FETAL HEART MONITORING

DEFINITION

The aim of fetal heart monitoring is to prevent adverse perinatal outcomes by identifying fetuses with metabolic acidosis/cerebral hypoxia at a point when the process is reversible by appropriate intervention.

Fetal heart rate monitoring can be performed by regular auscultation with a fetoscope, Pinard or hand-held Doppler (Intermittent Auscultation (IA)) or by continuous electronic fetal monitoring (EFM) by cardiotocograph (CTG).

Fetal heart monitoring is discussed with women antenatally, including the recommendation for intermittent auscultation and indications for recommending EFM. Where EFM is recommended in labour, the rationale is discussed with women and informed consent gained. Women who decline continuous EFM are supported with close intermittent auscultation. Women's wellbeing is considered, and their wishes are respected in relation to monitoring. Disturbances to the woman are also minimised, e.g. monitoring volume low, upright positions/mobility, and use of water for pain relief, use of CTG monitors that measure the maternal pulse via the toco instead of pulse oximeter probe.

A majority of our fetal heart monitoring guideline is taken from the RANZCOG Intrapartum fetal surveillance clinical guidelines – fourth edition (2019)[9].

ANTENATAL ELECTRONIC FETAL MONITORING (INCLUDING COMPUTERISED CTG)

Antenatal computerised CTG (cCTG) analysis is recommended for fetal heart rate monitoring in high risk pregnancies[3].

The use of cCTG is via a Huntleigh CTG machine and utilises a Dawes-Redman (DR) criteria.

It is NOT suitable to use intrapartum.

There is however no evidence to support the routine antenatal use of EFM for fetal assessment in women with an uncomplicated pregnancy[2].

EFM should only be used for monitoring once SGA or FGR is diagnosed by ultrasound. Ultrasound scan is recommended as the initial investigation.

Any decision to perform EFM to assess fetal wellbeing between 26-37 weeks of gestation will be based on clinical indication and should be discussed with the Obstetric team.

The use of a cCTG is suitable after 26 weeks gestation and therefore for high-risk pregnancies this is a suitable monitoring option for assessing fetal wellbeing in conjunction with the overall clinical assessment which may include ultrasound including growth, liquor and dopplers and maternal assessment.

A computerised CTG may take a longer time to reach criteria for a fetus under 32 weeks gestation due to the immature fetal autonomic nervous system.

Appendix 5 outlines the procedure and interpretation of cCTG.

Interpretation of antenatal EFM is the same as intrapartum with the added considerations of:

- An isolated small variable deceleration is not usually significant on an antenatal CTG if the remainder of the CTG is normal. However, all decelerations on an antenatal CTG require obstetric or senior midwifery review.
- Most decreased baseline variability is due to normal fetal sleep. If decreased variability continues for more than 40 minutes, in spite of manoeuvres to encourage fetal movements, obstetric review is required.
- During electronic fetal monitoring it is recommended the hand held patient event marker is used by the woman to clearly determine fetal movements. The automatic fetal movement detector (FMD or Actogram) is not a reliable method for detecting fetal movement as it can be triggered by low velocity movement.

EFM is not appropriate in any case of suspected intrauterine fetal demise, ultrasound scan is recommended as the initial investigation.

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- An isolated small variable deceleration is not usually significant on an antenatal CTG if the remainder of the CTG is normal. However, all decelerations on an antenatal CTG require obstetric or senior midwifery review.
- Most decreased baseline variability is due to normal fetal sleep. If decreased variability continues for more than 40 minutes, in spite of manoeuvres to encourage fetal movements, obstetric review is required.
- During electronic fetal monitoring it is recommended the hand held patient event marker is used by the woman to clearly determine fetal movements. The automatic fetal movement detector (FMD or Actogram) is not a reliable method for detecting fetal movement as it can be triggered by low velocity movement.

USE OF ANTENATAL CTG IN A (MIDWIFERY LED COMMUNITY BIRTHING UNIT) MLCBU (REFER APPENDIX 3)

MLCBUs offering antenatal CTG for rural women or as indicated, provide this service for the following:

- Reduced fetal movements on first presentation **only.**
- As indicated by the obstetric team following consultation with Christchurch Women's Maternity Outpatient Department. Any concerns contact the Day Assessment Unit (DAU) at 03 364 4471.
- On Intermittent Auscultation, hearing a deceleration and in consultation with CWH

If any concerns on antenatal (not in labour) fetal heart auscultation consult with CWH obstetric team and consider CTG.

USE OF INTRAPARTUM EFM IN A MIDWIFERY LED COMMUNITY BIRTHING UNIT (MLCBU)

This is not recommended or supported.

INTRAPARTUM CARE

Initial assessment to include: [9]

- **Risk factors** for increased fetal compromise (refer to Appendix 1)
- **Abdominal palpation** to assess lie, presentation, position, descent, growth and liquor volume, including plotting fundal height on a customised G.R.O.W. chart
- Usual pattern of **fetal movements**
- Assessment of **uterine activity** – frequency, length, strength, resting tone, uterine irritability and tenderness
- **Maternal pulse** – recorded to distinguish from fetal heart

The decision for mode of fetal monitoring is made in discussion with the woman, taking into consideration her pregnancy, gestation and the presence of any risk factors.

