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

Cardiotocography Monitoring Standard

Statewide Obstetric Support Unit on behalf of the System Manager (Patient Safety and Clinical Quality Directorate)

better health ▪ better care ▪ better value

1 Introduction 2
2 Background 2
3 Educational requirements 2
4 Clinical requirements 3
4.1 Fetal heart rate assessment 3
4.2 Uterine Activity Assessment 3
4.3 CTG monitoring in clinical practice 3
4.4 Cardiotocograph recording and reporting 4
4.4.1 Antenatal CTG 5
4.4.2 Intrapartum CTG 5
4.5 Clinical Care Escalation 6
5 Clinical audit and compliance 6
6 Definitions 7
References 8
Appendix A: Escalation Pathways 9
Appendix B: Example of standardised CTG reporting acronym 11
Appendix C: Audit Sheet for WA CTG Fetal Monitoring Standards 12

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 in providers of 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) was developed in response to a directive by the Acting Director General of Health in 2015 to address 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 in metropolitan and country maternity services.

3 Educational requirements

- Health Service Providers must ensure that all clinicians with a responsibility for performing and/or interpreting CTGs meet the following minimum mandatory education requirements:
    - Confirmation 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
    - Completion of an annual CTG monitoring education update, content to be determined by the Health Service Provider
    - Achievement of the practitioner assessment level commensurate with their experience and level of responsibility in the delivery of maternity care, assessed at intervals determined by the Health Service Provider
    - Completion of an advanced skill CTG education program which may include a

structured face to face learning component (e.g. FSEP face to face multidisciplinary education session), content to be determined by the Health Service Provider, every three years, dependent on the current level of required practice and responsibility for performing and interpretation of CTG's, as determined by the Health Service Provider

- Orientation to the *Cardiotocography Monitoring Policy*, this Standard; and any associated relevant local maternity service guidelines and clinical escalation pathways associated with CTG monitoring

- Regular, scheduled multidisciplinary learning opportunities should be provided to promote effective communication, teamwork and conflict resolution between clinicians with a responsibility for performing and/or interpreting CTGs.

4 Clinical requirements

4.1 Fetal heart rate assessment

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

4.2 Uterine Activity Assessment

- It is important that the fetal heart rate and uterine activity are recorded simultaneously
- This is critical 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,
    - 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 with identified clinical risk factors should 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
- Women should be provided with sufficient information to make informed decisions regarding the use of CTG monitoring
- 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 ante and/or intrapartum record
    - the senior medical officer responsible for care of the woman should 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
- Paper speed of 1cm per minute
- Validated date and time settings at commencement of recording
- Each CTG recording is labelled with the mother's name, hospital number, gestation, date, time of commencement and maternal observations
- The indication/s for the CTG is/are annotated on the CTG recording
- Any events that may affect the fetal heart rate are annotated on the CTG recording
- Each Health Service Provider that provides 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 and in accordance with relevant legislation. CTG recordings should be stored for the same period of time as medical records. CTGs from centrally monitored systems may be initially stored on the hard disc of the server and subsequently archived to a permanent medium
- Definition of specific procedures must be implemented for the long-term storage of paper-based CTG recordings, which fade over time, particularly for situations when there has been a known adverse neonatal outcome. Short traces may need to be microfilmed whilst long traces should be stored in their original format in heat protected envelopes (not plastic sleeves). Electronic storage of traces. e.g. optical disc should be considered.

Health Service Providers that provide maternity services 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 (Appendix B); and
- 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 provider of maternity services. Examples include the Buddy System (NHS Saving Babies Lives, 2016) and Fresh Eyes Approach (Fitzpatrick and Holt, 2008)
- All CTG interpretations include the signature and designation of the reviewing clinician/s.

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 in a timely manner by two clinicians with responsibility 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
  - No decelerations
  - Accelerations above the baseline
- 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 of fetal heart rate 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

- All intrapartum CTG traces must be reviewed by two clinicians, (neither of who are students), at least 2 hourly or more frequently if concerned.

4.5 Clinical Care Escalation

- Health Service Providers that provide maternity services are required to have clear escalation pathways specific to the local resources/situation, for:
    - Abnormal antenatal CTG
    - Abnormal intrapartum CTG; and
    - 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

- Health Service Providers that provide maternity services must audit compliance with adherence to clinical care escalation pathways, including scrutiny of reasons for non-adherence.

5 Clinical audit

In addition to auditing compliance with this Standard using the audit sheet provided in Appendix C (as required by the *Cardiotocography Monitoring Policy*), Health Service Providers that provide maternity services must:

- Maintain a database capable of audit and reporting of individual clinician compliance with the mandatory CTG education requirements of the *Cardiotocography Monitoring Standards*
- Monitor clinical care compliance with the local requirements using a Clinical Audit Tool.

