Electronic Fetal Heart Rate Monitoring Policy

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1. Purpose

Cardiotocography (CTG) is the most widely used screening tool for fetal wellbeing in the developed world. The primary purpose of CTG is to help identify early signs of suspected fetal compromise and minimise adverse fetal outcomes.[1]

CTGs have a high degree of sensitivity but a low level of specificity which means that they are:

- very good at identifying well fetuses (high negative predictive value), but
- very poor at identifying unwell fetuses (low positive predictive value).

The differences in individual fetal responses to a decrease in oxygen (and therefore differences in heart rate changes) mean that the positive predictive value of CTG for adverse outcome is low and the negative predictive value high.[2]

The increased obstetric intervention rates (caesarean section) associated with CTG can be reduced with the use of intrapartum fetal blood scalp sampling (FBS).[3]

2. Policy

Maternity clinicians are to read this policy in conjunction with the:

- WA Health Cardiotocography Monitoring Policy MP 0076/18 and Cardiotocography Monitoring Standard
- Women and Newborn Health Service (WNHS) Fetal Heart Rate Monitoring clinical practice guideline Clinical Practice Guideline and Fetal compromise (acute): Management if suspected clinical practice guideline **except that**:
  - the KEMH 'Obstetric Registrar/Senior Registrar or Consultant' means the WACHS on call obstetric doctor
  - the KEMH MR255 and MR 226 means integrated progress notes or the notes section of the K2 INFANT-Guardian® System (K2 IGS)
  - the clinical indications for CTG are found in Appendix A.

The aims of this policy are to:

- reduce the likelihood of CTG interpretation errors.
- ensure timely, appropriate clinical response and escalation of abnormal CTGs
- improve the confidence of clinicians when describing and classifying CTGs
- improve the accuracy of verbal CTG handovers between clinicians
- describe WACHS specific clinician guidance where it differs from the endorsed WNHS clinical practice guideline
- ensure compliance with the WA Health Cardiotocography Monitoring Policy MP 0076/18.

2.1 K2 fetal monitoring system

WACHS uses the K2 INFANT-Guardian® System (K2 IGS) for continuous CTG electronic fetal heart monitoring.

The K2 IGS is an electronic CTG system with artificial intelligence software, INFANT® (INtelligent Fetal AssessmeNT), to support clinician interpretation of the CTG at the bedside. This system will be discussed further on in this policy.

2.2 Intermittent fetal heart rate auscultation

In the absence of any pregnancy or intrapartum risk factors, intermittent auscultation (IA) of the fetal heart rate (FHR) is the recommended method for fetal surveillance. Where IA is used:

- Midwives are to use a hand-held doppler ultrasound with the speaker volume on for all present to hear.[4,9,10]
- **Do not turn on the K2 INFANT Guardian Portal when using the CTG machine for IA or recording maternal observations** as it will generate an anonymous CTG that requires a significant administrative burden to track and attach to the correct woman / episode of care.
- An abdominal palpation should be performed prior to IA to determine the optimal location to listen to the FHR.
- The maternal heart rate (MHR) should be palpated simultaneously with FHR auscultation to differentiate between the two. Both the MHR and FHR should be documented
- Baseline variability cannot be assessed by IA (only via CTG)
- Where there is any FHR abnormality or deceleration heard, a CTG should be commenced, and a senior midwife notified.
- If the woman is having an elective caesarean section IA should be attended when admitted and following the insertion of the spinal prior to skin prep.

Antenatal:

- The FHR must be auscultated for at least one (1) minute and the FHR recorded as an average.

Intrapartum:

- IA must be documented every:
  - Two (2) hours in the latent phase of labour (less than 4 cm)
  - 15 minutes in the active phase of labour (4 cm or more), **and**
  - at least every five (5) minutes in the second stage of labour or after every contraction. If 2nd stage is longer than 60 minutes a CTG should be commenced.
- IA should be undertaken during a palpated contraction and continue for at least 60 seconds after the contraction has finished. If IA needs to continue for longer than 1-2 minutes a CTG should be commenced.[3,4,9,10]
- If an acceleration is heard during a contraction, there is a high likelihood that the MHR is being heard and maternal pulse oximetry should be applied. If there are any doubts a CTG should be commenced.[9,10]

2.3 Indications for CTG

There is no evidence to support the use of CTG:

- as routine on admission
- for women with uncomplicated pregnancies and labour/birth.

The clinical indications for antenatal and intrapartum CTG are found in Appendix A.

2.4 CTG classification process

All CTGs must be reviewed and classified by two clinicians (neither of whom are students) with appropriate expertise in CTG interpretation (see Appendix C and Appendix H) either:

- two midwives – one of whom is a Level 3 CTG Practitioner **OR**

- one midwife and one obstetric doctor - one of whom is a Level 3 CTG practitioner
  OR
- two obstetric doctors – one of whom is a Level 3 CTG Practitioner.

Where there is not a Level 3 CTG practitioner on site, or only one midwife on per shift, then the second clinician review can be obtained by contacting the Midwifery and Obstetric Emergency Telehealth Service (MOETS) (see Appendix B).

Interpretation, classification, and documentation of the CTG should occur at the bedside portal by both clinicians:

- If the obstetric doctor is reviewing a CTG off-site then the midwife can document that obstetric doctor's CTG classification in K2 IGS on their behalf, once confirmed via readback over the phone.
- If the obstetric doctor does not have remote access to K2 IGS, they must attend the woman in person to review the CTG (midwives are not to send photos of CTGs offsite).
- If the doctor is more than 20 minutes away or the CTG has been classified by the midwife as abnormal with likely fetal compromise, if required, MOETS can be contacted to observe the trace, and support clinical decision making or expediate delivery.

2.5 Performing an antenatal CTG

Capturing CTGs accurately

The midwife must ensure:

- the date and time settings on the CTG machine are cross-checked with K2 IGS on commencement of the CTG
- all episodes of CTG are captured within K2 IGS and the CTG outcome recorded
- the process of capturing clinical documentation when K2 IGS is in use is outlined in Appendix I
- the K2 downtime process for capturing and documenting CTGS will be discussed later in this policy.

Prior to commencing a CTG:

The midwife must ensure:

- The woman's well-being has been considered and their informed choices respected in relation to use of CTG.
- The woman has been admitted to K2 IGS Portal before commencing the CTG
- MHR recorded simultaneously with the FHR to differentiate it from the FHR and a full set of maternal observations recorded.
- Any medications should be noted on the trace prior to commencement.
- It should be noted on the CTG if the woman has consumed any of the following in the last 30 minutes:
  - smoked or vaped, consumed coffee or any form of energy drink, containing caffeine
  - taken any illicit substances
  - if she has been fasting.

On commencement of the CTG

The clinician will ensure that:

- The CTG is recording continuously and there are no signs of abnormality before leaving the room.
- If the CTG is interrupted for any reason before a normal **(GREEN)** CTG is observed, it is to be recommenced as soon as possible and the reason for the interruption documented.

Interpretation and classification of an antenatal CTG

Prior to discharging a woman and before removing a CTG, the CTG must be classified by two clinicians as outlined in the CTG classification process section of this policy.