For women in spontaneous labour with uncomplicated pregnancies, intermittent auscultation is recommended. Admission CTGs are not recommended for these women.

Women with specific risk factors (listed in appendix I) are recommended to have continuous electronic fetal monitoring EFM).

INTERMITTENT AUSCULTATION

(Refer to algorithm in Appendix 1 for suitability for intermittent auscultation.)

Intermittent auscultation is a listening and counting method and the fetal heart rate should be documented as a single number (like documentation of maternal pulse rate) instead of a range. The terminology used around IA is different from that used for CTG's as there is not a printed trace to interpret[9]. A Sonicaid is preferable for IA rather than use of a CTG transducer. If the printer is left running on the CTG during IA, this results in substandard documentation.

In addition to the initial assessment for all women, document:

- **Average fetal heart rate** – determined by listening toward the end of a contraction, in the absence of fetal movements, and counting for 30-60 seconds on several occasions.
- **Fetal heart rate increases** – determined by listening during a fetal movement
- **Fetal heart rate decreases** – these should not be audible when auscultation is performed immediately after a contraction for 60 seconds in first stage

ONGOING MONITORING USING IA

First stage of labour:	**Frequency**	every 15-30 minutes
	Timing	commence toward the end of a contraction
	Duration	and count for 30-60 seconds after
Second stage of labour:	**Frequency**	at least every 5 minutes or after each contraction
	Timing	from the end of a contraction
	Duration	count for 30-60 seconds

IA INTERPRETATION

Normal findings:	**Fetal heart rate**	between 110-160 bpm Fetal heart increases above the average No fetal heart decreases below the average Regular rhythm
Abnormal findings:		**Tachycardia** (> 160 bpm) **Bradycardia** (< 110 bpm) Gradual or abrupt **decreases in fetal heart rate** **Changes to rhythm** (irregular)

CONTINUOUS EFM

There is evidence that continuous CTG in labour reduces the risk of neonatal seizures compared with intermittent auscultation but there were no clear differences in cerebral palsy, infant mortality or other standard measures of neonatal wellbeing, including for women with low-risk, high-risk and preterm pregnancy. However, continuous CTG was associated with an increase in caesarean sections and instrumental vaginal births[2]. Access to fetal blood sampling did not appear to influence differences in neonatal seizures or other outcomes[1].

A number of antenatal and intrapartum risk factors have been shown to be associated with adverse perinatal outcomes (see algorithm Appendix 1). In the presence of any of these risk factors, continuous EFM is recommended and an individualised plan is made with the woman.

For continuous EFM to be of use, uterine activity and FHR trace must be clearly recorded with minimal loss of contact. The abdominal transducer and toco are placed according to palpation findings and adjusted with maternal and fetal position changes and descent.

Where continuous EFM is required for the substantial part of labour, and if the EFM to date is considered normal, monitoring may be interrupted for short periods of up to 15 minutes to allow for personal care (e.g. toilet or shower). Such interruptions should be infrequent and not occur following any intervention that might be expected to alter the fetal heart rate (e.g. medication administration, rupture of membranes).

Intrapartum fetal surveillance and its interpretation is a complex task which requires a sound understanding of fetal physiological responses to hypoxia, good pattern recognition skills and the ability to integrate this knowledge with each clinical situation. Health professionals involved in intrapartum care have a responsibility to access regular training in intrapartum fetal surveillance (see below for training recommendations). The summary of fetal heart rate patterns provided below is to be used in addition to, rather than instead of, an understanding of fundamental physiology.

NORMAL CTG

The **normal** CTG is associated with a low probability of fetal compromise and has the following features:

Baseline rate 110-160 bpm
Baseline variability of 6-25 bpm
Accelerations 15 bpm for 15 seconds
No decelerations

ABNORMAL CTG

All other CTGs are by this definition **abnormal** and require further evaluation taking into account the *full clinical picture*.

The following features are *unlikely* to be associated with significant compromise *when occurring in isolation:*

Baseline rate 100-109 bpm
Reduced or reducing baseline variability 3-5 bpm
Absence of accelerations
Early decelerations
Variable decelerations without complicating features

The following features may be associated with significant fetal compromise and require further action including consultation (Refer to page 16 RANZCOG (2019) Intrapartum fetal surveillance Clinical Guidelines – fourth edition):

Baseline fetal tachycardia > 160 bpm
Rising baseline fetal heart rate (including where it remains within the normal range)
Complicated variable decelerations
Late decelerations
Prolonged decelerations (fall in baseline FHR for more than 90 secs and up to 5 mins)
Rising baseline FHR

The following features are *likely* to be associated with significant fetal compromise and *require immediate management*, which may include urgent delivery:

Bradycardia (fall in baseline FHR for more than 5 mins)
Absent baseline variability <3bpm
Sinusoidal pattern
Complicated variable deceleration with reduced or absent baseline variability
Late decelerations with reduced or absent baseline variability

CORDLESS FETAL TRANSDUCERS

EFM can be performed using cordless transducers via radio wave telemetry giving women freedom of movement while being monitored. In the event of technical issues with the wireless signal reception, standard wired monitoring should be resumed[8].

