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FETAL MONITORING GUIDELINE

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Version	Date	Author Job Title	Reasoning
1A	October 2023	Laura Little	Update to include IA initial assessment tool

AUTHORSHIP, RESPONSIBILITY AND REVIEW

Author	Laura Little / George Haroun	Ratification Date	October 2023
Job Title	Fetal Surveillance Midwife/Obstetric Consultant – Labour ward Lead	Review Date	October 2026

Contents

i. Purpose

The purpose of this guideline is to provide guidance and standardise documentation, interpretation, and management of fetal monitoring, including antenatal and intrapartum fetal monitoring. Ensuring appropriate use of antenatal and intrapartum fetal monitoring to assess fetal wellbeing to reduce fetal mortality/morbidity.

ii. Equality and diversity

Cwm Taf Morgannwg Health Board is committed to the provision of a service that is fair, accessible and meets the needs of all individuals.

Throughout this guideline, the term woman will be used. However, this should be taken to also include any pregnant person who does not identify as female.

Glossary of terms

CTG	Cardiotocograph
CEFM	Continuous Electronic Fetal Monitoring
IIA	Intelligent Intermittent Auscultation
HIE	Hypoxic Ischaemic Encephalopathy
FHR	Fetal Heart Rate
FSE	Fetal Scalp Electrode

1. Introduction

Fetal monitoring is a routine procedure which enables the clinician to monitor the wellbeing of the fetus and to intervene if appropriate. In normal low risk labour it can be performed by intermittent auscultation either by using a Pinard stethoscope or a doppler. When there are maternal or fetal conditions that increase the risk of intrapartum hypoxia or non-hypoxic stress to the fetus (see Table 3), continuous Electronic Fetal Monitoring (EFM) is recommended, to provide the clinician with a period of continuous tracing of the fetal heart. Fetal hypoxia is associated with abnormal heart changes and thus monitoring of the fetal heart changes assists in identifying the hypoxaemic fetus. In addition, other non-hypoxic situations can also be detected using fetal heartrate monitoring.

Electronic fetal monitoring (EFM) / cardiotocography (CTG) is used in standard obstetric practise for interpreting indirect fetal hypoxia and non-hypoxic changes.

Recognising abnormal patterns, interpreting EFM and initiating necessary actions reduces perinatal morbidity and mortality.

1.1 Appropriate care

- Women have the right to make informed decisions regarding the use of EFM/CTG. Their level of care should be the same regardless of the mode of monitoring or in its absence.

- A woman choosing to decline recommended fetal monitoring should be reviewed by a senior obstetrician who must then document that a discussion has occurred regarding the risks and limitations with the woman.

- The assessment of fetal wellbeing is only one component of care.

- Remote monitoring, when available, should never be used as a substitute for one-to-one care.

- In the event there is difficulty in determining the fetal heart rate or an inability to detect a fetal heart with either a Pinard, handheld sonicaid or CTG machine; assistance should be sought immediately and an ultrasound assessment should be performed by an appropriately trained practitioner.

1.2 Infection Prevention

All staff should follow Trust guidelines on infection prevention by ensuring that they effectively ‘decontaminate their hands’ before and after each procedure.

All staff should ensure that they follow Trust guidelines on infection control, using

Aseptic Non-Touch Technique (ANTT) when carrying out procedures i.e. application of an FSE.

2. Antenatal Fetal Monitoring

Routine auscultation of the fetal heart with a Doppler or Pinard stethoscope is usually part of each antenatal assessment during pregnancy. Whilst it confirms that the fetus is alive, it is unlikely to have any predictive value and routine listening is not recommended by the NICE Antenatal Guidelines (2017a). However, auscultation of the fetal heart usually provides reassurance for the mother.

The antenatal CTG is widely used as the primary method of antenatal fetal assessment but can have high inter-observer inconsistencies. It is usually used in conjunction with other ways of monitoring fetal health and wellbeing including observation of fetal movements, ultrasound assessments and doppler blood flow recording.

The evidence does not support the routine use of antenatal CTG for fetal assessment in women with an uncomplicated pregnancy (NICE 2017b) and a Cochrane review found no clear evidence that antenatal CTGs improve perinatal outcomes.