If a normal antenatal CTG is recorded within a 10-minute period (i.e. all parameters are in the GREEN category (Appendix C) the CTG can be discontinued except in cases of abdominal trauma or if clinically indicated

Discharge the woman from K2 IGS once 2nd reviewer completes review to avoid creating an anonymous trace.

2.6 Interpretation, classification and the process used to handover CTGs

Clinicians are required to interpret the features of the CTG and use these findings to make a classification:

- This is achieved by using a combination of pattern recognition, CTG analysis, review of the individual woman's antenatal/ intrapartum history / risk factors and consideration of fetal physiology.
- By describing all the CTG features including baseline, variability, accelerations, decelerations, and uterine activity, when relevant, an overall assessment is described as either NORMAL or ABNORMAL.
- When handing over, reporting, or documenting a CTG the preferred acronym is DR C BraVADO this provides a standardised process to describe all the features of the CTG:
    - **DR** **D**etermine **R**isks (i.e. indication for CTG)
    - **C** **C**ontraction pattern
    - **Bra** **B**aseline **Ra**te
    - **V** **V**ariability
    - **A** **A**cceleration presence
    - **D** **D**eceleration pattern
    - **O**verall classification (see Appendix C) and **O**utcomes agreed.

Once an interpretation of the features has been made the CTG is then classified using the four Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) accepted CTG classifications below:

- **Normal** – low probability of fetal compromise
- **Abnormal (blue)** – unlikely to be significant fetal compromise
- **Abnormal (yellow)** – may be significant fetal compromise
- **Abnormal (red) –** likely to be significant fetal compromise – requires immediate action
- Should clinicians differ in their classification of and/or management plan for a CTG, **they are to refer to** the WACHS Maternal and Newborn Care Collaboration and Escalation Policy. This difference of clinical opinion should be documented within the

notes including any steps taken to escalate the situation to provide a resolution or gain independent expertise.

2.7 CTG handover

Clinicians handing over a CTG are:

- to follow a standardised process for describing and documenting the CTG classification
- to only describe CTGs as either **normal or abnormal** and for abnormal the level compromise
- not to use vague subjective terms for describing a CTG including 'non-reassuring,' 'sinister,' 'pathological' or non-evidenced based pattern descriptions such as 'sleep pattern,' 'thumb-sucking pattern' etc.

ATTENTION

If the CTG is abnormal and has been escalated for review (see Appendix D and Appendix E), both the primary and the reviewing clinician must both document a full CTG classification in K2 IGS with consensus on classification.

CTG definitions

WACHS bases its definitions around the RANZCOG Intrapartum Fetal Surveillance Clinical Guidelines - 4th Edition 2019 as per Table 1 below. However due to some logistical constraints in rural and remote services some items have been adapted in the interests of patient safety.

Table 1: CTG related WACHS definitions

FEATURE	DEFINITION
Tachysystole	More than 4 contractions in 10 minutes without FHR abnormalities. **NOTE:** WACHS has an accepted limit of 4 contractions in 10 minutes with oxytocin / prostaglandin use as this has an iatrogenic association to fetal hypoxia.
Hypertonus	Contractions either lasting: • more than 90 seconds or • occurring with less than 60 second rest period between • without FHR abnormalities.
Hyperstimulation	• excessive uterine activity • tachysystole or hypertonus with FHR abnormalities. • commonly related to the use of oxytocin /prostaglandins.

Baseline fetal heart rate	• the mean level of the FHR when it is stable
	• assessed over a 5-10 minute window and expressed in beats per minute (bpm)
	• can only be assessed:
	  ○ between contractions, **and**
	  ○ not during accelerations or decelerations, **and**
	  ○ in the absence of fetal movements.

FEATURE	DEFINITION
Baseline variability	• minor fluctuations in baseline FHR occurring at 3-5 cycles / minute • measured by estimating the differences in bpm between the highest and lowest trough • can only be assessed between contractions.
Accelerations	• transient increases in FHR of 15 bpm, or more, above the baseline which lasts for at least 15 seconds measured at the baseline • accelerations in the preterm fetus may be of lesser amplitude and shorter duration • the minimum required is two (2) accelerations in a 20 minute window • the significance of the absence of accelerations in an otherwise normal antenatal CTG is unclear.
Decelerations	• transient decreases of the FHR below the baseline lasting at least 15 seconds, conforming to one of the patterns below.
Early decelerations	• uniform, repetitive decrease of the FHR with slow onset early in the contraction and return to baseline by the end of the contraction.
Variable decelerations	• repetitive or intermittent decrease of the FHR with rapid onset and recovery (often V shaped) • the timing relationship to the contraction cycle may be variable but most commonly occur simultaneously with contractions.
Complicated variable decelerations	As for above but the presence of any additional features below increases the likelihood of fetal hypoxia: • rising baseline rate • fetal tachycardia • slow return to baseline **after** the end of the contraction • large amplitude (by 60 bpm or down to 60 bpm) and/or long duration (60 seconds). Known as rule of 60's • presence of smooth post deceleration overshoots (temporary smooth increase in FHR above baseline).
Late decelerations	Occur with **EVERY contraction** as they are caused by contractions in the presence of fetal hypoxia. Uniform, repetitive decreasing of FHR with: • usually, slow onset at mid to end of the contraction, and • nadir (lowest rate) occurs after the peak of the contraction, and • ends after the contraction. In a non-accelerative trace with baseline variability < 5 bpm, this includes decelerations of < 15 bpm amplitude. **The following additional features increase the likelihood of fetal hypoxia:** • rising baseline rate • fetal tachycardia.

FEATURE	DEFINITION
	• slow return to baseline FHR after the end of the contraction. • large amplitude (by 60 bpm or to 60 bpm) and/or long duration (60 seconds). Known as rule of 60's. • presence of smooth post deceleration overshoots (temporary smooth increase in FHR above baseline).
Prolonged deceleration	• a decrease in the fetal heart rate below the baseline for longer than 90 seconds but **less than five minutes**.
Bradycardia	• Bradycardia less than 100 bpm **for greater than 5 minutes**

Sinusoidal Pattern	• a regular oscillation of the baseline FHR resembling a sine wave
	• this smooth, undulating pattern:
	  ○ is persistent
	  ○ has a fixed period of 2–5 cycles per minute
	  ○ has an amplitude of 6–15 bpm above and below the baseline.
	• baseline variability is absent and there are no accelerations.
	• **it is typically reflective of severe anaemia, with Hb levels below 50 gm/L caused by feto maternal transfusion, Rh isoimmunisation, fetal infection, antepartum haemorrhage or twin to twin transfusion**
	• it would be unlikely that any fetal movements would be felt or observed if the trace is sinusoidal.

Note: Less common abnormalities or features:

- **Pseudo sinusoidal pattern**. This can be confused with the more serious pattern of sinusoidal. The differences between the two would be reporting of normal fetal movements. This FHR pattern is usually preceded or followed by a normal CTG.
- **Fetal heart rate arrythmias.** These abnormalities are usually picked up antenatally but may present in labour. Arrythmias are heard as irregular heart sounds on the CTG in the form of extra or dropped beats. It is extremely difficult to adequately monitor a fetus with an arrythmia during labour therefore parents should be counselled by a senior clinician and provided with adequate information to make an informed decision around the safest mode of birth.
- **Increased variability (> 25 bpm).** Increased variability is an unusual pattern and can be confused with extended periods of fetal heart rate accelerations due to fetal movement, and in this instance is a reassuring finding. It can also occur with acute fetal hypoxia in the term fetus e.g. acute abruption or hyperstimulation. The clinical picture should be taken into consideration when managing increased variability such as:
  - the presence or absence of decelerations
  - accelerations
  - fetal movement
  - increased uterine stimulation.