The following requirements should be met prior to making the decision for cordless monitoring:

- Health professionals using this equipment must be familiar with instructions for use (DVD and booklet available from Birthing Suite Clinical Coordinators or Midwifery Educators).
- If a woman is mobilising during EFM, the chance of losing the signal or detecting the maternal heart rate is higher than for standard wired EFM and requires extra vigilance from health professionals around regular checking of maternal heart rate and position of transducers. Ensure that women stay within range of the base unit, i.e. the same corridor as her room.
- Cordless transducers may be used while woman is in water.
- Use of the 'MONICA' cordless GTG
  - Generally, most appropriate for women with an increased BMI and for whom continuous fetal monitoring is difficult due to maternal habitus. Use is decided on a case by case basis.
  - Health professionals using the MONICA need to be familiar with its use, including the skin preparation.
  - Extra vigilance required from health professionals around regular checking of maternal heart rate and position of transducers
  - MONICA must NOT be used in water or with multiple pregnancies.
  - Changing the ECG electrodes is necessary every 24 hours. Observe for skin irritation.

FETAL SCALP ELECTRODES

The use of a fetal scalp electrode (FSE) is indicated when there is significant loss of contact with an abdominal trace which cannot be rectified with palpation and repositioning of transducer.

- Contraindications to FSE: known maternal infection, e.g. HIV, hepatitis B&C viruses, active herpes simplex virus or evidence of intrauterine sepsis. Group B Streptococcus carrier status does not preclude FSE
- History of genital herpes – avoid FSE if possible unless benefits outweigh risks
- Prematurity < 34 weeks unless the following apply[5].
  - it is not possible to monitor the fetal heart rate using either external cardiotocography or intermittent auscultation
  - it has been discussed with a Obstetric Consultant
  - the benefits are likely to outweigh the potential risks, i.e. not being able to monitor the heart rate
  - the alternatives (immediate birth, intermittent ultrasound and no monitoring) have been discussed with the woman and are unacceptable to her
- Face, brow or uncertain presentation
- Bleeding disorder such as suspected fetal thrombocytopenia, haemophilia or known maternal autoimmune thrombocytopenia

ABNORMAL FETAL HEART RATE

In clinical situations where the fetal heart rate is considered abnormal, whether using IA or continuous EFM, correct action includes:

- Checking maternal **pulse**/attach maternal probe if not recorded by toco
- Checking **positioning of CTG** transducer
- Maternal **position change** to increase utero-placental perfusion and/or alleviate cord compression
- Continuing or commencing **continuous EFM**
- Identification of any **reversible cause** of the abnormality and initiation of appropriate action (e.g. correction of maternal hypotension, cessation of oxytocin infusion* and/or acute tocolysis for excessive uterine activity)
- Consideration of fetal blood sampling
- Escalation of care

*NOTE: In certain circumstances, oxytocin infusion may be reduced rather than discontinued, in order to maintain dose sufficient for continuing augmentation of labour but without hyperstimulation. If CTG is abnormal but unlikely to be associated with fetal compromise, the trace must be reviewed by the obstetric team prior to decision is made on continuing dose of oxytocin for augmentation.

FETAL BLOOD SAMPLING

The increased intervention rate associated with EFM can be reduced with the use of fetal blood sampling (FBS)[9].

Fetal blood lactate sampling is easier to perform as it requires a smaller sample size. In addition to testing fetal blood lactate it is recommended that pH is tested if sufficient blood sample is available. Lactate level gives a more direct measure of metabolic acidosis than pH, as it measures a metabolite of anaerobic metabolism. The following are recommended actions according to lactate level and pH level[10].

LACTATE	pH	CLASSIFICATION	ACTION
≤ 4.0	≥ 7.25	Normal	Repeat FBS in 40-60 minutes if continued concerns about fetal wellbeing (or if CTG does not return to normal).
4.1-4.7	7.21-7.24	Borderline	Repeat FBS 20-30 minutes.
4.8-5.7	7.01-7.20	Indicative of fetal acidaemia	Requires rapid Category 2 delivery by caesarean section unless assisted vaginal birth possible or spontaneous vaginal birth imminent.
≥ 5.8	< 7.0	Abnormal	Requires urgent assisted vaginal delivery if possible or a category 1 caesarean section.

As an adjunct to CTG monitoring in the active phase of labour, fetal blood sampling (FBS) for scalp pH and/or lactate should be considered in all circumstances where the CTG is abnormal.

If worsening lactates with ongoing CTG abnormality and inadequate progress, delivery to be expedited.

INDICATIONS TO PERFORM FBS INCLUDE

(Refer to pages 19-20 RANZCOG (2019) Intrapartum Fetal Surveillance Clinical Guidelines – (fourth edition) [9].