All women who attend the admission/day assessment units should be assessed on an individual basis to establish if CTG monitoring is indicated.

Indications for use

(This is not an exhaustive list and other indications may apply)

Women with recognised pre-existing risk factors

- Previous stillbirth or neonatal death
- Medical disorders such as diabetes and hypertension

Women who develop complications during pregnancy

- Antepartum haemorrhage
- Hypertensive disorder of pregnancy
- Reduced fetal movements
- Pre-labour premature rupture of membranes
- Threatened pre-term labour
- Abdominal trauma/pain
- Small for gestational age fetus
- Oligohydramnios/polyhydramnios
- Abnormal umbilical artery Doppler velocimetry
- Multiple pregnancy

- Isoimmunisation
- Post-term pregnancy >42 weeks
- Known fetal abnormality which requires monitoring
- Any medical/obstetric condition which constitutes a significant risk of fetal compromise
- Limited evidence available suggests there is no specific risk associated to recommend continuous monitoring with regards to Raised Bmi (singularly a risk factor) However, a low threshold and emphasis is encouraged in achieving quality of recording- so use of a CTG or FSE may be indicated if habitus inhibits auscultation.

2.1 Interpretation of the antenatal CTG

The CTG must be of good technical quality to be interpreted safely.

It should be continued for a minimum of 20 minutes

The four main features, baseline rate, baseline variability, accelerations and decelerations should be systematically examined to assist in the interpretation of the CTG

The whole clinical situation should be considered including the reason for performing the CTG and gestational age

The designated antenatal CTG proforma should always be used for the classification of the trace in non-labouring women (see appendix 1)

Using an intra-partum proforma is not appropriate as an antenatal CTG is either normal or abnormal.

Accelerations of the fetal heart rate appear to be a reflection of central nervous system wellbeing and there should be at least 2 accelerations (>15 beats for >15secs) in 10 minutes.

The sleep phase with no fetal movement and no fetal heart accelerations does not usually exceed 40 minutes. If there are no accelerations in 20 minutes, continue for a further 20 minutes.

If a woman is admitted >37 weeks the initial admission sticker should be undertake after 30-60mins (see appendix 3). The initial admission sticker aims to detect those fetuses with pre-existing insult, it aims to exclude chronic hypoxia and other features of non-hypoxic insult. If any grey boxes are highlighted in the admission sticker an obstetric review should take place and plan of care documented in the woman's notes.

3. Use of Computerised CTG (Cctg)

The Dawes-Redman cCTG monitor should only be used for antenatal women with **NO** uterine activity and only if electronic fetal monitoring is required. It is NOT to be used for women who are contracting this includes active labour and latent phase of labour. See Appendices 10 for Dawes-Redman algorithm.

The Dawes-Redman will provide you with two possible outcomes:

- Criteria met
- Criteria not met

3.1 Criteria met:

A CTG can meet the Dawes-Redman criteria in as little as ten minutes

- If criteria are met (and there are no other clinical concerns) the CTG can be considered normal and discontinued- it does not need to remain on for twenty minutes
- A visual inspection of the CTG by the practitioner must always be performed to confirm the CTG is normal.
- If Dawes-Redman criteria are met but there are concerns about the normality of the CTG, an obstetric review (ST3 or above) should be sought.
- Dawes-Redman is an 'expert assistant', however it also requires robust clinical judgement and confirmation.
- If criteria are met but the woman has clinical concerns that need obstetrician involvement regardless of the Dawes-Redman outcome request a review.
- If criteria are met and there are no additional concerns, obstetric reviews is not mandatory.

3.2 Criteria not met:

- If the Dawes-Redman criteria are not met the CTG should continue for the full 60 minutes, if there are pathological features or any cause for concern during this time, immediate escalation should take place.
- The reason(s) why the trace did not meet the criteria are highlighted as coded numbers alongside the 'criteria not met' message. These codes should be evaluated with the appropriate risk factors.
- If the trace appears normal at 60 minutes but the Dawes-Redman criteria is not met the CTG should be discontinued, and obstetric review (ST3 or above) should be sought.
- The Dawes-Redman measurements including the Short Term Variation (STV) should be documented and reviewed as this will identify why the trace has not met the criteria. The STV is important and should be compared to any previous Dawes-Redman CTG analysis for the fetus. A low STV is most commonly associated with fetal growth restriction and chronic hypoxia.