2.8 Intrapartum assessment fetal wellbeing

The midwife / or obstetric doctor will:

- record any events relevant to interpretation of the CTG into either the notes section of K2 IGS or via annotation in K2 IGS e.g. change of position, vomiting, blood pressure, temperature, maternal pulse, oxytocin rate changes, vaginal examination etc.
- If the woman has smoked, vaped, consumed coffee or any form of energy drink within the last 30 minutes, or if she has been fasting this should be recorded on the CTG.
- If the woman requires an emergency caesarean section the CTG should be continued until skin prep

Midwifery care when an intrapartum CTG indicated

The woman's well-being is to be considered and their informed choices respected in relation to use of CTG. Therefore:

- Offer telemetry, when available.
- CTG use does not replace the need for one-on-one midwifery care.
- Disturbances to the woman should be minimised e.g. CTG volume low but audible, upright positions/mobility and use of water for pain relief.
- If the CTG is normal, it may be interrupted for short periods of up to 15 minutes to allow for personal care. Such interruptions should be infrequent and not occur immediately after any intervention that might be expected to alter FHR i.e. artificial rupture of membranes. The reason for the interruption should be documented on in K2 IGS.
- If an intrapartum CTG has been started because of concerns arising from IA and the CTG is normal after 20 minutes, the woman may, after consultation with the obstetric doctor, return to IA.
- During intrapartum CTGs the MHR should be recorded via pulse oximeter and graphed on the CTG.
- If the FHR or MHR cannot be identified, or there is any suspicion of maternal tachycardia being recorded, fetal wellbeing will be assessed with real time ultrasound.

Interpretation and review of intrapartum CTG

The primary midwife must:

- interpret and classify the CTG every 30 minutes in the K2 IGS
- If the CTG is anything other than normal (GREEN) at a 30-minute review, perform a full second clinician review / classification and continue the CTG
- Obtain a 'fresh eyes' review by a second midwife or obstetric doctor who is a level 3 FSEP practitioner every 2 hours and at any time a significant change occurs in the CTG.

Indications for fetal scalp electrode (FSE)

A FSE is indicated in the absence of contraindications (refer to KEMH Fetal heart rate monitoring clinical practice guideline). All midwives and obstetric doctors must be proficient in the application of FSE or escalate to a senior midwife or obstetric doctor who is. Particularly when:

- signal quality from external monitoring is poor, or
- a quality FHR recording is not able to be obtained over a 10 minute period
- there is maternal tachycardia (>100 bpm) or when it is difficult to differentiate between the maternal and fetal heart rate

If there is an inability to adequately monitor the fetal heart in the intrapartum period, especially if labour has been induced a multidisciplinary team (MDT) discussion involving the parents should take place to consider the mode of delivery.

Indications for fetal blood scalp sampling (FBS)

Site considerations for use of scalp pH versus lactate:

- When an abnormal FHR pattern indicates fetal compromise and birth is not imminent, FBS analysis of lactate and/or pH values will provide a reliable diagnosis of fetal acidosis status, support decision making and may avoid unnecessary intervention.
- Evidence comparing fetal lactate and pH blood results demonstrates no difference in newborn outcomes including low Apgar's, low pH cord bloods, or admissions to the neonatal intensive care nursery.
- Fetal blood lactate samples require a smaller amount of blood for analysis and therefore are more likely to be successfully performed with less scalp incisions.
- All FBS results should be discussed with an obstetric consultant / advDRANZCOG practitioner, and a plan made for future management.

If FBS is available at site maternity managers and lead medical officer are required to:

- have FBS equipment available to undertake fetal blood scalp sampling including access to either pH or lactate analysers
- ensure that there are midwives and obstetric doctors proficient in FBS technique 24/7
- ensure an appropriate local policy exists to determine who should perform the FBS
- provide regular education in FBS for midwives and obstetric doctors as required.

Table 2: Interpretation and management of intrapartum FBS results

Result		Interpretation	Action
pH	Lactate		
≥ 7.25	Less than 4.2	**Normal**	Repeat in 1 hour if the CTG abnormality persists or sooner if required
7.21 – 7.24	4.2 – 4.8	**Borderline**	Pre-acidaemia. Repeat in 30 minutes, or consider delivery if a significant fall has occurred since the previous sample or the condition of the CTG has deteriorated
≤ 7.2	4.9 or more	**Abnormal**	Acidaemia – imminent delivery is indicated
Note: If FBS obtains both pH and lactate, clinical management plans should be formulated upon whichever is the most abnormal result.			

2.9 Recognition and response to contraction pattern

Midwives are:

- to assess contraction frequency, strength, duration, and rest period by manually palpating the uterus for 10 minutes every two hours in latent phase of labour and every 30 minutes in active phase of labour
- not to rely on the tocograph recording to assess contractions.

The classification of the CTG (normal or abnormal) is not altered by the contraction pattern status however first aid actions must be taken to address amber or red contraction patterns to avoid fetal harm (see Table 3 below).

Table 3 – Normal and abnormal contraction patterns

	Contraction pattern	Response required
Green Normal	• 0-4 contractions in 10 minutes • May palpate as weak/ moderate/ strong • Last 30-90secs • Resting tone greater than 60 secs	Nil escalation required
Amber Abnormal	• Contractions lasting longer than 90secs with at least a 60 second rest period between them • Tachysystole more than 4 contractions in 10 minutes in the presence of syntocinon /prostaglandins	• Senior midwife or obstetric doctor review Decrease syntocinon and observe response
Red Abnormal	• Hypertonus (lasting more than 90 seconds or with less than 60 second rest period) • Hyperstimulation is tachysystole or hypertonus with FHR abnormalities	• Senior midwives and obstetric review required • STOP syntocinon • Consider tocolysis

Note: Prior to the administration of tocolysis the CTG should be reviewed and discussed with the treating on call obstetrician. If the woman requires transfer this should also be discussed with the accepting on call obstetrician.

2.10 K2 INFANT-Guardian® System

INFANT® (INtelligent Fetal AssessmeNT) artificial intelligence analyses the CTG data and contraction pattern in the background every 60 seconds.

If a CTG requires interruption for any reason (i.e. maternal toileting, transfer to theatre) then clinicians need to consider:

- CTG interruptions should be limited to a maximum of nine (9) minutes, where possible, to ensure seamless INFANT analysis can occur of the entire CTG recording session
- that K2 IGS CTG session will timeout at 10 minutes and a completely new CTG recording session will begin
- INFANT® will then start a new CTG analysis but only for that new session and not include the CTG preceding the interruption
- it will take INFANT® another 30 minutes to detect previous abnormalities until the new session has been running for 30 minutes i.e. baseline variability reduced for 30 minutes or more
- if the CTG is abnormal it should not be interrupted as this will compromise the ability of INFANT to accurately analyse the CTG and will result in delayed escalation.