Abnormal trace + clinical picture. If normal variability – no need to do FBS. (Need to have a senior obstetrician if out of hours/overnight of not performing FBS).

- Persistent variable or late decelerations – if persistent late decelerations do not waste time doing FBS – expediate delivery.
- Unexplained reduced variability in the absence of other normal features.
- Unexplained tachycardia
- Prior to trial of assisted delivery where the CTG is abnormal (see comments below regarding fetal blood sampling at full dilatation)

Caution with FBS should be exercised with:

- Maternal Pyrexia
- Evidence of maternal sepsis
- Between 34+0 and 36+6 weeks of pregnancy discuss the possible use of FBS if the benefits[5] are likely to outweigh potential risks.
- Full dilatation – second stage is naturally accumulative of lactic acids in both mother and fetus and not necessarily associated with hypoxia.

In the presence of infection fetal condition can change rapidly. Fetal blood sampling may be of less value in the presence of pyrexia, as it assesses hypoxia/acidaemia and not sepsis. Therefore, the results of fetal blood sampling, if reassuring, should be interpreted with caution.

In general, it is reasonable to perform fetal blood sampling in the passive phase of second stage. In the active phase of the second stage maternal lactate rises by 2mmol/l for every 30 minutes of active pushing[6]. The fetal lactate rises correspondingly and may be difficult to interpret. FBS may be appropriate before a 'trial' of instrumental delivery, but if delivery is assured at a low station with OA presentation, then proceeding direct to assisted delivery without FBS may be expedient.

Where more than one sample is obtained, the 1st sample should be tested. If a result is achieved, discard all other sample(s).

CONTRA-INDICATIONS TO FBS

(Refer to pages 19-20 RANZCOG (2019) Intrapartum Fetal Surveillance Clinical Guidelines – (fourth edition) [9].

- Clear evidence on CTG of serious fetal compromise, e.g. fetal bradycardia where urgent birth is required/chronic hypoxic late decelerations, sinusoidal trace.
- Significant fetal compromise in second stage of labour where assisted vaginal birth is appropriate
- Known maternal infection, e.g. HIV, hepatitis B&C viruses, active herpes simplex virus or evidence of intrauterine sepsis. Group B Streptococcus carrier status does not preclude FBS
- Prematurity < 34 weeks
- Face, brow or uncertain presentation
- Bleeding disorder such as suspected fetal thrombocytopenia, haemophilia or known maternal autoimmune thrombocytopenia

The threshold for FBS should be reduced in the presence of other risk factors such as meconium, known IUGR or oligohydramnios. Scalp pH/lactate results should be interpreted taking into account any prior pH/lactate measurement, the rate of progress in labour and any other risk factors.

After a normal FBS result, sampling should be repeated at an interval of 40 to 60 minutes if the CTG remains abnormal or sooner if there are new abnormalities.

After a borderline FBS result, sampling should be repeated at an interval of 20 to 30 minutes if the CTG remains abnormal or sooner if there are new abnormalities.

If the CTG remains unchanged and the FBS result is unchanged at the second test, a further sample may be deferred unless additional abnormalities develop on the trace.

Where FBS sampling is considered necessary for a third separate occasion, a consultant/specialist obstetric opinion should be sought prior.

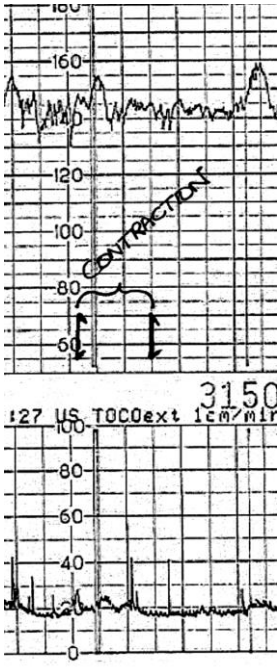
If worsening lactates with ongoing CTG abnormality and inadequate progress, delivery to be expedited.

Following any labour where FBS has been performed, paired cord samples should be taken at birth to confirm acid-base status of the baby.

UTERINE ACTIVITY MONITORING

If there are difficulties in obtaining a clear recording of uterine contractions on a CTG despite adjusting the toco, contractions must be recorded manually on the CTG itself. This is achieved by using the fetal movement button to record the start and the end of the contraction and then drawing a bracket between the two markers on the CTG paper.

NB.: marking the CTG paper with a pen at the time of the contraction will result in inaccurate recording. It takes 1 minute for the paper to appear out of the machine so marking the paper by hand will be 1 minute earlier than the actual event.



