></li> <li>• meconium or blood stained liquor<sup>34</sup></li> <li>• absent liquor following amniotomy</li> <li>• prolonged first stage as defined by referral guidelines</li> <li>• prolonged second stage as defined by referral guidelines</li> <li>• pre-term labour less than 37 completed weeks</li> <li>• tachysystole (more than five active labour contractions in ten minutes without fetal heart rate abnormalities)</li> <li>• uterine hypertonus (contractions lasting more than two minutes in duration or contractions occurring within 60 seconds of each other, without fetal heart rate abnormalities)</li> <li>• uterine hyperstimulation (either tachysystole or uterine hypertonus with fetal heart rate abnormalities)</li> </ul>
*Following a decision to insert an epidural block, a CTG should be commenced to establish baseline features prior to the block's insertion.	

Conditions where intrapartum cardiotocography is not indicated when the condition occurs in isolation, but if multiple conditions are present, intrapartum cardiotocography should be considered	
<p><b>Antenatal risk factors</b></p> <ul style="list-style-type: none"> <li>• pregnancy gestation 41.0 – 41.6 weeks' gestation<sup>22, 29-31</sup></li> <li>• gestational hypertension<sup>35</sup></li> <li>• gestational diabetes mellitus without complicating factors</li> <li>• obesity (BMI: 30-40)</li> <li>• maternal age: <math>\geq 40</math> and <math>&lt; 42</math> years</li> </ul>	<p><b>Intrapartum risk factors</b></p> <ul style="list-style-type: none"> <li>• maternal pyrexia: <math>\geq 37.8</math> and <math>&lt; 38</math> degrees<sup>33</sup></li> </ul>

Communication and Information	
Recommendation 1	Grade and supporting references
During pregnancy, women should be offered information on intrapartum fetal surveillance by those responsible for provision of maternity care.	Consensus-based recommendation 36-38 (Level IV)
Recommendation 2	Grade and supporting references
Health professionals who provide intrapartum care have a responsibility to ensure that they undertake that care with an understanding of the relevant maternal and fetal pathophysiology and understand the available fetal surveillance options.	B 39 (Level I)

Intrapartum Fetal Surveillance	
Recommendation 3	Grade and supporting references
Fetal surveillance in labour, whether by intermittent auscultation or by electronic fetal monitoring, should be discussed with and recommended to all women.	C 20, 38 (Level III-3)

Intrapartum Fetal Surveillance in the absence of recognised risk factors	
Admission CTG	
Recommendation 4	Grade and supporting references
<p>Limitations in the randomised controlled trial evidence make it difficult to depend on that evidence to guide practice in the Australian and New Zealand context regarding the use of admission CTG in women.</p> <p>Admission CTG increases the rate of continuous electronic fetal monitoring use, may increase the rate of caesarean section but may identify a small number of previously unidentified at risk fetuses.</p> <p>Attending clinicians should decide whether or not to use admission CTG according to individual women's circumstances and decisions.</p>	A 40 (Level I)
Good Practice Note	Grade and supporting references
Women should receive 1:1 midwifery intrapartum care. Cardiotocography should not be used as a substitute for adequate intrapartum midwifery staffing.	Good Practice Note (Consensus-based)

Admission CTG	
Good Practice Note	Grade and supporting references
<p>It is important to identify the potentially unrecognised “at risk” fetus.</p> <p>Cardiotocography may be beneficial for women with risk factors for fetal compromise that on their own do not meet the criteria for recommending continuous cardiotocography (e.g. maternal age 40-41, BMI 35-39, assisted reproduction, gestational hypertension etc.) but do so where more than one such risk factor is present, as multiple factors are more likely to have a synergistic impact on fetal risk.</p>	<p>Good Practice Note (Consensus-based)<sup>41</sup></p>

Modality of Intrapartum Fetal Surveillance in the absence of recognised risk factors	
Recommendation 5	Grade and supporting references
<p>Intermittent auscultation is an appropriate method of intrapartum fetal monitoring in women without recognised risk factors.</p> <p>Weighing the probable increase in operative birth against a possible fetal benefit in a very small number of labours, the use of cardiotocography in women without recognised risk factors for fetal compromise should be individualised after discussion with the woman.</p>	<p>B<sup>42</sup> (Level I)</p>
Good Practice Note	Grade and supporting references
<p>Regardless of the method of intrapartum monitoring, it is essential that an accurate record of fetal wellbeing is obtained. Fetal and maternal heart rates should be differentiated whatever the mode of monitoring used.</p>	<p>Good Practice Note (Consensus-based)</p>