INFANT® Concern State Alerts

INFANT® will alert the clinician to individual abnormalities detected either **blue** (unlikely significant compromise), **yellow** (maybe significant compromise or **red** (likely significant compromise) via coloured annotations on the CTG.

The frequency of INFANT® alerts depends on the significance of the abnormality detected i.e. **red** alerts are most frequent. If clinicians do not acknowledge the INFANT® annotated alert, it will escalate to:

- Yellow alert – audible alert after five (5) minutes. If the alert **is not acknowledged** within a further 15 minutes, a verbal alert will be activated
- Red alert - audible alert after two (2) minutes. This alert is different and more pronounced than a yellow alert. If the alert is **not acknowledged** within a further four (4) minutes, a verbal alert will be activated.

Clinician response to INFANT® Concern State Alerts

If K2 INFANT Concern State alerts any **ABNORMALITIES (blue, yellow or red),** then the clinicians are to:

- acknowledge the alert in K2 IGS.
- undertake a full CTG classification in K2 IGS.
- notify senior midwife/coordinator or MOETS or obstetric doctor for review
- follow the Escalation of K2 INFANT Concern State Flow Chart (Appendix E)
- document all actions and escalations within K2 IGS.
- If the second clinician review classification also differs from K2 INFANT Concern State, a mandatory rationale must be documented in K2 IGS and a further third opinion obtained via process in Appendix E.

2.11 K2 IGS downtime procedure

In the rare event of K2 IGS downtime – clinicians are to:

- Interpret and classify CTG at the bedside (both reviewers)
- ensure that CTG paper is set with the paper scale to 30/240 so that the correct baseline FHR is recorded. Using the incorrect paper scale setting will record the baseline FHR at either significantly lower or higher baseline FHR than actual.
- All antenatal and intrapartum paper CTG's should have an UMRN identification sticker attached.
- All CTG's should be either scanned into BOSSnet or filed in a heat proof envelope within the medical record.
- **Antenatal:** The standardised WACHS CTG sticker should be placed on the front/back of the actual CTG trace.
- **Intrapartum**: The standardised WACHS CTG reporting sticker (Appendix F) is to:
  - be placed in the progress notes on each occasion of review.
  - to be completed intrapartum:
  - every 30 minutes by the primary midwife caring for that woman, and
  - by both clinicians performing a 'fresh eyes' review every 2 hours, and
  - any time a significant change occurs in the CTG.
  - anytime a second review is undertaken.
- the down time process for obtaining second clinician review at one midwife sites is as per Appendix G.

3. Roles and Responsibilities

Regional Nursing and Medical Directors are responsible for ensuring that all midwifery and obstetric medical staff have read and understood this policy.

All midwives and obstetric doctors are responsible for following this policy when performing and/or classifying CTGs.

Line managers are responsible for ensuring midwives and obstetric doctors meet the CTG learning requirements as per MyLearning

4. Monitoring and Evaluation

4.1 Monitoring

Maternity managers are to ensure there is a clinician allocated to audit compliance with this policy via:

- routine review of all cases of Apgar's < 7 at 5, newborns requiring resuscitation at birth, abnormal cord blood gases (ph < 7.1 or lactate > 7.5)
- monitor, investigate and escalate any clinical incidents where the CTG was identified as a contributing factor
- undertaking the WACHS In-MATernity audit
- report audit results to the local Obstetric Governance Committee and the WACHS Obstetric Leadership Group.

4.2 Evaluation

This policy will be evaluated by the Obstetric Leadership Group annually via review of the monitoring outcomes above.

5. Compliance

This policy is a mandatory requirement under the *Health Services Act 2016*.

Failure to comply with this policy may constitute a breach of the WA Health Code of Conduct (Code). The Code is part of the Integrity Policy Framework issued pursuant to Section 26 of the *Health Services Act 2016* and is binding on all WACHS staff which for this purpose includes trainees, students, volunteers, researchers, contractors for service (including all visiting health professionals and agency staff) and persons delivering training or education within WACHS.

WACHS staff are reminded that compliance with all policies and procedures is mandatory.

6. References

1. Western Australian Government Department of Health (2021) Cardiotocography Monitoring Policy Perth Australia [Accessed 27 June 2024]
2. Cochrane Library (2017) (1): CD005122. Cardiotocography versus intermittent auscultation of fetal heart on admission to labour ward for assessment of fetal wellbeing [Accessed 27 June 2024]

3. The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (2019) Intrapartum Fetal Surveillance Clinical Guidelines - Fourth edition 2019 [Accessed 27 June 2024]
4. Mater Health (2020) Fetal heart rate monitoring (including downtime processes) – procedure. Misericordiae Ltd, Newstead QLD
5. King Edward Memorial Hospital (2020) Fetal heart rate monitoring clinical practice guideline [Accessed 27 June 2024]
6. Women and Newborn Health Service (2021) Fetal compromise (acute): Management if suspected [Accessed 27 June 2024]
7. King Edward Memorial Hospital (2019) Cardiotocography (CTG) Monitoring Mandatory education requirements for midwives and medical practitioners-procedure
8. Fiona Stanley Hospital (2018) Fetal Surveillance Policy [Accessed 27 June 2024]
9. K2 Medical Systems Ltd (2019) K2MS CTG Surveillance Bedside Functional Guide Rev.01. Devon UK
10. K2 Medical Systems Ltd (2019) K2MS INFANT Functional Guide Rev.01. Devon UK

7. Definitions

Term	Definition
K2 Infant Guardian™ system	Realtime electronic CTG system including remote to bedside.
K2 INFANT®	**IN**telligent **F**etal **A**ssessme**NT** artificial intelligence CTG interpretation system validated on databases of several thousand interesting, abnormal and challenging traces and found to perform at the level of experts whose CTG interpretation ability have been measured[10].

8. Document Summary

Coverage	WACHS wide
Audience	Midwives and obstetric doctors
Records Management	Clinical: Health Record Management Policy
Related Legislation	*Health Services Act 2016* (WA)
Related Mandatory Policies / Frameworks	• MP 0076/18 Cardiotocography Monitoring Policy • MP 0067/17 Information Security Mandatory Policy • Clinical Governance, Safety and Quality Policy Framework
Related WACHS Policy Documents	• Maternal and Newborn Care Collaboration and Escalation Policy
Other Related Documents	• KEMH Fetal heart rate monitoring clinical practice guideline • RANZCOG Intrapartum Fetal Surveillance Clinical Guideline – Fourth Edition 2019 • WA Health Cardiotocography Monitoring Standard • WNHS Fetal compromise (acute): Management if suspected clinical practice guideline
Related Forms	• MR72 WACHS Partogram form • MR140B Maternal Observation Response Chart (M-ORC) • WACHS CTG interpretation sticker
Related Training Packages	Via MyLearning
Aboriginal Health Impact Statement Declaration (ISD)	ISD Record ID: 2010
National Safety and Quality Health Service (NSQHS) Standards	5.07, 8.02, 8.06
Aged Care Quality Standards	Nil
Chief Psychiatrist's Standards for Clinical Care	Nil

9. Document Control

Version	Published date	Current from	Summary of changes
6.00	12 August 2024	12 August 2024	• review and changes made to policy text • review and inclusion of new Clinical Indications for CTG. • amendments to documentation requirements for IA and use of K2 IGS when a CTG is in progress • change to Abnormal wording of Appendix C to include variable decelerations with reduced baseline variability • addition of Appendix E, review and updates to Appendix F and Appendix H • review and update to education requirements, codes changed in MyLearning and removal of Appendix I
6.01	15 August 2024	12 August 2024	• fix typos in the INFANT® Concern State Alerts section.