EXCESSIVE UTERINE ACTIVITY

IN THE ABSENCE OF FETAL HEART RATE ABNORMALITIES

In the presence of excessive uterine activity (defined as either):

- **Tachysystole** (more than five active labour contractions in ten minutes, without fetal heart rate abnormalities), or
- **Uterine hypertonus** (contractions lasting more than two minutes in duration or contractions occurring within 60 seconds of each other, without fetal heart rate abnormalities)

Appropriate management of uterine hypertonus or tachysystole should include:

- Continuous electronic fetal monitoring;
- Consider reducing or ceasing oxytocin infusion;
- Maternity staff remaining with woman until normal uterine activity is observed;
- Tocolysis may be considered. (Acute Tocolysis with Terbutaline (Ref.2401299))

EXCESSIVE UTERINE ACTIVITY IN THE PRESENCE OF FETAL HEART RATE ABNORMALITIES

Appropriate management of uterine **hyperstimulation** should include:

- Continuous electronic fetal monitoring;
- Reducing or ceasing oxytocin infusion;
- Maternity staff remaining with the woman until normal uterine activity is observed;
- Consideration of tocolysis; and or
- Consideration of urgent delivery

Maternity care providers should be familiar with and have a protocol for acute tocolysis (relevant to the level of service) in the event that uterine hyperstimulation occurs.

Tocolytic regimens available may include:

- Terbutaline, 250 micrograms subcutaneously or IV (Grade C) – on birthing suite
- GTN, 100-200 micrograms IV – in theatre

DOCUMENTATION

Both IA and continuous EFM require careful documentation. All staff asked to review a CTG must independently record their findings.

When using IA, the fetal heart rate is documented as a single number, i.e. 136 bpm and not as a range of numbers. The timing and duration are documented as well as the equipment used to listen to the fetal heart[9].

Partograms may be useful during EFM and IA as it may provide visual clues to changes in the fetal heart rate such as a rising baseline.

WHEN COMMENCING A CTG ALWAYS

- Attach the woman's identification label to the CTG paper
- Check the time and date stamp and paper speed and sign as correct on CTG paper
- Document in the clinical record the time and date of commencement of CTG
- Document the maternal pulse on the CTG paper/continuous maternal heart rate

WHILE CTG IS IN PROGRESS

- Record significant events on the CTG paper, e.g. vaginal examinations, insertion of epidural, episodes of vomiting or hypotension, fetal blood sampling.
- Document maternal pulse on the CTG paper if there is a break in recording or if there is a sudden change in baseline rate. Use continuous maternal pulse rate monitoring where available with CTG. Many CTG machines record this automatically via the toco. The pulse oximeter is not required for these machines unless SpO_2 is explicitly required.
- Ensure that any member of staff who is asked to provide an opinion signs the trace and documents in the woman's clinical record the plan of care along with the date, time and signature.
- A CTG sticker to be used by medical and midwifery staff when documenting in the clinical record. (Ref.2400217)
- A **documented systematic assessment** to be undertaken at least every **hour**.

CTG BUDDY SYSTEM 'FRESH EYES'

INTRAPARTUM

- In labour the CTG should be independently reviewed by another midwife or doctor at least **every two hours and more frequently in the presence of concerns regarding fetal wellbeing**. This can be any member of staff who has completed the appropriate training as outlined in the 'Education and Training' section.
- A separate CTG sticker shoulder be completed and placed in the woman's clinical notes as part of the 'Fresh Eyes' documentation.
- To facilitate 'Fresh Eyes', midwives should identify a 'Buddy' to complete their 'Fresh Eyes' checks. Core midwives should identify a 'Buddy' at the start of their shift and LMCs should identify a 'Buddy' when they arrive to Birthing Suite to care for a woman in labour. The ACMM is able to facilitate this also.

- Where there is a **concern about fetal wellbeing** all midwifery staff to complete the CTG sticker tool to assess the CTG features prior to requesting a review by the senior midwife, preferably in the first instance, or medical staff. When a CTG is reviewed, the reviewer is to document CTG analysis in clinical notes below or use another CTG sticker.

CARDIOTOCOGRAPH (CTG):				☐ Antenatal ☐ Intrapartum
Date:	Time:	Maternal pulse:	Gestation: / 40	*Fetal movements: Y / N
Risk	Indication for CTG:			
Contractions	None Irregular Regular Mild		Moderate Strong	…… in 10 min
Baseline rate …….. bpm	110 - 160	100 - 109	> 160 Rising baseline Y/ N	< 100 bpm for > 5 mins Rising baseline Y/ N
Variability	6 - 25 bpm		Reduced (3-5 bpm)	Absent (< 3 bpm)
Accelerations	Present	*The absence of accelerations with otherwise normal trace is of uncertain significance*		
Decelerations	1. None	1. Early 2. Variable without complicating features	1. Complicated variable 2. Late 3. Prolonged (> 90 secs but < 5 mins)	1. Bradycardia > 5 mins 2. Complicated variable with reduced variability 3. Late with reduced variability 4. Sinusoidal
Overall assessment	**NORMAL**	**ABNORMAL** **Unlikely** associated with significant fetal compromise	MORE **ABNORMAL** **May be** associated with significant fetal compromise	VERY **ABNORMAL** **Very likely** associated with significant fetal compromise
Determine action	**MOST ABNORMAL FEATURE DETERMINES 'ACTION' BELOW**			
Action	No action required	☐ Correct reversible causes* ☐ Second opinion	☐ Correct reversible causes* ☐ **Urgent** referral to senior colleague	☐ Correct reversible causes* ☐ **Urgent** referral to senior colleague
Plan	(eg. FBS, tocolysis, continue CTG)			
Print Name:			Signature:	
☐ 'Fresh Eyes': document CTG analysis in clinical notes below or use another CTG sticker				
Ref.2400217 Authorised: CMM Birthing Suite June 2022			*Refer to CDHB Maternity Guideline 'Fetal Heart Monitoring'	