3.3 Short Term Variation values

4-5 Normal	<4 low	<3 abnormal	<2 very abnormal

If STV >5 the fetus may have a problem but is unlikely to be hypoxemic. Consider other clinical aspects of the case. It is more significant in preterm fetuses, especially <32 weeks.

If STV 4.0-4.99 it is normal and does not need intervention

If STV 3.0-3.99 repeat CTG within four hours and notify obstetrician.

If STV <3.0 = preterminal trace, immediately notify obstetrician and prepare for delivery.

3.4 Reasons for not meeting Dawes-Redman criteria and codes

1	Basal heart rate outside normal range
2	Large decelerations
3	No episode of high variation
4	No movements or fewer than 3 accelerations
5	Baseline fitting is uncertain
6	Short Term Variation (STV) is less than 3ms
7	Possible error at end of record
8	Deceleration at end of record
9	High frequency sinusoidal rhythm
10	Suspected sinusoidal rhythm
11	Long Term Variation (LTV) in high episodes below accepted level
12	No accelerations

1. **Basal Heart Rate outside normal range**

The FIGO and NICE guidelines agree that a normal baseline fetal heart rate for a term fetus is 110 – 160 beats per minute. Baseline FH Rates must be assessed in consideration of expected baseline for a fetus of the gestation being monitored. The Dawes/ Redman analyses the intervals between beats and converts into a Basal Heart Rate. Basal rate is not the same as baseline rate and may deviate significantly from a visual assessment of baseline rate.

2. **Large decelerations**

These will be unprovoked decelerations. Review by obstetric Registrar. Immediate intervention if the trace is otherwise abnormal, or significant clinical concerns.

3. **No episodes of high variation**

Long Term Variation (LTV) is essentially equivalent to traditional baseline variability. Measured over 1-minute, the difference between the high and low FH values is analysed. Important evidence of normality is the episodic variation in the baseline heart rate. LTV is reported as “High” or “Low” episodes. In deep sleep the fetal heart rate is relatively constant with lower short-term variation but this should not normally exceed 50 minutes. In other words, it indicates absence of cycling.

4. **No movements and fewer than 3 accelerations**.

This is significant and requires review by the obstetric team.

5. **Baseline fitting is uncertain**
If all else is normal and the baseline falls within normal parameters then this can be ignored.

6. **Short-term variation (STV) is less than 3ms**
Short-term variation is a computerised measure of the micro fluctuations of the fetal heart. These are not visible to the human eye. A value of less than 3ms is strongly linked to the development of metabolic acidaemia and impending intrauterine death. Particularly with the absence of an episode of high variation. STV can only be analysed after a full 60 minutes. STV of less than 3ms is significant and should be discussed and reviewed by the Obstetric Registrar or Consultant. Urgent review is required if the CTG visual assessment is also abnormal

7. **Possible error at end of the record**
This occurs when the machine detects a possible abnormality at the end of the trace which would otherwise be passed as CRITERIA MET. In this event the trace may be continued or, if the clinical evaluation is that it is significantly abnormal, for example prolonged deceleration, then action should be taken as appropriate.

8. **Deceleration at the end of the record**
In this event the trace should be continued, and action taken as appropriate. Review by Obstetric Registrar or Consultant on call.

9. **High frequency sinusoidal rhythm**
Sinusoidal FHR patterns are associated with either severe fetal anaemia or severe/prolonged fetal hypoxia with acidosis and are associated with poor fetal outcomes. The analysis of the Dawes Redman system should be acted on immediately and discussed with the Obstetric Registrar or Consultant on call.

10. **Suspected sinusoidal rhythm**
Sinusoidal FHR needs to be distinguished from a pseudosinusoidal FHR which, while it closely resembles a sinusoidal pattern, is usually transient, resolves spontaneously and is associated with a good fetal outcome. Where a diagnosis of Sinusoidal FHR pattern is made, immediate intervention is required with probable emergency delivery if intrauterine resuscitation is not appropriate. The CTG should be continued. Maternal blood should be taken for an urgent Kleihauer test to assess the degree of any feto-maternal haemorrhage. The Obstetric Registrar, Obstetric Consultant, Neonatal Paediatricians and Haematologist, should be alerted.