10. Approval

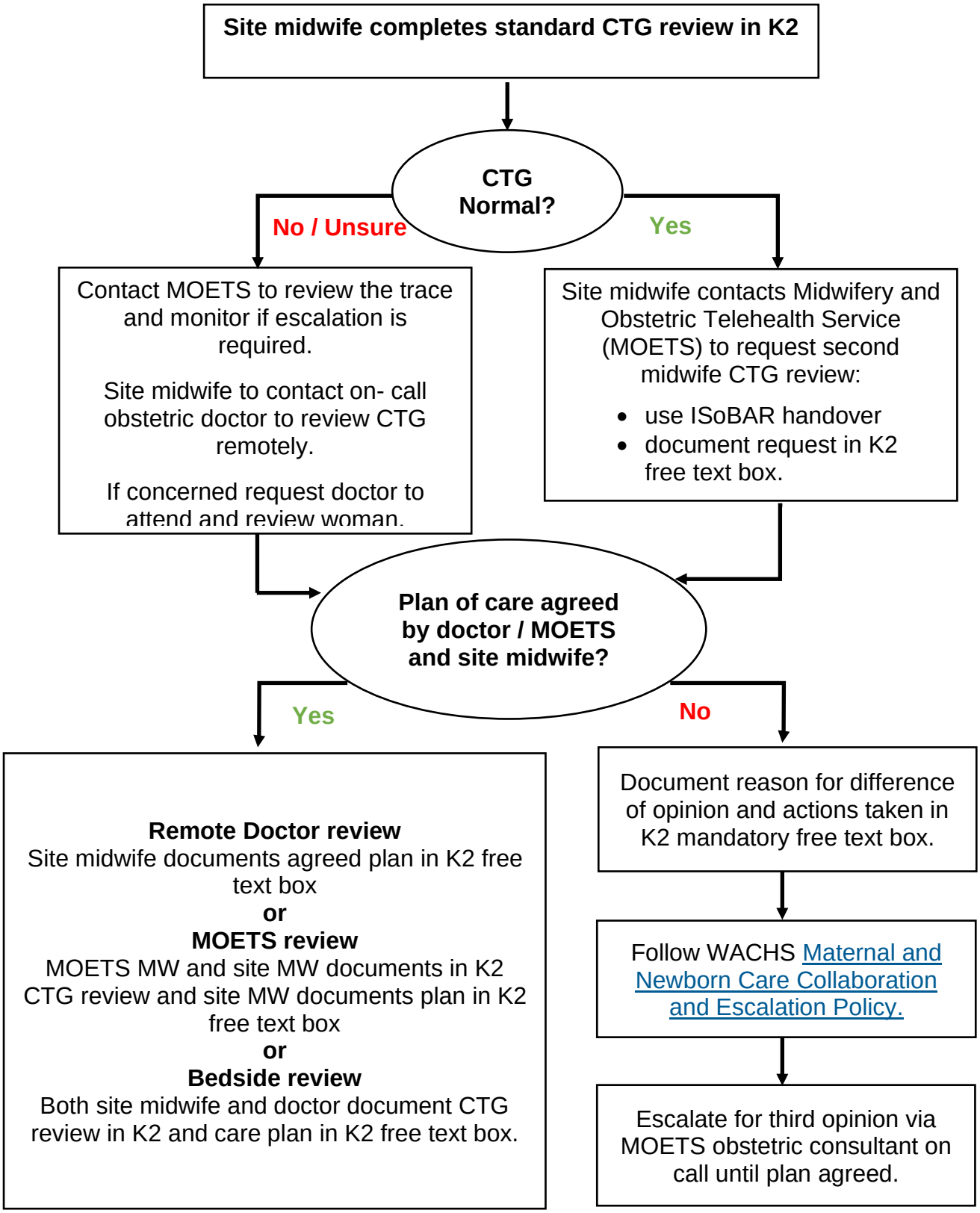
Policy Owner	Executive Director Nursing and Midwifery Services
Co-approver	Executive Director Clinical Excellence
Contact	WACHS Coordinator of Midwifery
Business Unit	Midwifery
EDRMS #	ED-CO-14-25314

This document can be made available in alternative formats on request.

Appendix A: Clinical indications for CTG

ANTENATAL indications
• Postponed induction of labour (**daily**) • Postponed ELUSCS (**daily**) • Altered fetal movement pattern • Pre and post external cephalic version • Prolonged pregnancy (≥ 41 weeks)
ANTENATAL and INTRAPARTUM indications
• Abnormal antenatal Doppler flows (umbilical artery velocimetry) • Abnormal fetal heart rate on auscultation • Oligohydramnios (MVP < 2) or Polyhydramnios (MVP > 8) • Suspected or confirmed fetal growth (FGR) • Maternal (essential) hypertension/ pre-eclampsia • Abnormal vaginal bleeding • Multiple pregnancy • Diabetes on medication or poorly controlled or with fetal macrosomia • Known fetal abnormality which requires monitoring • Maternal conditions constituting a fetal risk (e.g. cholestasis, isoimmunised, substance use) • Rhesus isoimmunisation
INTRAPARTUM indications
• Prior to discharge for expectant management of latent phase labour or SRoM at term • Prolonged pre-labour ruptured membranes (> 24 hours) • Persistent abnormal antenatal CTG • Antepartum haemorrhage • Persistent altered fetal movements in week prior to labour commencing • Abnormal presentation (breech or transverse) • Prolonged ROM (> 24 hours) • Threatened or actual preterm labour less than 37 completed weeks • Previous caesarean once contractions are regular and painful (regardless of dilatation) • Prolonged pregnancy 42 weeks • Abnormal cerebroplacental ratio • Prolonged latent phase (more than 12 hours of regular contractions but less than 4 cm) • Prolonged 1st stage (12 hours once 4cm with regular contractions) • Prolonged 2nd stage (more than 1 hour and birth not imminent) • Induction with prostaglandin or oxytocin • Augmentation with oxytocin • Meconium or blood-stained liquor • Absent liquor following amniotomy • Maternal age ≥ 42 • Fever ≥ 38 C • Abnormal cord insertion • Pre-pregnancy BMI ≥ 40 • Prior to insertion of epidural / spinal / paracervical block to establish fetal wellbeing
Consider INTRAPARTUM if more than one of the below indications
• 41 – 41+6 weeks • Gestational hypertension • Maternal age 40 – 42 years • Fever 37.8 – 38°C • GDM without complication • BMI 30 – 40 • AFI 5-8 cm (or MVP 2-3 cm)

Appendix B: Process for second clinician review at one midwife sites or where there is no level 3 practitioner on duty.