NOTE: *CTG sticker to be used in conjunction with this guideline and training programme as described below, (e.g. indications for CTG listed in Appendix 1, action for correction of reversible causes summarised above in 'Management of Abnormal Fetal Heart Rate').

ANTENATAL

Every antenatal CTG should ideally be independently reviewed as per 'Fresh Eyes' regardless of whether there have been particular concerns.

'Fresh Eyes' should be routine practise where any CTG is continuing over 2 hours or more.

AT COMPLETION OF CTG

- Following birth, sign the CTG paper and note the date, time and mode of birth.
- Store CTG paper securely with the woman's clinical record at the end of the monitoring process.
- Multiple CTG's need to be numbered in chronological order.

EDUCATION AND TRAINING

It is acknowledged that these guidelines need to be complemented by a comprehensive and ongoing education and training programme.

Fetal monitoring training is mandatory for all Te Whatu Ora Waitaha health professionals undertaking any aspect of EFM and is a strong recommendation for all self-employed Lead Maternity Carers (LMC's) (No charge to attend).

Te Whatu Ora Waitaha staff are required to complete **fetal heart monitoring training at least once every 2 years** either:

- Online Fetal Surveillance Education Programme (OFSEP)
- Fetal Surveillance Education Programme (FSEP) full day workshop (funded for staff newly employed to Te Whatu Ora Waitaha or for those requiring a more in-depth update)

A Te Whatu Ora Waitaha staff member with a score below 55% in their FSEP assessment requires an individual learning/supervision plan developed with their line manager and/or educator training supervisor within 3 months and re-assessment within 6 months.

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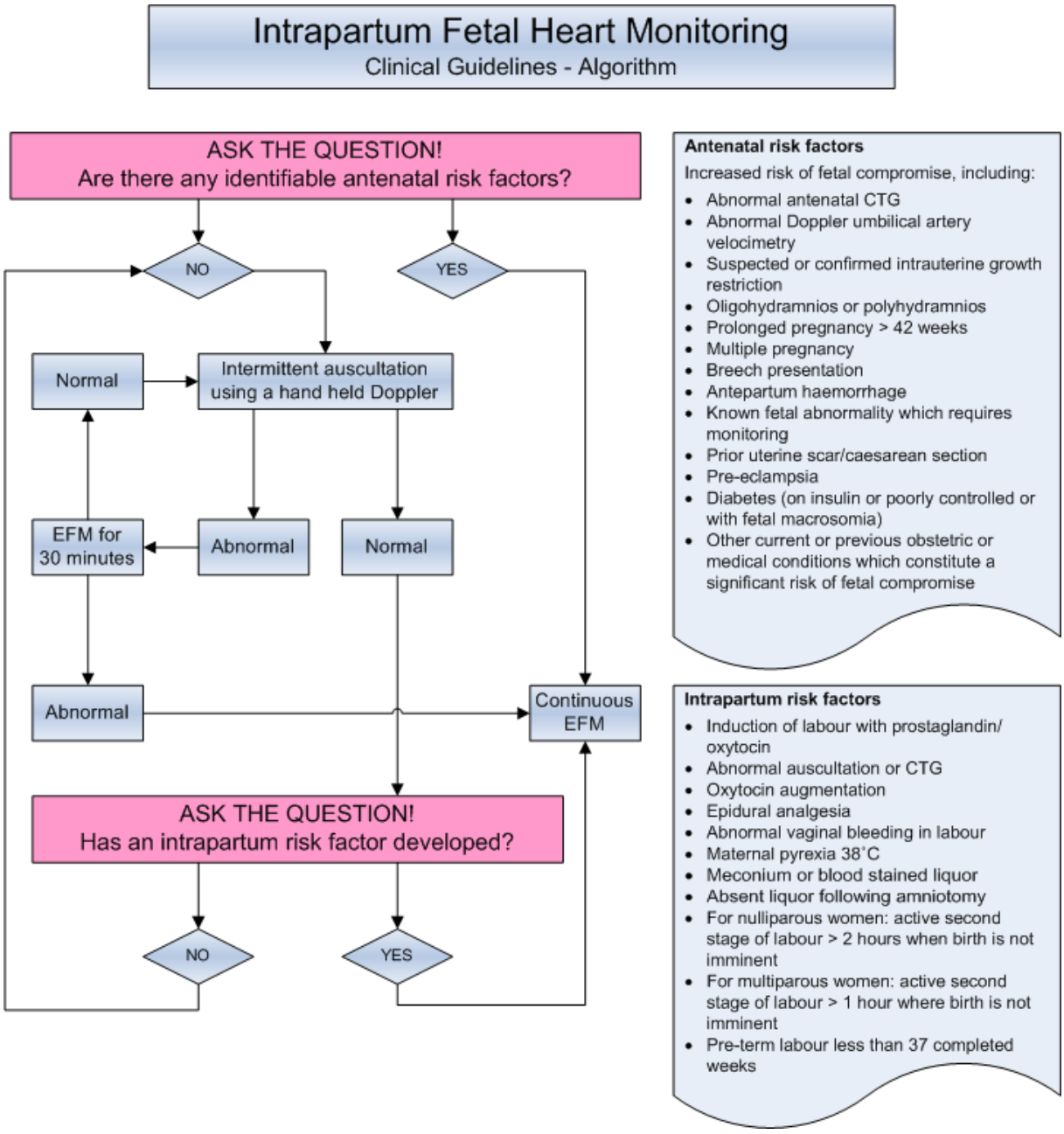
APPENDIX 1: INTRAPARTUM FETAL HEART MONITORING