11. **Long-term variation in high episodes below acceptable level**
This should be acted upon in the same way as STV.

12. **No accelerations**
In this event the CTG trace should be continued but should be reviewed by Obstetric Registrar or Consultant. (Dawes Redman analyses acceleration using a slightly lower threshold (>10bpm) than FIGO and NICE definitions)

4. Intrapartum Fetal Monitoring

4.1 Intelligent Intermittent Auscultation

Intermittent auscultation (IA) of the fetal heart in labour with a sonicaid or pinnard should be recommended for all women who are at low risk of fetal hypoxia. In low risk women routine CEFM is associated with a higher rate of caesarean sections and assisted vaginal births (NICE 2017). Be aware that for women at low risk of complications, there is insufficient evidence about whether cardiotocography as part of the initial assessment either improves outcomes or results in harm for women and their babies, compared with intermittent auscultation alone (NICE 2017).An initial assessment using the All Wales Clinical Pathway for Normal Labour (AWCPNL) should be made in conjunction with any antenatal risk factors, birth plans and history as well as the current presenting history and physical assessment. Where there are maternal or neonatal complexities but IA is a suitable form of fetal monitoring during labour, please use the IA Initial Assessment Tool (Appendix 2)

4.2 Technique for recording intermittent auscultation of the fetal heart

Use either a pinard stethoscope or doppler.

During the initial assessment of the woman:

- Auscultate the fetal heart between contractions to obtain a baseline rate
- Auscultate the fetal heart immediately after a contraction, to identify any concerning decelerations
- Auscultate the fetal heart during fetal movements to confirm presence of accelerations

Carry out intermittent auscultation immediately after a contraction for at least 1 minute, at least every 15 minutes in the first stage, at least every 5 minutes in the second stage, and record it as a single rate, during active labour, transition between the first and second stage of labour should be clearly documented and identified on the partogram.

Record accelerations and decelerations if heard.

Palpate the maternal pulse for at least one minute every 30 minutes, concurrently with the fetal heart to ensure 2 separate rates, both within normal limits

The midwife responsible for caring for the woman should be alert to the possibility of quick transition between different phases of labour and increase fetal surveillance accordingly. If the second stage of labour is suspected but not confirmed the responsible midwife caring for the patient should assess the FHR immediately after a contraction for at least 1 minute, every 5 minutes.

In line with the Normal Labour Pathway an hourly overall holistic assessment should be carried out to confirm maternal and fetal wellbeing and consideration given to any emerging risk factors.

If there is a rising baseline fetal heart rate or decelerations are suspected on intermittent auscultation, actions should include:

- Carrying out intermittent auscultation more frequently, for example after 3 consecutive contractions initially
- Thinking about the whole clinical picture, including the woman's position and hydration, the strength and frequency of contractions and maternal observations.

If a rising baseline or decelerations are confirmed, further actions should include:

Immediate escalation

- Advising continuous cardiotocography and, explaining to the woman and her birth companion(s) why it is needed.
- Transferring the woman to obstetric-led care, provided it is safe and appropriate to do so.

If continuous cardiotocography has been started because of concerns arising from intermittent auscultation, but the trace is normal after 30 minutes, return to intermittent auscultation unless the woman asks to stay on continuous cardiotocography.

4.3 Transfer from intermittent auscultation to continuous CEFM

- Suspected chorioamnionitis or sepsis
- Temperature of 38 degrees centigrade or above on a single reading, or 37.5 degrees centigrade or above on 2 consecutive occasions 1 hour apart
- Maternal pulse over 120 beats/minute on 2 occasions 30 minutes apart
- Severe hypertension (160/110 mmHg or above)
- Hypertension: either a systolic blood pressure of 140mmHg or more or diastolic blood pressure of 90 mmHg or more on 2 consecutive readings taken 30 minutes apart, measured between contractions
- A reading of 2+ proteinuria on urinalysis and a single reading of either raised systolic blood pressure (140mmHg or more) or a raised diastolic blood pressure (90 mm Hg or more)
- Oxytocin use
- Presence of significant meconium
- Fresh vaginal bleeding that develops in labour
- Confirmed delay in first or second stage of labour
- Pain reported by the woman that differs from the pain normally associated with contractions
- In advance of epidural for labour.