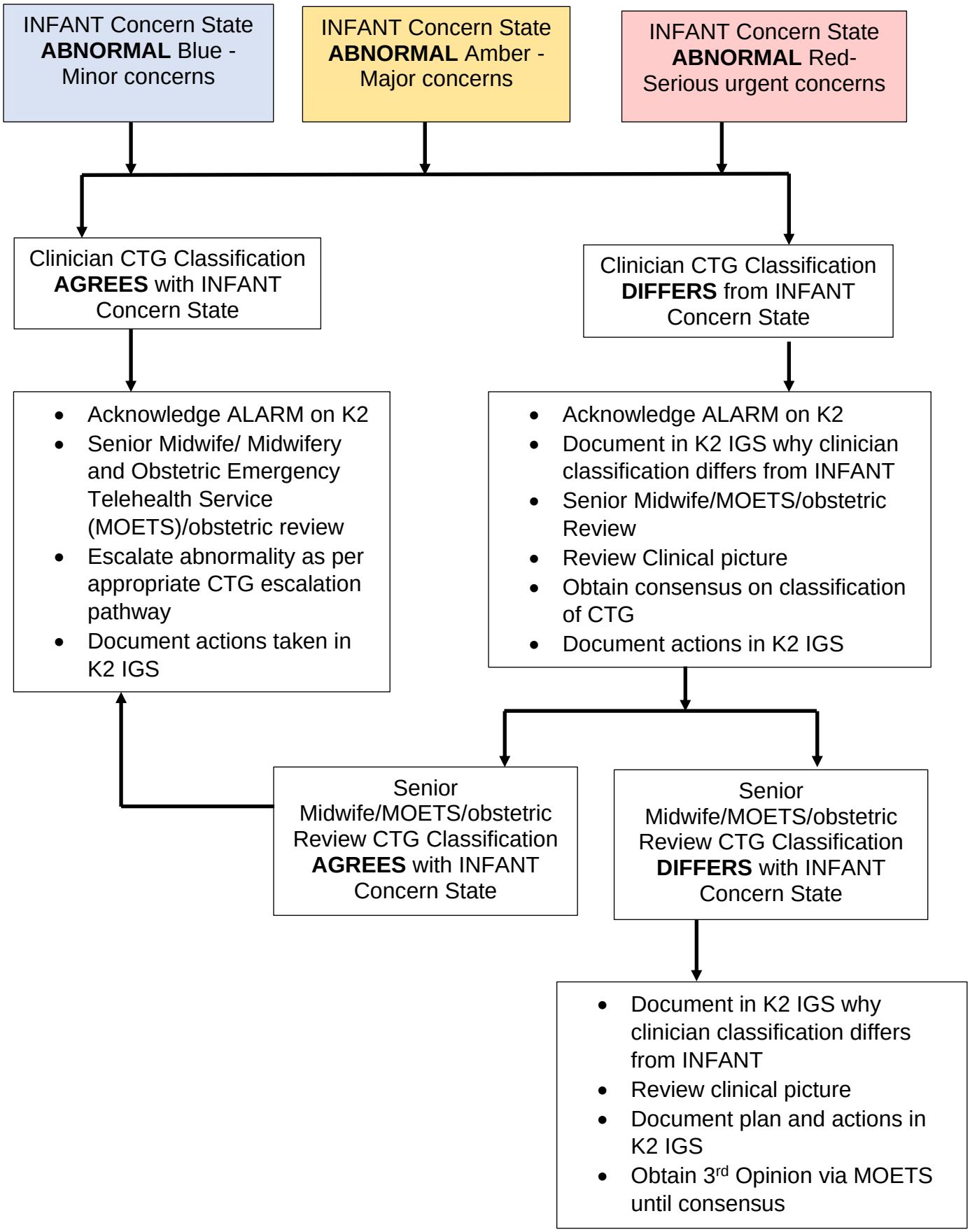
Appendix C: CTG classification and response pathway

	NORMAL	ABNORMAL		
	Low probability of compromise	**Unlikely to be significant fetal compromise**	**May be significant fetal compromise**	**Likely significant fetal compromise – IMMEDIATE ACTION**
Features	All 4 features are green	**Any** one (1) feature is **blue** (remaining are **blue** or **green**)	**Any** one (1) feature is **amber** (remaining are **blue** or **green**)	• Anyone (1) feature is **red,** or • two (2) or more are **amber** (either at the same time or at 2 consecutive 30 minute reviews)
Baseline rate	110 -160 bpm	100-109 bpm	Rise in baseline within the normal baseline range	Less than 100 bpm or more than 160 bpm
Baseline variability	6 – 25 bpm	Less than 5 bpm for less than 30 minutes	• 3-5 bpm for more than 30 minutes • Greater than 25 bpm for more than 30 minutes	• Less than 3 bpm for 30 minutes • Sinusoidal
Decelerations	None	• Early • Variable	• Late • Complicated Variables • Bradycardia less than 100bpm for less than 5 minutes	• Bradycardia less than 100 bpm for 5 minutes or more • Lates with reduced baseline variability • Complicated variables with reduced baseline variability
Accelerations	2 in 20 minutes	Less than 2 in 20 minutes	**Antenatal**: Nil	
Antenatal Management	• obtain 2nd clinician review prior to discharge from K2 IGS • Obstetric doctor determine frequency /necessity for repeat CTG according to maternal and fetal condition	• Obtain **second** clinician review • Initiate first aid measures to treat reversible causes and observe response • Review clinical picture • Document management plan in K2 IGS	• **As for blue, and** • Inform senior midwife or shift coordinator or MOETS • Escalate to the on-call obstetric doctor • Consider ultrasound assessment	• **IMMEDIATE ACTION** • **As for yellow, and** • Ultrasound assessment • Review management (birth may be indicated if not resolving) • Consider feto-maternal haemorrhage (FMH) if suspected sinusoidal.
Intrapartum management	• primary midwife to classify in the K2 IGS every 30 minutes, **and** • obtain fresh eyes review every 2 hours	• Notify Senior Midwife **OR** MOETS **OR** obstetric doctor for 2nd clinician review • Continue CTG • Review clinical picture • Treat reversible causes • +/- scalp stimulation or FBS • Review in 30 minutes • Consider IV hydration	**As for blue, and** • Notify obstetric doctor • Scalp stimulation+/- FBS • VE to assess progress • Stop /reduce oxytocin and observe response • Review management- birth may be indicated	**Immediate notification to Doctor and Senior midwife (Or MOETS) for 2nd clinician review** **As for yellow, and** • Stop oxytocin • Consider tocolysis • Expedite birth - instrumental or Cat 1 Caesarean • Consider Feto-Maternal Haemorrhage (FMH) if suspected sinusoidal

