



Government of **Western Australia**  
Department of **Health**

# Cardiotocography (CTG) Monitoring Standard

Chief Nursing and Midwifery Office

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## 1 Introduction

The aim of this mandatory Standard is to set out the minimum requirements for cardiotocography (CTG) monitoring. These minimum requirements are designed to improve perinatal outcomes and reduce the risk of adverse events related to the use of CTG monitoring in clinical practice across all Health Services Providers that provide maternity services.

Integral to contemporary maternity care is surveillance for evidence of both fetal wellbeing and early recognition of fetal compromise in pregnancies with identified clinical risk factors. Current research identified continuous CTG monitoring during labour is associated with a reduction in the incidence of neonatal seizures but has no obvious impact on cerebral palsy or perinatal mortality when used in healthy low-risk labouring women. However, it is associated with an increase in the incidence of caesarean section and instrumental vaginal births (Alfirevic, Gyte, Cuthbert and Devane, 2017). Additionally, there was no evidence of benefit for the use of CTG for women at low risk of complications on admission in labour and this may increase the caesarean section rate by approximately 20% in this group. (Devane Lalor, Daly, McGuire, Cuthbert, Smith, 2017).

The focus of this standard is the use and interpretation of CTG recordings of the fetal heart rate and uterine activity, hereafter referred to as CTG monitoring.

The primary purpose of CTG monitoring is to help identify signs of suspected fetal compromise in order to initiate management that may reduce or prevent fetal morbidity and mortality in pregnancies with identified clinical risk factors.

## 2 Background

The *Cardiotocography Monitoring Standard* (the Standard) aims to reduce inconsistencies identified in CTG monitoring clinical practices that may adversely impact perinatal outcomes.

The intent of the Standard is to provide a consistent framework for CTG monitoring and interpretation to underpin clinical practice that is in accordance with the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) Intrapartum Fetal Surveillance Clinical Guideline Fourth Edition 2019 and relevant maternity service policies/guidelines.

This Standard has been developed and updated following consultation with key stakeholders across all Health Service Providers that provide maternity services.

## 3 Educational requirements

- Health Service Providers must ensure that all clinicians achieve and maintain demonstrated competency in performing and/or interpreting CTGs commensurate with their experience and level of responsibility in the delivery of maternity care. The following minimum mandatory education requirements must be followed:
  - Evidence of equivalent prior learning or an introduction to CTG monitoring, content to be determined by the Health Service Provider, prior to a clinician being required to perform or interpret CTG monitoring
  - Review of the *Cardiotocography (CTG) Monitoring Policy*, *Cardiotocography (CTG) Monitoring Standard*; and any associated relevant local maternity service guidelines and clinical escalation pathways associated with CTG monitoring

- Completion of annual CTG monitoring education with content to be determined by the Health Service Provider; RANZCOG Online Fetal Surveillance Education Program (OFSEP) is recommended.
- Completion of RANZCOG Fetal Surveillance Education Program (FSEP) or equivalent as determined by the Health Service Provider, every three years

All CTG education courses should have an assessment component to assess the practitioner level attained e.g. RANZCOG FSEP practitioner assessment level 2 must be achieved in order to be responsible as the second clinician for interpretation of CTG.

Clinicians who are not compliant with the above educational requirements must not have responsibility for performing and interpreting CTG as part of their role.

Health Service Providers must schedule a minimum of bi-monthly multidisciplinary clinical practice review meetings (and monitor attendance) to promote effective communication, teamwork, and conflict resolution between clinicians. These meetings should involve review and interpretation of actual CTG recordings and their outcomes.

## **4 Clinical requirements**

### **4.1 Fetal heart rate assessment**

- While fetal heart rate detection may be performed using a Pinard or stethoscope, it is a requirement that, whenever possible, clinicians will use an electronic fetal heart rate detection device to provide an audible signal to all present
- Electronic fetal heart rate assessment may be conducted in a number of ways:
  - using a hand-held device intermittently, in both the antenatal and intrapartum period
  - using a CTG recording device where indicated as determined by clinical risk factors:
    - periodically in the antenatal period; and
    - either intermittent CTG or continuously CTG in the intrapartum period.