If anyone of the following risk factors is present or arises during labour, perform a full assessment of all factors listed:

- Prolonged period since rupture of membranes (24 hours or more)
- Moderate hypertension (150/100 to 159/109 mmHg
- Confirmed delay in second stage of labour
- Presence of non-significant meconium
- Continuous CTG should be undertaken with an epidural infusion, as CTM use patient-controlled analgesia and therefore the woman can administer a bolus dose intermittently as required. CTG monitoring should be in situ prior to epidural insertion.

Address any concerns that the woman has about continuous cardiotocography, and give her the following information:

- Explain that continuous cardiotocography is used to monitor the baby's heartbeat and the labour contractions.
- Explain that it may restrict her mobility.
- Give details of the types of findings that may occur. Explain that a normal trace indicates that the baby is coping well with labour.
- Explain that changes to the baby's heart rate pattern during labour are common and do not necessarily cause concern.
- Explain that if the trace is not normal there will be less certainty about the condition of the baby and so continuous monitoring will be advised.
- Explain that decisions about her care during labour and birth will be based on an assessment of several factors, including her preferences, her condition and that of her baby, as well as the findings from cardiotocography**.**

4.4 Indications for continuous fetal monitoring

Continuous CTG should be offered if any of the following risk factors are present or arise in labour, this list is not exhaustive and clinical judgement should be used:

- Previous caesarean section (Refer to the guideline entitled ‘Vaginal birth after caesarean section’

06030)

- Multiple pregnancy
- Suspected IUGR
- Suspected chorioamnionitis or sepsis, or a temperature of 38 C or above
- Severe hypertension (150/100mmHg or above)
- Oxytocin or prostaglandin use
- The presence of significant meconium
- Fresh vaginal bleeding that develops in labour
- Pre-term labour
- Prolonged period since rupture of membranes (24 hours or more)
- Confirmed delay in first or second stage of labour
- Use of epidural anaesthesia

During the siting of an epidural catheter, monitoring must continue and be of good enough quality to allow classification. If unable to monitor appropriately, the procedure must be paused to allow monitoring to be adjusted. The procedure must only be recommenced on establishment of good quality recording.

4.5 Technique for recording electronic fetal heart

Abdominal palpation and auscultation of fetal heart using a Pinard stethoscope is necessary before continuous monitoring is commenced.

The mother should be in a comfortable and supportive position and aorto-caval compression avoided.

The tocograph transducer should be placed where the fetal heart was heard.

Maternal pulse oximeter should be used continuously to ensure differentiation between maternal and fetal heart rate. If there is concern regarding similarities between fetal and maternal heart rates, actions should be undertaken to confirm difference.

The duration of any recording should be at least 20 minutes with at least 2 movements/accelerations and the recording of good quality, if this is not possible, a senior obstetrician should make the decision of when the recording should cease and document an ongoing plan. If Dawes-Redman is used, then the recording may be stopped before twenty minutes as long as all criteria has been met and the CTG has been visually reviewed and classified as normal, if normal and no other ongoing clinical concerns the CTG can be discontinued.

All relevant information eg. vaginal examinations, administration of drugs, fetal blood sampling, vomiting, sitting for epidural insertion, that may affect the fetal heart should also be noted contemporaneously on the cardiotocograph.

Any member of staff who is asked to provide an opinion on a trace should date/time and sign the cardiotocograph and note any findings in the maternal case notes. The same should happen at any staff change over.

Applying a fetal scalp electrode (FSE) should be considered where cardiotocograph tracing is of poor quality using an abdominal transducer after repositioning of the monitor and consideration of maternal position has taken place. An FSE should not be applied solely because of an abnormal fetal heart rate pattern.

When active labour is established, external fetal monitoring may be difficult to achieve in women with high BMI. Internal monitoring with a fetal scalp electrode (FSE) is indicated when it is not possible to record a quality trace with external monitoring despite repositioning and consideration of maternal position (as stated in the Guideline for the Management of Women with Obesity in Pregnancy).