It is recommended that Health Service Providers that provide maternity services discuss fetal monitoring and clinical outcomes at regular, scheduled multidisciplinary educational clinical practice review meetings. These meetings should involve review and interpretation of actual CTG recordings.

When undertaking audit of compliance with this Standard, Health Service Providers must ensure the sample size reflects the level of acuity of the maternity service and seasonality, i.e. student placements, graduate placements and resident rotations.

6 Definitions

Term	Definition
Fetal Heart Rate Assessment	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.
Identified Clinical Risk Factors	Antenatal and intrapartum factors that increase risk of fetal compromise where intrapartum cardiotocography is recommended, Intrapartum Fetal Surveillance Clinical Guideline RANZCOG 2019.
Escalation pathway	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.
Pinard Horn	A type of fetal stethoscope used to listen to the heart rate of a fetus during pregnancy. Also known as a fetoscope or Pinard.
Advanced Skill CTG Education	Attainment of a level of education and successful completion of assessment as determined by the HSP to be able to independently prioritise and make decisions regarding the care of women with CTG.

References

Alfirevic Z, Gyte G, Cuthbert A, and Devane D. (2017) Continuous cardiotocography (CTG) as a form of electronic fetal monitoring (EFM) for fetal assessment during labour. Cochrane Database of Systematic Reviews 2017, Issue 2. Art. No: CD006066. https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD006066.pub3/full#0

Australian College of Midwives (2013) *National Midwifery Guidelines for Consultation and Referral- Third Edition*

Australian Commission on Safety and Quality in Health Care. *The Australian Charter of Healthcare Rights: a guide for healthcare providers. 2nd Edition*. 2019.

Australian Commission on Safety and Quality in Health Care. *National Safety and Quality Health Service Standards 2nd Edition*

Baker LS, Beaves MC, Wallace EM. (2016) Assessing Fetal Wellbeing: A Practical Guide. Melbourne, Victoria: RANZCOG and Monash Health: 2016

Devane D, Lalor JG, Daly S, McGuire W, Cuthbert A, Smith V. (2017) Cardiotocography versus intermittent auscultation of fetal heart on admission to labour ward for assessment of fetal wellbeing. Cochrane Database of Systematic Reviews 2017, Issue 1. Art. No: CD005122.

Fitzpatrick T, Holt L. (2008) *A 'buddy' approach to CTG*. Midwives 11(5): 40-1.

National Health Service. Saving babies lives: A care bundle for reducing stillbirth. (online) 2016. Available from: https://www.england.nhs.uk/wp-content/uploads/2016/03/saving-babies-lives-car-bundl.pdf

Small K, Sidebotham M, Fenwick J, and Gamble J. (2020) Intrapartum cardiotocograph monitoring and perinatal outcomes for women at risk: Literature review. *Women and Birth 33,* p 411 – 418. https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD005122.pub5/epdf/full

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	***Low probability of compromise***	**110-160**	**2 in 20 mins (Reactive)**	**6-25 bpm**	**Absent**	**Discuss with doctor and confirm follow-up arrangements as per clinical picture** **Remove trace once all normal features are present** **If 2 accelerations in 20 mins are not present after 1 hour, a further management plan is required**
Abnormal ***Any of these features***	***REQUIRES ACTION***	**<110 >160**	**Absent**	**3-5 bpm for > 45mins** **<3 bpm**	**Present**	**Notify doctor and midwife coordinator** • **Review clinical picture** • **Treat reversible causes** • **Arrange repeat CTG within 4 hours if clinical picture allows** **2 x abnormal requires an ultrasound for fetal wellbeing**

Interpretation and response to Intrapartum CTG

Classification		Baseline	Variability	Decelerations	Action plan - intrapartum
Normal	***Low probability of compromise***	**110-160**	**6-25 bpm**	**Absent**	**Nil**
Abnormal ***Any of these features***	***In isolation unlikely to be associated with compromise***	**100-109**		• **Early** • **Variable**	**Notify doctor and midwife coordinator** • **Continue CTG** • **Review clinical picture** • **Treat reversible causes** • **+/-Scalp stimulation or FBS** • **Review 30 minutes**
Abnormal ***Any of these features***	***REQUIRES ACTION*** ***May be associated with compromise***	**>160** **Rising baseline**	**3-5 bpm or >25 bpm for 30 minutes**	• **Complicated variables** • **Late** • **Prolonged (below baseline > 90sec & <5 mins)**	**Notify doctor and midwife coordinator** • **Review clinical picture** • **Treat reversible causes** • **Scalp stimulation +/- FBS** • **VE to assess progress** • **Review management in light of above interventions – delivery may be indicated**

Abnormal: **Any of these features**	***IMMEDIATE MANAGEMENT*** ***Very likely to be associated with compromise***	**Bradycardia (<100 for > 5 mins)**	**<3 bpm** **Sinusoidal**		**Notify doctor and midwife coordinator** • **As above: immediately** • **Consider tocolysis** • **Early assisted delivery** • **Reduce second stage or Category 1 (Urgent) C/S**