### **4.2 Uterine activity assessment**

- It is important that the fetal heart rate and uterine activity are recorded simultaneously for accurate interpretation of any fetal heart rate abnormality that may occur.
- Uterine activity is assessed:
  - electronically via a pressure sensitive toco-transducer placed directly over the fundus, or by use of an intrauterine pressure gauge and/or,
  - by placing a hand on the abdomen and feeling when the uterus becomes hard, when it relaxes and identifying the resting tone. The length of a contraction is assessed by taking the time at the beginning and end of the contraction. The frequency is assessed by how often they occur in a period of 10 minutes
  - half hourly during active labour.
- Where uterine activity is not being picked up adequately on the CTG, notation must be made on the CTG recording.

### 4.3 CTG monitoring in clinical practice

- Women should be provided with sufficient information to make informed decisions regarding the use of CTG monitoring
- Women with identified clinical risk factors must be offered intrapartum CTG monitoring as appropriate to their individual clinical circumstance
- Women without risk factors should be offered routine assessment of fetal heart rate using intermittent auscultation with an electronic hand-held device
- For women choosing not to have fetal monitoring or a mode of fetal monitoring outside of current, best evidence-based clinical guidelines:
  - Health Service Providers that provide maternity services must have processes and communication pathways to support women and health professionals to maintain a care partnership when women decline recommended care. This includes a requirement for care decisions to be recorded clearly in the antenatal and/or intrapartum record
  - the senior medical officer responsible for care of the woman must be made aware of the woman's decision/s.

### 4.4 Cardiotocograph recording and reporting

When conducting CTG monitoring, the following CTG recording requirements must be met:

- All staff members responsible for use of CTG equipment must be oriented to the local equipment system/s, including clarification of the vertical fetal heart rate (FHR) scale in use
- CTG recording speed of 1cm per minute
- Validated date and time settings at commencement of recording
- The indication/s for CTG monitoring, mother's name, hospital number, gestation date time and of commencement
- Any events that may affect the fetal heart rate are must be annotated on the CTG recording.

### Storage Requirements

- Health Service Providers that provide maternity services must ensure a process for the management of CTG recordings is in place which complies with their retention and storage of confidential information requirements, in accordance with [MP 0145/20 Information Storage Policy](#).
- CTG recordings should be stored for the same period as medical records.
- Storage of CTG recordings whether paper based or electronic, must be in accordance with [MP 0145/20 Information Storage Policy](#).

### Terminology, documentation, and interpretation

Health Service Providers must adopt a standardised approach to terminology, documentation, and interpretation of CTG recordings to promote clear communication between clinicians. This will include the following requirements:

- Written or verbal reporting must:

- include all features of the CTG;
- use a designated, structured description of CTG information, such as the DR C BRAVADO acronym (see Appendix B) or as determined by the Health Service Provider
- use standardised RANZCOG terminology
- Interpretation and response to findings must align with escalation thresholds and processes described in Appendix A
- Interpretations, decisions, and actions must be documented using a standardised recording system as determined by the Health Service Provider
- A CTG recording must be reviewed and interpreted by a second clinician at a minimum 2 hourly and findings discussed and documented (Examples include the Buddy System (NHS Saving Babies Lives, 2016))
- Where there is differing opinion local escalation procedures should be followed
- All CTG interpretations must include the name, signature and designation of the reviewing clinician/s (or HE/user number for electronic platforms). If using electronic monitoring with real time alerts Health Service Providers must have a process for acknowledgment and escalation.

#### 4.4.1 Antenatal CTG

- As defined by *Baker, Beaves and Wallace (2016)* a normal antenatal CTG has:
  - a baseline fetal heart rate (FHR) of between 110 and 160 bpm
  - baseline variability of 6-25 bpm
  - a minimum of two accelerations within a 20-minute period (reactivity); and
  - no decelerations
- While all CTGs require interpretation, those that DO NOT meet the above criteria are **abnormal** and require IMMEDIATE FURTHER interpretation and management based on the individual clinical situation and local care escalation pathways
- Gestation should be considered when interpreting the significance of FHR features which do not meet all the normal antenatal criteria
- All antenatal CTG recordings must be reviewed and documented by two clinicians competent in CTG interpretation as per the education requirements in Section 3. for CTG interpretation (neither of whom are students) and prior to the woman leaving the hospital.