Applying a fetal scalp electrode should be considered prior to epidural insertion or spinal if cardiotocograph tracing is non-reassuring or abnormal.

Please see appendix 7 for contraindications for FSE application.

4.6 Ensure accurate record keeping for cardiotocography:

Make sure that date and time clocks on the cardiotocograph monitor are set correctly to align with the clock in the room and initial this on the trace. When commencing a CTG the following should be documented on the CTG trace utilising the minimum dataset CTG sticker (See appendix 4) by the responsible professional:

- Woman's first name and surname (use addressograph if available)
- Woman's hospital number
- Date and time of commencement of CTG
- Gestation of pregnancy
- Reason for CTG
- Maternal pulse
- Auscultation with pinard or handheld doppler
- Signature of professional assessing woman prior to commencing CTG

Confirm that the monitor is set to record at 1cm/minute.

At sites where central monitoring is available, CTG traces must be assigned at the earliest opportunity and always before discontinuing monitoring.

To maintain maternal skin integrity, the position of the cardiotocograph transducers and the bands must be regularly adjusted and consideration given to the comfort of the belts.
Once antenatal CTG trace has been completed the responsible midwife should sign the trace. In addition, the responsible midwife should sign the CTG interpretation sticker and document the outcome in the maternity records. Please see section 4.7 on interpretation of electronic fetal monitoring.

All significant events and interventions should be marked on the CTG contemporaneously, signed and timed, including when help has been summoned (if applicable).

Following the birth, the mode of birth, time, outcome and signature of midwife must be written on the CTG.

The CTG tracing needs to be stored in the designated wallet and placed appropriately in the maternal records and kept for 25 years. The woman's details must be clearly recorded on the front of the wallet.

4.7 Interpretation of electronic fetal monitoring

Prior to classification of the CTG chronic hypoxia needs to be excluded using admission sticker (See Appendix 3). Signs of chronic hypoxia may indicate that the fetus has already suffered from a hypoxic insult in the antenatal period. The fetus would therefore, have a reduced capacity to cope with the additional stress imposed by labour. The sticker must be used for women presenting in labour after 37 weeks gestation and prior to commencing induction of labour. In these circumstances it is to be used on its own without another interpretation sticker – following 30-60 mins of tracing to exclude chronic hypoxia. Any concerns found highlighted by the grey areas on the sticker would prompt the need for review and an individualised plan.

Where continuous monitoring is recommended the midwife is responsible for continual CTG interpretation. If there are any concerns with the interpretation of the tracing an appropriate obstetric review is essential, and any concerns should be clearly documented in the midwifery records.

The individual midwife caring for the woman is accountable for the interpretation of the CTG, the use of "fresh eyes" CTG interpretation is required hourly. The midwife seeks the assistance of a colleague (midwife or doctor) hourly to systemically review the trace with them and the sticker will be placed in the records and completed and signed by both practitioners (appendix 5).

The relevant interpretation label (antenatal or intrapartum) should be used in the antenatal and intrapartum settings to ensure a standardised assessment. It is to be placed in the maternity records hourly, and more frequently following any significant clinical event. If no label is available, the same information needs to be hand written.

To prevent delay of fresh eyes due to interventions i.e. epidural insertion or 2nd stage perform 'fresh eyes' prior to the intervention so fetal wellbeing and maternal wellbeing are assessed appropriately prior to the intervention.

There should be a good quality CTG to provide an accurate precise tracing assisting to identify abnormal heart changes associated with fetal hypoxia. If there is an inability to maintain a good quality trace with an abdominal transducer and repositioning and maternal position have been unsuccessful i.e. loss of contact, a fetal scalp electrode must be applied. The labour ward co-ordinator and obstetrician should be informed of a poor-quality trace where a fetal scalp electrode cannot be applied.

4.8 Fetal Blood Sampling

The evidence to support the benefit of Fetal Blood Sampling (FBS) in improving fetal outcomes or reducing caesarean section rates is minimal. In addition, there are several Cochrane reviews that advise against FBS considering the associated risks. Knowledge on the interpretation of fetal heart rate is more valuable in diagnosing hypoxia, non-hypoxic stress and acidosis. Current NICE guidance recommends that certain clinical situations, may result in a false reassurance. The FBS competency has been removed from the Royal College of Obstetrics and Gynaecology (RCOG) training curriculum and, therefore, trainees should not perform.