FETAL MONITORING QUICK REFERENCE GUIDE (RANZCOG 2019)

CTG Interpretation – always take into account the FULL clinical picture (e.g. liquor colour, palpation, contractions, length of labour, infection etc.)

Description of CTG fetal heart rate patterns – use this to guide completion of CTG sticker in clinical notes

TERM	DEFINITION
Baseline Fetal Heart Rate (FHR)	The mean level of FHR when stable, in the absence of accelerations, decelerations and contractions. It is determined over a time period of 5 or 10 minutes and expressed in bpm. A progressive rise in baseline is as important as the absolute values.
Baseline Variability	The minor fluctuations in baseline FHR. It is assessed by estimating the difference in beats per minute between the highest peak and lowest trough of fluctuation in one minute segments of the trace between contractions.
Sinusoidal	A regular oscillation of the baseline FHR resembling a sine wave. This smooth, undulating pattern is persistent with a relatively fixed period of 2-5 cycles per minute and amplitude of 5-15 bpm above and below the baseline. Baseline variability is absent and there are no accelerations.
Accelerations	Transient increases in FHR of 15 bpm or more above the baseline and lasting 15 seconds. The significance of no accelerations in an otherwise normal 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 FHR with slow onset early in the contraction and slow return to baseline by the end of the contraction.
Variable decelerations	Repetitive or intermittent decreasing of FHR with rapid onset and recovery. Time relationships with contraction cycle may be variable but most commonly occur simultaneously with contractions.
Complicated variable decelerations	The following additional features increase the likelihood of fetal hypoxia: • Rising baseline rate or fetal tachycardia. • Reducing baseline variability. • 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). • Presence of smooth post deceleration overshoots (temporary smooth increase in FHR above baseline).
Prolonged decelerations	Fall in baseline FHR for more than 90 seconds and up to 5 minutes.
Bradycardia	Fall in baseline FHR for more than 5 minutes.
Late decelerations	Uniform, repetitive decreasing of FHR with, usually, slow onset mid to end of contraction and nadir more than 20 seconds after the peak of the contraction and ending after the contraction. In the presence of a non-accelerative trace with baseline variability < 5 bpm, the definition would include decelerations of < 15 bpm.
Excessive uterine activity	
Tachysystole	More than 5 active labour contractions in 10 minutes, ***without*** FHR abnormalities.
Uterine hypertonus	Contractions lasting longer than 2 minutes in duration or contractions occurring within 60 seconds of each other, ***without*** FHR abnormalities.
Uterine hyperstimulation	Excessive uterine activity, (either tachysystole or uterine hypertonus) ***with*** FHR abnormalities.

Steps for escalation – if concerns about serious sustained fetal compromise are not heard …

Tell the Clinical Midwife Manager (CMM) – fresh eyes clarify your concerns → Re-emphasise concerns to the obstetric registrar → If concerns are not acknowledged, any member of team can elevate concern to obstetric SMO

APPENDIX 3: FETAL MONITORING – USING A CTG MACHINE IN A COMMUNITY LED BIRTHING UNIT

The CTG machine is NOT to be used for labouring women in a MLCBU. It is only to be used for the three antenatal situations as described below.

Maternal pulse must be monitored either continuously by way of a pulse oximeter or manually and documented regularly on the CTG printout. Many CTG machines record this automatically via the toco. The pulse oximeter is not required for these machines unless SpO_2 is explicitly required.

OCCASIONS FOR USE OF A CTG IN A MLCBU

1. First presentation of Decreased Fetal Movements (DFM) (not absent)
2. Postdates surveillance as per as per Timing of Birth Obstetric Indications (TOBA)
3. Community Day Assessment Unit (DAU)

First presentation of Decreased Fetal Movements (DFM) (not absent)

LMC led – when a woman reports DFM (not absent) on the first occasion **only**, commence a CTG and if any fetal abnormality is present during EFM (or if you are unsure) at any stage of the CTG call the on-call Birthing Suite Obstetric Register on 027 886 2305 for a secondary consultation.