Appendix D: First aid management of reversible causes of abnormal CTG

<table>
<tr><th colspan="6">Antenatal and Intrapartum Reversible Causes and First aid management</th></tr>
<tr><td rowspan="3">ABNROAML - BLUE or AMBER</td><td>Assess quality of recording
External transducers correctly placed?
Consider if recording maternal heart rate
Consider maternal position
FSE not working or detached?
Management:
Apply maternal oximetry
Check position of transducer
Confirm FHR with real time USS if there is any doubt
Consider application of FSE</td><td>Assess uterine activity
hypertonus or tachysystole?
Recent prostaglandins?
Oxytocin in use?
If unexplained cause - consider abruption or infection
Management:
Reduce /stop oxytocin infusion and observe response
Remove prostaglandin from vagina
If persistent hypertonus or tachysystole - consider tocolysis</td><td>Assess maternal factors
Maternal position?
Check HR, BP and Temp
Hydration status?
Review recent medications?
Abdominal palpation/ assessment?
Vaginal examination indicated?
Management:
Reposition, encourage left lateral position
IV hydration / bolus
Temp 38 or more x 2 then treatment for infection
Anaesthetic review if epidural related hypotension</td><td>If unresponsive to treatment, then consider other:
Gestational age
Consider stage/progress of labour
Risk factors for fetal compromise
Placental
Infection
Review preceding CTG
Consider causes of new changes in CTG
Abruption
Uterine Rupture
Cord prolapse
Management:
Escalate to Senior Midwife OR MOETS OR Obstetric Doctor for second clinician review</td></tr>
<tr><td colspan="4">If trace remains ABNORMAL BLUE, continue to observe for further deterioration and consider other clinical factors</td></tr>
<tr><td colspan="4">If trace remains ABNROMAL AMBER despite reversible causes being addressed, trace becomes ABNORMAL RED</td></tr>
<tr><td>ABNROAML - RED</td><td colspan="4">Call for urgent obstetric and senior midwife assistance
Encourage mother to adopt left lateral position
All first aid measure above
Consider escalation of care / options/transfer
Arrange urgent transfer for operative intervention if birth not imminent – birth suite / theatre / regional or metro
IV Access and rehydration
Take blood for Group and Hold</td></tr>
</table>

Appendix E: Escalation of K2 INFANT Concern State flowchart

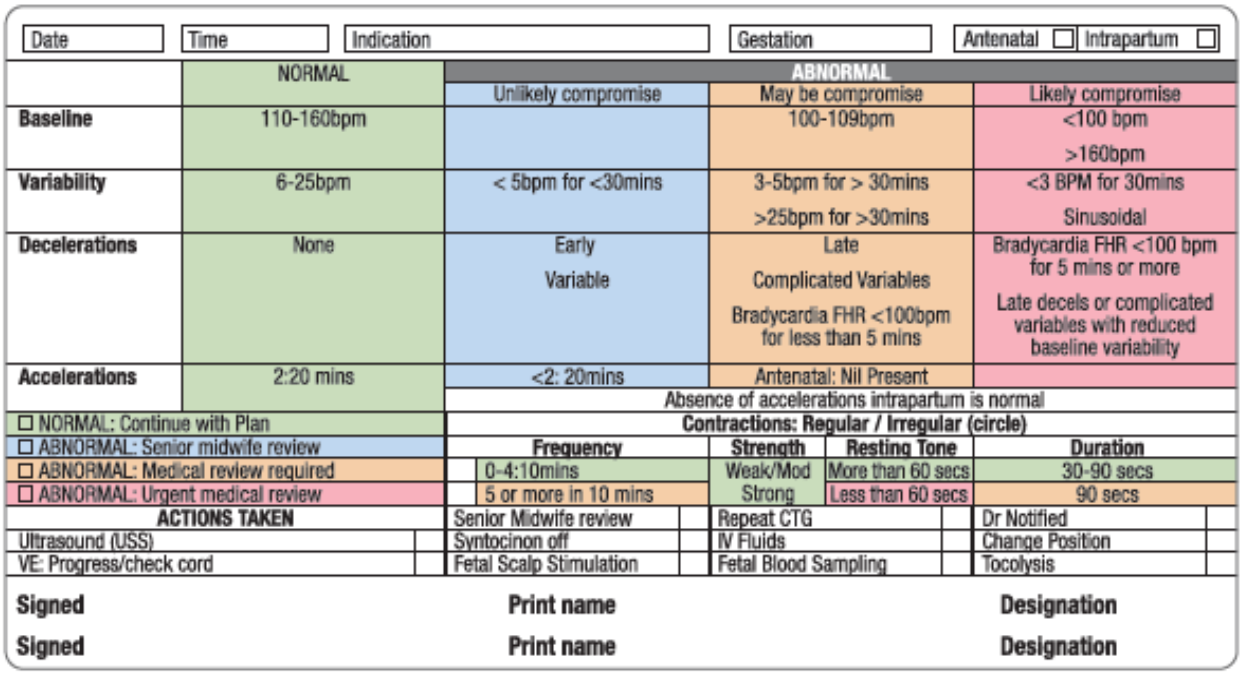


Appendix F: Downtime CTG interpretation sticker

Order via iProc: **UCN 54292Y** "WACHS CTG BIRTHING LABEL"

Updated October 2023 to include:

1. **Abnormal (RED) – likely significant compromise:** Late and complicated variable decelerations with reduced baseline variability in
2. **Abnormal (AMBER) – may be significant compromise:** Bradycardia for less than 5 minutes in



Date	Time	Indication	Gestation	Antenatal ☐ Intrapartum ☐

	NORMAL	ABNORMAL		
		Unlikely compromise	May be compromise	Likely compromise
Baseline	110-160bpm		100-109bpm	<100 bpm >160bpm
Variability	6-25bpm	< 5bpm for <30mins	3-5bpm for > 30mins >25bpm for >30mins	<3 BPM for 30mins Sinusoidal
Decelerations	None	Early Variable	Late Complicated Variables Bradycardia FHR <100bpm for less than 5 mins	Bradycardia FHR <100 bpm for 5 mins or more Late decels or complicated variables with reduced baseline variability
Accelerations	2:20 mins	<2: 20mins	Antenatal: Nil Present	
		Absence of accelerations intrapartum is normal		

☐ NORMAL: Continue with Plan
☐ ABNORMAL: Senior midwife review
☐ ABNORMAL: Medical review required
☐ ABNORMAL: Urgent medical review