Prior to carrying out an FBS there should be discussion with a consultant to determine whether it is appropriate, as well as results obtained from the procedure.
Before carrying out, start conservative measures and offer digital scalp stimulation. NICE (2022) recommends only continuing with FBS if the CTG then remains pathological.
When considering FBS the woman's preferences and whole clinical picture should be taken into account. See appendices 9 for further information on FBS.

4.9 Maternal Position and Oxygen Therapy

Prolonged monitoring whilst in supine recumbent position should be avoided due to the risk of aorto-caval compression.

During the presence of abnormal FHR patterns when a woman is lying supine she should be advised to adopt a left lateral position.

Prolonged use of maternal reservoir facial oxygen therapy may be harmful to the baby and should be avoided. There is no research evidence evaluating the benefits or risks of short-term maternal reservoir facial oxygen therapy in suspected fetal compromise.

5 Use of CTG in the pre-term fetus

There is a lack of evidence-based recommendations for electronic monitoring pre-term fetuses. NICE Intrapartum Guidelines (2017) covers the care of healthy women in labour at term (37 – 42 weeks gestation).

Some of the characteristics of fetal heart rate are dependent on gestational age as they reflect the development and maturity of cardiac centres in the central nervous system as well as the cardiovascular system which need to be taken into consideration to correctly interpret the CTG (Afors and Chandraharan 2011).

Assessment of the survival and long term outcome at the given gestational age should be taken into consideration as well as the wider clinical picture such as any infection, maternal age, condition of the fetus and wishes of the woman when making a management plan.

Evaluation of the risks of any intervention should include possible need for a classical caesarean section and future increased risk of uterine rupture.

Fetal blood sampling is contra-indicated in the pre-term fetus as there are concerns with reduced thickness of fetal scalp, wider separation of the skull bones and immature coagulation system which could increase risk of complications.

5.1 24 – 26 weeks

At this gestation there is a high risk of neonatal morbidity and mortality.

Use of CTG is contentious, each case should be considered individually with an intrapartum plan of care documented following discussion with woman, senior obstetrician (ideally a consultant) and neonatologists considering the likelihood of severe morbidity of the fetus and issues related to mode of delivery. If a caesarean section is agreed as a delivery option then consideration should be given to CTG monitoring.

- Operative intervention is likely to increase risk of maternal morbidity associated with a classical caesarean section, haemorrhage and increased risk of uterine rupture in a future pregnancy.
- Baseline rate is ' usually between 150 – 160bpm, but >160 should be considered tachycardic
- Variability and cycling is reduced: this may also be associated with drugs such as opiates, magnesium sulphate and steroids.
- Accelerations may not be present or greatly reduced in amplitude
- Decelerations are common at this gestation and may not be indicative of hypoxia

5.2 26 – 28 weeks

- Survival is significantly higher than at 24 – 26 weeks
- Women should make informed choice regarding CTG following discussion with obstetrician and neonatologist
- CTG usually similar to 24 – 26 weeks gestation
- After 27 weeks incidents of variable decelerations is greatly reduced
- Variability often within normal range
- Frequency of accelerations increased but usually with lower amplitude: 10 beats above the baseline as opposed to 15 beats and lasting for 10 seonds as opposed to 15 seconds at term.

5.3 28 – 32 weeks

- Survival increases as the fetal organs are relatively mature and significantly improved neurological development
- CTG is recommended following discussion and agreement with the woman
- Features often comparable with term fetus
- Variable deceleration reduce in number and should disappear after 30 weeks
- Baseline rate usually decreasing from the upper end of normal range
- Variability of >5bpm and signs of cycling more likely from 30 weeks
- In normal well grown fetuses, acidosis can take up to 90 minutes to develop but with pre-term or growth restricted fetuses acidosis may develop much quicker and there should be a low threshold for intervention