#### 4.4.2 Intrapartum CTG

- In accordance with the definition in the RANZCOG Intrapartum Fetal Surveillance Clinical Guideline – Fourth Edition 2019 a normal intrapartum CTG has:
  - A baseline FHR between 110 and 160 bpm
  - Baseline variability of 6-25 bpm
  - Accelerations 15 bpm for 15 seconds from baseline
  - No decelerations
- Baker, Beaves and Wallace (2016) note that although the presence of accelerations in an intrapartum CTG is reassuring, their absence does not necessarily indicate compromise

- For the purposes of this Standard, a CTG recording is not abnormal in the absence of accelerations if all other features (normal baseline, normal variability and absence of decelerations) are present
- Intrapartum CTG's with abnormalities of baseline or baseline variability or where fetal heart rate decelerations are present are abnormal and require IMMEDIATE ACTION to review interpretation and management based on the individual clinical situation and local care escalation pathways (See Appendix A)
- Minimum requirements for intrapartum documentation of CTG interpretation by the primary clinician should occur at 30 minutely intervals, unless more frequent documented interpretation is clinically indicated
- Any interruptions to CTG monitoring, including insertion of an epidural or transfer to theatre, should be minimised and the fetal heart rate monitored and documented regularly by intermittent auscultation if continuous CTG monitoring is not practical
- All intrapartum CTG traces must be reviewed and documented by two clinicians competent in CTG interpretation as per the education requirements (section 3) for CTG interpretation (neither of whom are students) at least 2 hourly or more frequently if clinically indicated.

#### **4.5 Clinical care escalation**

- Health Service Providers are required to have clear escalation pathways specific to the local resources/situation, for:
  - Abnormal antenatal CTG
  - Abnormal intrapartum CTG
  - Conflict of opinion between clinicians regarding the interpretation of, and/ or management of, a CTG.
- Any CTG classified as abnormal must be escalated according to the relevant local escalation pathway as referred to above and managed in a clinically appropriate, required time frame (See Appendix A)
- The inability to record a quality CTG trace within 10 minutes of commencement or for any period of 10 minutes, requires escalation including consideration of the need to place a fetal scalp electrode or perform a bedside ultrasound. Health Service Providers must audit compliance with adherence to clinical care escalation pathways, including rationale for non-adherence.

## 5 Definitions

Term	Definition
<b>Fetal Heart Rate Assessment</b>	Assessment of fetal heart rate that can be conducted in an intermittent and/or continuous manner, during the antepartum and intrapartum periods. Intermittent methods use a stethoscope, fetal stethoscope or Pinard horn, or Doppler ultrasound device. A cardiotocograph (CTG) is the only method of continuous fetal heart rate monitoring in common usage.
<b>Identified Clinical Risk Factors</b>	Antenatal and intrapartum factors that increase risk of fetal compromise where intrapartum cardiotocography is recommended, <a href="#">Intrapartum Fetal Surveillance Clinical Guideline RANZCOG 2019</a> .
<b>Escalation pathway</b>	A documented process that outlines actions required for timely review ensuring appropriate interventions for patients. This process will be site specific in relation to the local team structure and resources.
<b>Pinard</b>	A type of fetal stethoscope used to listen to the heart rate of a fetus during pregnancy. Also known as a fetoscope or Pinard.
<b>Assessment Practitioner Level</b> <a href="#">FSEP Assessment Scoring.doc (ranzocg.edu.au)</a>	Attainment of a level of education and successful completion of assessment as determined by the Health Service Provider to be able to independently prioritise and make decisions regarding the care of women with CTG. For example FSEP Assessment Scoring

## References

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Royal Australian and New Zealand College of Obstetricians and Gynaecologists. [\*Intrapartum Fetal Surveillance Clinical Guideline – Fourth Edition \(2019\)\*](#). Melbourne, Victoria: RANZCOG.