Transfer immediately to Christchurch Women's Hospital if there are serious concerns.

Postdates surveillance as per Timing of Birth Obstetric Indications (TOBA)

LMC led – for woman 41+1/40 weeks gestation offered additional fetal monitoring. Commence a CTG and if any fetal abnormality is present during EFM (or if you are unsure) at any stage of the CTG call the on-call Birthing Suite Obstetric Register on 027 886 2305 for a secondary consultation to review decision for timing of delivery.

Transfer immediately to Christchurch Women's Hospital if there are serious concerns.

Community Day Assessment Unit (DAU)

Following an assessment and consultation with Christchurch Women's Maternity Outpatient Department CTGs may be performed as part of the ongoing plan to ensure women do not have to travel in to Christchurch Women's Hospital. Any concerns regarding CTGs requested by DAU during daytime hours contact 03 364 4272. Contact Maternity Assessment Unit (MAU) 03 378 6410 for all other matters.

On Intermittent Auscultation, hearing a deceleration and in consultation with CWH

If any concerns on antenatal (not in labour) fetal heart auscultation consult with CWH obstetric team and consider CTG.

All instances of CTG use in a MLCBU and resultant care plans are to be fully documented by filling in a CTG sticker, that clearly identifies the women, with name and NHI. For any CTGs done in a MLCBU setting, please ask a colleague to also be the "Fresh Eyes" buddy check for the CTG (where possible).

For all other MLCBUs, the Day assessment women are recorded as an outpatient visit and HCS Maternity Planned Assessment is completed.

All completed CTG traces should be numbered and placed in a Continuous Fetal Heart Monitoring envelope (Ref.2403588), with NHI label and completed CTG sticker. These are held in the MLCBU until birth, then sent to clinical records to be reconciliated with the woman's clinical notes.

APPENDIX 4: CTG BUDDY SYSTEM

APPENDIX 5: USE AND INTERPRETATION OF COMPUTERISED CTG

PERFORMING COMPUTERISED CTG (CCTG)

The use of cCTG is via a Huntleigh CTG machine and utilises a Dawes-Redman (DR) criteria. A guide on how to undertake a cCTG can be found below:

- Start the CTG, turn 'analysis' on
- Enter the gestational age in weeks and days (the analysis will not start unless the gestation is entered)
- Turn the printing on
- After 10 minutes if the DR criteria is met, this will be displayed on the bottom of the screen (with a tick)
- If the DR criteria is not met then continue to record the CTG.

Do not delay undertaking a CTG if a Huntleigh Machine is not available.

It is NOT suitable to use intrapartum.

The benefits of cCTG include a shorter analysis time (as little as 10mins) which reduces the time required for both the woman and the midwife to undertake monitoring as well as being shown to reduce caesarean section rates, improvements in perinatal outcomes and reduces numbers of diagnostic interventions when compared to traditional CTG[4].

OUTCOME OF CCTG ANALYSIS

There are only two outcomes possible, criteria met and criteria not met.

Criteria met:

The analysis can deem criteria met at 10min. The CTG is analysed every 2 mins.

Please use clinical judgement and visual assessment of CTG as well as the cCTG analysis to assess fetal wellbeing.

Criteria not met:

The CTG will continue until 60min, if the criteria are not met this will print on the CTG and the woman must be reviewed by the Obstetric Registrar or Senior Medical Officer on call to aid clinical decision making regarding ongoing management. This is an ABNORMAL result.

Short term variation (STV) can only be assessed with a 60min CTG and should be reviewed if the CTG does not meet criteria. This should not be used in isolation to assess fetal wellbeing.

- > 4ms is normal
- < 4ms is low
- < 3ms is abnormal
- < 2ms is highly abnormal.

CRITERIA FOR BIRTH WHEN USING CCTG

Grossly abnormal CTG or cCTG (e.g., unprovoked decelerations, or reduced STV in babies intended for neonatal intensive care admission)[3].

Reduced STV are:

- 26+0 to 28+6 weeks' gestation: STV < 2.6 ms
- 29+0 to 31+6 weeks' gestation: STV < 3.0 ms

Individualise timing of birth recommendations and discuss and agree with the pregnant woman, their whānau (if appropriate) and the LMC.

The table below indicates reasons why DR criteria not met may occur:

Reasons for Dawes Redman Criteria NOT Being Met	
Code	
1	Basal Heart Rate outside normal range
2	Large decelerations
3	No episodes of high variation
4	No movements and fewer than 3 accelerations
5	Baseline fitting is uncertain
6	Short-term variation (STV) <3
7	Possible error at the end of the recording
8	Deceleration at the end of the recording
9	High frequency sinusoidal rhythm
10	Suspected sinusoidal rhythm
11	Long-term variation (LTV) in high episodes below acceptable level
12	No accelerations

For traditional CTG when the cCTG is not available please evaluate as usual practice with the CTG sticker (Ref.2400217).