Method of auscultation	
Recommendation 6	Grade and supporting references
<p>When using intermittent auscultation, it should be performed according to a standardised protocol:</p> <ol style="list-style-type: none"> <li>Intermittent auscultation must be performed with a technique that can accurately measure the fetal heart rate in the individual woman.</li> <li>Each auscultation episode should commence toward the end of a contraction and be continued for at least 30-60 seconds after the contraction has finished.</li> <li>Auscultation in labour should be undertaken and documented: <ul style="list-style-type: none"> <li>Every 15-30 minutes in the active phase of the first stage of labour.</li> <li>After each contraction or at least every five minutes in the active second stage of labour.</li> </ul> </li> </ol>	<p>B<sup>43</sup> (Level II) Consensus-based recommendation  Consensus-based recommendation</p>

Intrapartum Fetal Surveillance in the presence of, or with the emergence of fetal and/or maternal risk factors	
Recommendation 7	Grade and supporting references
Continuous CTG should be recommended when either risk factors for fetal compromise have been detected antenatally, are detected at the onset of labour or develop during labour.	B <sup>42</sup> (Level I)
Good Practice Notes	Grade and supporting references
<p><b>Interruptions to fetal heart rate monitoring</b></p> <p><b>Personal care</b> Where continuous electronic fetal monitoring is required, and if the electronic fetal monitoring to date is considered to be normal, monitoring may be interrupted for short periods of up to 15 minutes to allow personal care (e.g. shower, toilet). Such interruptions should be infrequent and not occur immediately after any intervention that might be expected to alter the fetal heart rate (e.g. amniotomy, epidural insertion or top-up etc.).</p> <p>Women's wellbeing is considered and their wishes are respected in relation to monitoring. Disturbances to the woman are also minimised e.g. monitoring volume low, upright positions/mobility, and use of water for pain relief.</p> <p><b>Procedures</b> Consideration should be given to instituting electronic fetal monitoring prior to insertion of a regional anaesthetic or paracervical block to establish baseline fetal heart rate characteristics. Interruptions to fetal monitoring should be minimised given the potential for fetal vulnerability during these times.</p> <p><b>Transfers</b> The fetal heart rate should be monitored by intermittent auscultation during unavoidable interruptions, at times of potential fetal vulnerability, with re-commencement of continuous CTG when feasible. Interruptions to fetal monitoring should be minimised during transfer to the operating theatre and prior to delivery of the fetus.</p>	<p>Good Practice Note (Consensus-based)</p> <p>Good Practice Note (Consensus-based)</p> <p>Good Practice Note (Consensus-based)</p>

Management of fetal heart rate patterns considered suggestive of fetal compromise	
Recommendation 8	Grade and supporting references
<p>In clinical situations where the fetal heart rate pattern is considered abnormal, immediate management should include:</p> <ul style="list-style-type: none"> <li>• identification of any reversible cause of the abnormality and initiation of appropriate action (e.g. maternal repositioning, correction of maternal hypotension, rehydration with intravenous fluid, cessation of oxytocin and/or tocolysis for excessive uterine activity) and initiation or maintenance of continuous CTG.</li> <li>• Consideration of further fetal evaluation or delivery if a significant abnormality persists.</li> <li>• Escalation of care if necessary to a more experienced practitioner.</li> </ul>	A <sup>42</sup> (Level I)

Management of fetal heart rate patterns considered suggestive of fetal compromise	
Good Practice Notes	Grade and supporting references
<p><b>The normal CTG is associated with a low probability of fetal compromise and has the following features:</b></p> <ul style="list-style-type: none"> <li>• Baseline rate 110-160 bpm.</li> <li>• Baseline variability of 6-25 bpm.</li> <li>• Accelerations of 15 bpm for 15 seconds.</li> <li>• No decelerations.</li> </ul> <p>All other CTGs are by this definition abnormal and require further evaluation taking into account the full clinical picture.</p> <p><b>The following features are unlikely to be associated with fetal compromise when occurring in isolation:</b></p> <ul style="list-style-type: none"> <li>• Baseline rate 100-109 bpm.</li> <li>• Absence of accelerations.</li> <li>• Early decelerations.</li> <li>• Variable decelerations without complicating features.</li> </ul> <p><b>The following features may be associated with significant fetal compromise and require further action, such as described in Recommendation 8:</b></p> <ul style="list-style-type: none"> <li>• Baseline fetal tachycardia &gt; 160 bpm.</li> <li>• Reduced or reducing baseline variability (3-5bpm).</li> <li>• Rising baseline fetal heart rate.</li> <li>• Complicated variable decelerations.</li> <li>• Late decelerations.</li> <li>• Prolonged decelerations.</li> </ul> <p><b>The following features are likely to be associated with significant fetal compromise and require immediate management, which may include urgent delivery:</b></p> <ul style="list-style-type: none"> <li>• Prolonged bradycardia (&lt;100 bpm for &gt;5 minutes).</li> <li>• Absent baseline variability (&lt;3 bpm).</li> <li>• Sinusoidal pattern.</li> <li>• Complicated variable decelerations with reduced or absent baseline variability.</li> <li>• Late decelerations with reduced or absent baseline variability.</li> </ul> <p>See Appendix G for Definitions</p>	<p>Good Practice Notes (Consensus-based)</p>