Legend for Appendix A: Interpretation and response to CTG

Normal continue as per plan

Abnormal requires review

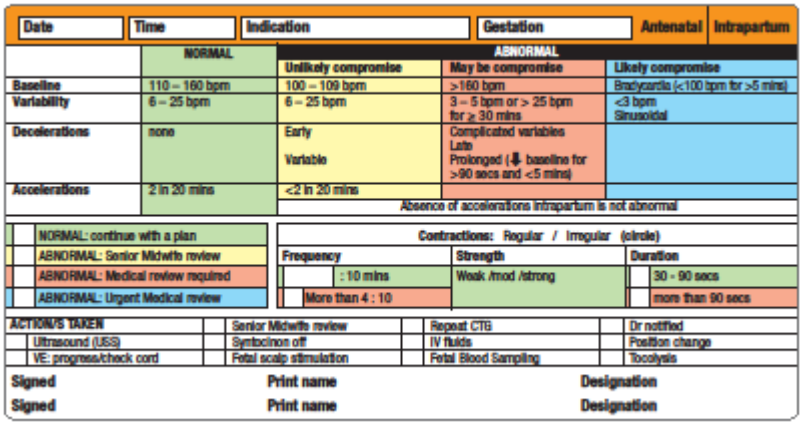
Abnormal requires ACTION

Abnormal requires URGENT ACTION – Code Blue

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

Example of standardised recording system including requirement for review, interpretation and documentation signed by two staff



Date	Time	Indication	Gestation	Antenatal	Intrapartum

	NORMAL	ABNORMAL		
		Unlikely compromise	May be compromise	Likely compromise
Baseline	110 – 160 bpm	100 – 109 bpm	>160 bpm	Bradycardia (<100 bpm for >5 mins)
Variability	6 – 25 bpm	6 – 25 bpm	3 – 5 bpm or > 25 bpm for ≥ 30 mins	<3 bpm Sinusoidal
Decelerations	none	Early Variable	Complicated variables Late Prolonged (↓ baseline for >90 secs and <5 mins)	
Accelerations	2 in 20 mins	<2 in 20 mins		
		Absence of accelerations intrapartum is not abnormal		

NORMAL: continue with a plan	Contractions: Regular / Irregular (circle)		
ABNORMAL: Senior Midwife review	Frequency	Strength	Duration
ABNORMAL: Medical review required	: 10 mins	Weak /mod /strong	30 - 90 secs
ABNORMAL: Urgent Medical review	More than 4 : 10		more than 90 secs

ACTION/S TAKEN			
Ultrasound (USS)	Senior Midwife review	Repeat CTG	Dr notified
VE: progress/check cord	Syntocinon off	IV fluids	Position change
	Fetal scalp stimulation	Fetal Blood Sampling	Tocolysis

Signed	Print name	Designation
Signed	Print name	Designation

WA Country Health Service CTG Reporting Sticker

Appendix C: Audit Sheet for WA CTG Fetal Monitoring Standard

Policy requirement – at the time of the audit The sample size must reflect the acuity level of the maternity service and seasonality i.e. student placements, graduates, residents	**Health Service Provider Response**
3. Educational Requirements	
Percentage of midwives who have completed introduction to CTG monitoring or prior learning within 6 months of employment Percentage of midwives who have completed annual education update Percentage of midwives who have completed advanced skill CTG education within past 3 years	
Percentage of medical staff who have completed introduction to CTG monitoring or prior learning within 6 months of employment Percentage of medical officers who have completed annual education update Percentage of medical officers who have completed advanced skill CTG education within past 3 years	
Number of scheduled multidisciplinary learning opportunities undertaken in previous 12 months	
4. Clinical Requirements – Sample of records is representative of Antenatal and Intrapartum CTG use across the service	
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 records where high risk situations and outcomes are identified	
Percentage of sample where women who decline CTG is documented (according to HSP process)	
Recording and Reporting – recorded as percentage of sample records	
Paper speed of 1cm/minute Validated date and time settings	

Policy requirement – at the time of the audit The sample size must reflect the acuity level of the maternity service and seasonality i.e. student placements, graduates, residents	**Health Service Provider Response**
Labelled with mother's name and medical record number Gestation noted at commencement Labelled with date and time of commencement Maternal observations noted at commencement Events affecting Fetal Heart rate noted (i.e analgesia, epidural insertion, ARM, etc)	
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 recordings reviewed by two clinicians (Fresh Eyes) at least 2 hourly	
Interpretation and response to findings align with escalation threshold	
CTG interpretation include signature and designation of reviewing clinicians	
5. Clinical Audit	
Clinician database for compliance of education Clinical audit tool	

This document can be made available in alternative formats on request for a person with a disability.