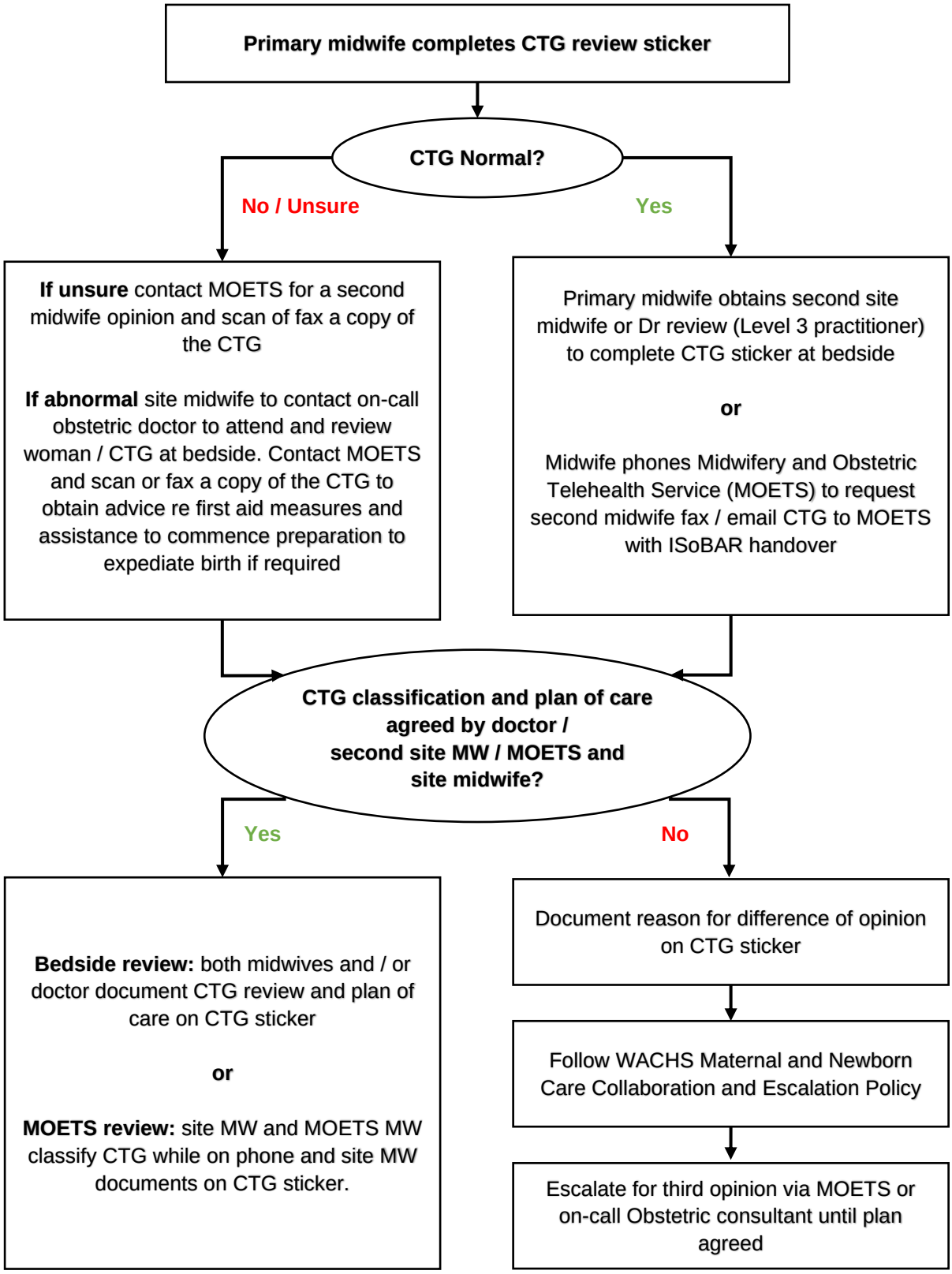
Contractions: Regular / Irregular (circle)

Frequency	Strength	Resting Tone	Duration
0-4:10mins	Weak/Mod	More than 60 secs	30-90 secs
5 or more in 10 mins	Strong	Less than 60 secs	90 secs

ACTIONS TAKEN							
Ultrasound (USS)		Senior Midwife review		Repeat CTG		Dr Notified	
VE: Progress/check cord		Syntocinon off		IV Fluids		Change Position	
		Fetal Scalp Stimulation		Fetal Blood Sampling		Tocolysis	

Signed	**Print name**	**Designation**
Signed	**Print name**	**Designation**

Appendix G: Downtime process for second clinician review at one midwife sites or where a level 3 practitioner is not on duty



Appendix H: Educational requirements

Purpose

All clinicians with a responsibility for performing and/or interpreting CTG's must meet the following mandatory education requirements.

New to WACHS

- All new WACHS obstetric and midwifery staff (clinicians) must provide evidence on day 1 of employment, of their recognition of prior learning (RPL) for fetal monitoring completed within the last year.
- **Accepted evidence for RPL is:**
  - RANZCOG Fetal Surveillance Education Program (FSEP) certificate
  - RANZCOG On-line Fetal Surveillance Education Program (OFSEP) certificate
  - K2MS Perinatal Training Program, all 7 modules completed with > 80% pass rate certificate.
- **Must complete FSEP workshop during 1st year of employment**
- On arrival to WACHS, if it is determined that this mandatory education is due to expire, or there is no current evidence of completion, the clinician will be provided with the relevant educational pathway required depending on the level commensurate with their role.

During orientation:

- The clinician will be provided orientation to the K2 Infant Guardian system
- A certificate of completion is to be maintained by the employee as evidence of completion.

Clinicians are to read, understand and comply with the following policies:

- WA Health Cardiotocography Monitoring Policy MP 0076/18
- WA Health Cardiotocography Monitoring Standard
- KEMH Fetal heart rate monitoring clinical practice guideline
- All associated relevant local maternity procedures and guidelines.

Confirmation of having contemporary understanding and application of these policies and compliance with the educational requirements listed below must be demonstrated prior to a clinician performing or interpreting CTG monitoring (via RPL process). This is done by submitting certificates of completion to your line manager including FSEP practitioner status certificate for submission to Regional L&D teams

.

Ongoing Educational requirements:

Annual and three yearly fetal monitoring education is required of all midwifery and obstetric staff.

FSEP face to face study day attendance is required every 3 years. The passing score of RANZCOG FSEP determines the level of practitioner.

- RANZCOG FSEP Level 1 passing score: 55-65%
- RANZCOG FSEP Level 2 passing score: 66-75%
- RANZCOG FSEP Level 3 passing score: 75.1-100%

Only Level 3 Practitioners can be a 2nd clinician reviewer (Fresh Eyes) for all CTG's. If a Midwife is a pre Level 1, Level 1 or Level 2 practitioner, they cannot be a 2nd clinician reviewer but can continue to care for women with CTG monitoring (antenatal and intrapartum).

MyLearning demonstrates how Level 3 practitioner status is achievable within WACHS.

Annual and three yearly Requirements:

- MyLearning CTG education requirements demonstrates mandatory annual and three yearly training compliance.
- Employee to maintain own evidence of completion of individual elements.

Appendix I: Clinical documentation when K2 IGS in use

WACHS has:

- the digital medical record (DMR) - BOSSnet
- K2 IGS for electronic CTGs
- an ongoing requirement for paper based maternity specific medical records.

To minimise confusion as to the appropriate place to document there needs to be a clear process to ensure continuity of clinical care documentation to provide a single, seamless source of truth while minimising duplication and fragmented care records.

When an antenatal or intrapartum CTG is in use, the clinicians must:

- admit the woman onto the K2 Portal including Location, reason for admission, Parity, Gravida, and Estimated Date of Birth (EDB)
- record progress notes within K2 IGS notes section or via the CTG annotations
- enter into the DMR progress note or paper-based progress notes “See K2 INFANT Guardian for Progress Notes and CTG reviews”
- not re-enter, copy and paste or print integrated progress notes for scanning into the DMR or placing into the patient’s paper based medical record.
- complete and document all CTG reviews / classifications via the K2 IGS CTG Review Tab and not in the DMR or paper-based progress notes.
- Document all other maternal observations / assessments on the relevant paper based medical records to ensure single source of truth and comparison of trends i.e. vaginal examinations on the MR72 WACHS Partogram form, observations on the MR72 WACHS Partogram form or MR140B Maternal Observation Response Chart (M-ORC)
- Discharge the woman from the K2 IGS portal once the CTG monitoring is no longer and all documentation within the DMR and / or relevant paper-based maternity forms.