Uterine hyperstimulation	
Recommendation 9	Grade and supporting references
<p><b>Excessive uterine activity in the absence of fetal heart rate abnormalities.</b></p> <p>In the presence of excessive uterine activity (defined as either):</p> <ul style="list-style-type: none"> <li>tachysystole (more than five active labour contractions in ten minutes, without fetal heart rate abnormalities), or</li> <li>uterine hypertonus (contractions lasting more than two minutes in duration or contractions occurring within 60 seconds of each other, without fetal heart rate abnormalities)</li> </ul> <p>Appropriate management of uterine hypertonus or tachysystole should include:</p> <ul style="list-style-type: none"> <li>continuous cardiotocography;</li> <li>consider reducing or ceasing oxytocin infusion;</li> <li>maternity staff remaining with the woman until normal uterine activity is observed;</li> <li>tocolysis may be considered.</li> </ul>	Consensus-based recommendation
Recommendation 10	Grade and supporting references
<p>Uterine hyperstimulation is defined as tachysystole or uterine hypertonus in the <b>presence</b> of fetal heart rate abnormalities.</p> <p>Appropriate management of uterine hyperstimulation should include:</p> <ul style="list-style-type: none"> <li>continuous cardiotocography;</li> <li>reducing or ceasing oxytocin infusion;</li> <li>maternity staff remaining with the woman until normal uterine activity is observed;</li> <li>consideration of tocolysis; or</li> <li>consideration of urgent delivery.</li> </ul> <p>Maternity care providers should be familiar with and have a protocol for acute tocolysis (relevant to the level of service) in the event that uterine hyperstimulation occurs.</p> <p>Tocolytic regimens available may include:</p> <ul style="list-style-type: none"> <li>Terbutaline, 250 micrograms intravenously or subcutaneously (Grade C)</li> <li>Salbutamol, 100 micrograms intravenously</li> <li>GTN spray, 400 micrograms sublingually</li> </ul>	<p>Consensus-based recommendation</p> <p>Terbutaline recommendation C<sup>44</sup> (Level II)</p>
Good Practice Note	Grade and supporting references
Excessive uterine activity in the absence of evidence of fetal compromise is not in itself an indication for tocolysis.	Good Practice Note (Consensus-based)

Fetal blood sampling	
Recommendation 11	Grade and supporting references
Units employing electronic fetal monitoring are strongly encouraged to have access to fetal blood sampling facilities to assist in the management of labours where the fetus is demonstrating equivocal CTG changes.	Consensus-based recommendation
Recommendation 12	Grade and supporting references
If fetal blood sampling is indicated, the use of scalp lactate rather than pH measurement will provide an easier and more affordable adjunct to electronic fetal monitoring for some units.	A <sup>45</sup> (Level I)
Good Practice Note	Grade and supporting references
Thresholds for lactate may vary between institutions. Institutions should have local protocols for lactate thresholds.	Good Practice Note (Consensus-based)
Recommendation 13	Grade and supporting references
Delivery should be expedited where: <ul style="list-style-type: none"> <li>• There is clear evidence of serious fetal compromise (FBS should not be undertaken).</li> <li>• CTG abnormalities are of a degree requiring further assessment, but FBS is contraindicated, clinically inappropriate or unavailable.</li> <li>• The decision to delivery interval may be prolonged by virtue of location, clinical staff availability, patient factors or access to clinical services.</li> </ul>	Consensus-based recommendation
Good Practice Note	Grade and supporting references
If fetal blood sampling is undertaken, it is recommended that the woman be in the left-lateral position or lithotomy with a wedge in place to avoid inferior vena cava syndrome or supine hypotension syndrome. Contraindications to FBS include: <ul style="list-style-type: none"> <li>• Evidence of serious, sustained fetal compromise.</li> <li>• Fetal bleeding disorders (e.g. suspected fetal thrombocytopenia, haemophilia).</li> <li>• Face or brow presentation.</li> <li>• Maternal infection* (e.g. HIV, hepatitis B, hepatitis C, herpes simplex virus and suspected intrauterine sepsis).</li> </ul> *Group B Streptococcus carrier status does not preclude FBS.	Good Practice Note (Consensus-based)
Good Practice Note	Grade and supporting references
Fetal blood sampling is not generally recommended in pregnancies at less than 34 weeks of gestation because delivery may be inappropriately delayed in a premature "at risk" fetus that may sustain damage earlier than would be expected in a term fetus.	Good Practice Note (Consensus-based)