## Appendix A: Escalation Pathways

### Interpretation and response to Antenatal CTG

Classification		Baseline	Accelerations	Variability	Decelerations	Action plan
Normal	<i>Low probability of compromise</i>	110-160	15 bpm for 15 seconds  2 in 20 mins (Reactive)	6-25 bpm	Absent	<p>Confirm follow-up arrangements as per clinical picture and document a plan</p> <p>Remove trace once all normal features are present</p> <p>If 2 accelerations in 20 mins are not present after 1 hour, a further management plan is required</p>
Abnormal	<i>Unlikely to be associated with fetal compromise when occurring in isolation</i>	110-160	Absent >40 mins	6-25 bpm  3-5 bpm for < 45mins	Absent	<p>Notify senior midwife and/or doctor using ISOBAR format</p> <ul style="list-style-type: none"> <li>Review clinical picture</li> <li>Arrange repeat CTG within 4 hours or perform bedside fetal wellbeing scan</li> <li>2x abnormal CTG requires an ultrasound for fetal wellbeing</li> </ul>
Abnormal	<b>REQUIRES ACTION</b>	<110 >160	Absent	3-5 bpm for > 45mins  <3 bpm  Sinusoidal*	Present	<p>Notify doctor and senior midwife using ISOBAR format</p> <ul style="list-style-type: none"> <li>Review clinical picture</li> <li>Treat reversible causes</li> <li>Continue CTG</li> <li>Medical review and consider ultrasound for fetal wellbeing if appropriate and urgency of situation allows</li> <li><i>*Consider feto-maternal haemorrhage if suspected sinusoidal features including urgent MFM opinion from KEMH</i></li> </ul>

## Interpretation and response to Intrapartum CTG

Classification		Baseline	Variability	Decelerations	Action plan – intrapartum
Normal	<i>Low probability of compromise</i>	110-160	6-25 bpm	Absent	Nil
Abnormal	<i>Unlikely to be associated with fetal compromise when occurring in isolation</i>	100-109	Reduced or reducing baseline variability 3-5 bpm	<ul style="list-style-type: none"> <li>• Early</li> <li>• Variable</li> </ul>	Notify senior midwife and/or doctor using ISOBAR format <ul style="list-style-type: none"> <li>• Continue CTG</li> <li>• Review clinical picture</li> <li>• Treat reversible causes</li> <li>• Consider VE and scalp stimulation +/- FBS</li> <li>• Review 30 minutes</li> </ul>
Abnormal	<b>REQUIRES ACTION</b> <i>May be associated with compromise</i>	>160  Rising baseline	3-5 bpm or >25 bpm for 30 minutes	<ul style="list-style-type: none"> <li>• Complicated variables</li> <li>• Late</li> <li>• Prolonged (below baseline &gt; 90sec &amp; &lt;5 mins)</li> </ul>	Notify doctor and senior midwife using ISOBAR format <ul style="list-style-type: none"> <li>• Continue CTG</li> <li>• Review clinical picture</li> <li>• Treat reversible causes</li> <li>• VE to assess progress and scalp stimulation +/- FBS</li> <li>• Review management in light of above interventions – delivery may be indicated</li> </ul>
Abnormal:	<b>IMMEDIATE ACTION</b> <i>Very likely to be associated with compromise</i>	Bradycardia (a fall in baseline FHR for > 5 mins)	<3 bpm  Sinusoidal	<ul style="list-style-type: none"> <li>• Complicated variables with reduced or absent baseline variability</li> <li>• Late decelerations with reduced or absent variability</li> </ul>	Immediately notify doctor and senior midwife using ISOBAR format <b>All actions as above without delay (please note FBS not appropriate in this situation)</b> <ul style="list-style-type: none"> <li>• Consider tocolysis</li> <li>• Expedite delivery</li> <li>• Reduce second stage or Category 1 (Urgent) C/S</li> </ul>

## Legend Appendix A: Interpretation and response to CTG's



Normal continue as per plan



Abnormal requires review by senior midwife and/or doctor 30 minutes.