Fetal blood sampling	
Good Practice Note	Grade and supporting references
If a fetus is in a breech presentation during labour and is exhibiting signs of fetal compromise that are not readily remediable, it would be more appropriate to deliver that baby by caesarean section than to undertake fetal blood sampling.	Good Practice Note (Consensus-based)

Other techniques for Intrapartum Fetal Surveillance	
Fetal ECG/ST segment analysis, fetal pulse oximetry and intrauterine pressure catheters	
Recommendation 14	Grade and supporting references
There is insufficient evidence to recommend fetal ECG/ST segment analysis, or fetal pulse oximetry for use in intrapartum fetal surveillance.	A 46, 47, 48, 92-94 (Level I)
Recommendation 15	Grade and supporting references
If there is difficulty auscultating the fetal heart OR obtaining an adequate fetal heart rate tracing at any time in labour, the fetal heart rate should be monitored using a scalp electrode.	Consensus-based recommendation
Amnioinfusion	
Recommendation 16	Grade and supporting references
Amnioinfusion is not recommended for routine treatment of variable decelerations in labour.  However, in a small number of cases where fetal blood sampling is not possible or contraindicated and caesarean section is relatively contraindicated, amnioinfusion may confer a small benefit.	B 49-51 (Level I)

Maintaining standards in Intrapartum Fetal Surveillance	
Standardisation	
Recommendation 17	Grade and supporting references
Settings on CTG machines should be standardised to enable a consistent approach to teaching and interpretation of CTG traces, particularly as many health professionals move between different institutions in Australia and New Zealand.	Consensus-based recommendation
Recommendation 18	Grade and supporting references
Until there is clear evidence that interpretation based on one paper speed is superior to the others, it is recommended that the paper speed of 1 cm per minute be adopted universally.	Consensus-based recommendation



Good Practice Notes	Grade and supporting references
<ul style="list-style-type: none"> <li>• Date and time settings on CTG machines should be validated whenever used.</li> <li>• CTGs should be labelled with the mother's name, hospital number, date and time of commencement and include the maternal observations.</li> <li>• Any intrapartum events that may affect the fetal heart rate (e.g. vaginal examination, obtaining a fetal blood sample (FBS), insertion/top-up of an epidural) should be noted contemporaneously including date, time and signature.</li> <li>• For women receiving continuous CTG, the trace should be reviewed at least every 15-30 minutes and should be acted upon. It should be regularly recorded, either by written or electronic entry, in the medical record that the CTG has been reviewed.</li> <li>• Health professionals should be aware that machines from different manufacturers use different vertical axis scales, and this can change the perception of fetal heart rate variability.</li> </ul>	Good Practice Notes (Consensus-based)

Paired umbilical cord blood gas analysis	
Recommendation 19	Grade and supporting references
<p>Paired umbilical cord blood gas or lactate analysis should be taken at delivery where any of the following are present:</p> <ul style="list-style-type: none"> <li>• Apgar score &lt; 4 at 1 minute.</li> <li>• Apgar score &lt; 7 at 5 minutes.</li> <li>• Fetal scalp sampling performed in labour.</li> <li>• Operative delivery undertaken for fetal compromise.</li> </ul> <p>Where paired umbilical cord blood gas or lactate analysis is taken at delivery as part of a clinical audit regimen, this process should not interfere with management of the third stage of labour.</p>	C <sub>52</sub> (Level III-3)
Recommendation 20	Grade and supporting references
All health professionals involved in providing antenatal and intrapartum care should participate in regular multi-disciplinary clinical audits focussing on maternal and perinatal outcomes in relation to intrapartum fetal monitoring.	Consensus-based recommendation
Good Practice Note	Grade and supporting references
<p>The following practices assist with clinical audit and education:</p> <ul style="list-style-type: none"> <li>• Regular CTG review meetings.</li> <li>• Review of the use of FBS where available.</li> </ul>	Good Practice Note (Consensus-based)
Good Practice Note	Grade and supporting references
CTG traces should be stored in a manner that enables ready access for multidisciplinary clinical audit and clinical education.	Good Practice Note (Consensus-based)