Abnormal requires ACTION including medical review within 15-30 minutes. Escalate further if clinical acuity means timely review unachievable.



Abnormal requires IMMEDIATE ACTION – Code Blue or equivalent site-specific MET ACTION protocol

## Appendix B: Example of standardised CTG reporting acronym

- DR C BRAVADO acronym to assist with interpreting CTG's is recommended
  - DR - Determine Risk (indication for CTG)
  - C – Contraction pattern
  - Bra – Baseline Rate
  - V – Variability
  - A – Acceleration presence
  - D – Deceleration pattern
  - O – Overall classification and Outcomes agreed

## Appendix C: Cardiotocography (CTG) Monitoring Compliance Audit Tool

<b>Policy requirement – at the time of the audit</b> The sample size must reflect the acuity level of the maternity service (20-50 cases, e.g. 50 cases for tertiary sites)	<b>Health Service Provider Response (record as percentage of sample size)</b>
<b>3. Educational Requirements</b>	
Percentage of relevant midwives who have completed introduction to CTG monitoring or prior learning within 6 months of employment Percentage of relevant midwives who have completed annual education update Percentage of relevant midwives who have completed CTG education within past 3 years and achieved required practitioner level	
Percentage of relevant medical staff who have completed introduction to CTG monitoring or prior learning within 6 months of employment Percentage of relevant medical staff who have completed annual education update Percentage of relevant medical staff who have completed CTG education within past 3 years and achieved required practitioner level	
Number of multidisciplinary clinical practice review meetings undertaken in previous 12 months	
<b>4. Clinical Requirements</b>	
Indication for CTG identified - antenatal (percentage of sample)	
Indication for CTG identified – intrapartum (percentage of sample)	
Percentage of admission CTGs performed in absence of clinical risk factors	
Percentage of abnormal CTGs escalated as per escalation pathway.	

<b>Policy requirement – at the time of the audit</b> The sample size must reflect the acuity level of the maternity service (20-50 cases, e.g. 50 cases for tertiary sites)	<b>Health Service Provider Response (record as percentage of sample size)</b>
<b>4.4 Recording and Reporting</b>	
CTG recording speed of 1cm/minute Validated date and time settings Marked with mother’s name and medical record number Gestation noted at commencement Marked with date and time of commencement Maternal observations noted at commencement (within 15 minutes) Events affecting Fetal Heart rate noted (i.e analgesia, epidural insertion, ARM, etc) Was a doppler used if unavoidable interruption to CTG	
All features of the CTG reported using designated, structured description (DR C BRAVADO) Standardised RANZCOG terminology is used	
Antenatal CTG recordings reviewed by two clinicians with responsibility for CTG interpretation Antenatal CTG recordings are reviewed as above prior to woman being discharged	
Intrapartum CTG interpretation has been documented at a minimum every 30 minutes using DR C BRAVADO	
Intrapartum CTG recordings reviewed, interpreted and documented using DR C BRAVADO by two clinicians (compliant in CTG interpretation training) at least 2 hourly	
Interpretation and response to findings align with escalation threshold	
CTG interpretation include signature and designation of reviewing clinicians	
CTG interpretation and response to findings align with escalation thresholds/ processes and timeframes as described in Appendix A	

<p><b>Policy requirement – at the time of the audit</b>  The sample size must reflect the acuity level of the maternity service (20-50 cases, e.g. 50 cases for tertiary sites)</p>	<p><b>Health Service Provider Response (record as percentage of sample size)</b></p>
<p><b>5. Clinical Audit</b></p>	
<p>HSP has clinician database for compliance of education  Number of multidisciplinary clinical practice review meetings offered this financial year involving CTG interpretation  Total number of midwifery and medical staff who attended these multidisciplinary review meetings  Provide information on all SAC 1 and 2 incidents related to CTG's and actions taken to address the recommendations</p>	

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