5.4 32 – 34 weeks

- Neonatal morbidity and mortality is significantly reduced
- CTG is recommended following discussion with and informed consent from, the woman
- Physiological maturity of the cardiovascular system and neuro control of the fetal heart rate is similar to the term fetus and the NICE classification of the CTG can be applied
- Fetal blood sampling is contra-indicated in fetuses <34 weeks gestation.
- Pre-term fetuses have lower reserves compared to term infants and may have a reduced ability to withstand any intrapartum insults. There should be a low threshold for intervention

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Appendix 1: Antenatal Interpretation Sticker

Antenatal CTG Proforma	Reassuring	Non-Reassuring		
Baseline rate (bpm)	110 - 160 Rate:	Less than 109 Rate: More than 161 Rate: Sinusoidal pattern for 10 minutes or more	Comments:	
N.B Rising baseline rate even within normal range may be of concern if other non-reassuring features present				
Variability (bpm)	5 - 25 bpm	Less than 5 bpm for more than 40 minutes	Comments:-	
N.B If variability > 25bpm continue CTG until normal range (5-25bpm)				
Accelerations	Present	None for 40 minutes	Comments:-	
Decelerations	None	Unprovoked deceleration/s Decelerations related to uterine tightenings (not in labour)	Comments:-	
Opinion	*Normal CTG* (All 4 features reassuring)	*Abnormal CTG* (1 or more non reassuring feature)		
Maternal Temp	Maternal pulse:	Membranes ruptured: Y / N If yes, date and time:	Liquor colour:	Gestation (wks):
Reason for CTG:				
Action: (An abnormal CTG requires prompt review by experienced obstetrician/senior midwife)				
Date:	Time:	Signature: ..... Print: ..... Designation:		

GIG CYMRU NHS WALES
Bwrdd Iechyd Prifysgol
Cwm Taf Morgannwg
University Health Board

Intermittent Auscultation (IA)

Fetal Assessment Checklist

Use prior to ALL IA on <u>LABOUR WARD</u>

Affix Label

In the absence of risk factors for fetal hypoxia IA is the recommended method for fetal surveillance in labour

Women recommended to birth on labour ward for complexity, but with **no risk factors for hypoxia in labour**, e.g. *Raised BMI, GBS, large for gestational age, previous PPH, previous shoulder dystocia epilepsy (refer to NICE Guidelines for recommendations for continuous CTG)*

Maternal Assessment	**Yes**	**No**
Singleton pregnancy & cephalic presentation?		
Absence of clinical concerns around growth e.g. Fundal Height measurement?		
Antenatal surveillance shows good growth velocity that is >10th centile?		
Pre-labour rupture of membranes > 24hrs prior to onset active labour excluded?		
Maternal observations within normal limits *(BP, temp, pulse, respirations)**?***		
Absence of significant meconium? *Assess significance and full clinical picture, discuss options with woman)*		
Fetal Assessment	**Yes**	**No**
Absence of concern/ongoing plan for recurrent Altered fetal movements (AFM)? *(Consider past RFM, including no. of episodes, as part of overall risk assessment).*		
Normal pattern of fetal movements over the last 24 hours?		
Is the baseline rate appropriate for gestational age 110—160bpm? *(Between contractions, when fetus is at rest)* **Rate:** _____		
Fetal heart IMMEDIATELY after a contraction & decelerations excluded? *(Count for full 60 seconds)*		
Fetal heart during fetal movements to observe accelerations (*if fetal movements present at time of assessment)**?* *(The absence of accelerations is of unknown significance)*		
Maternal pulse taken concurrently with fetal heart. **MP** _____ **is there a clear difference between them?** **FH** _____		
Overall assessment CONFIRMS suitability for IA in labour?	**Yes**	**No**

If 'YES' to all the above perform IA. Documentation to be on the Delivery Unit Record/Partogram **& NOT the All Wales Clinical Pathway for Normal Labour**

Appendix 3: CTG Initial Assessment Sticker

CTG Initial Assessment (From 37 Weeks gestation to be completed on admission if not suitable for MLC)			
1	Baseline fetal heart rate appropriate for gestational age? bpm	Yes	No
2	Normal variability and cycling?	Yes	No
3	Accelerations present? (not in labour/latent phase)	Yes	No
4	Shallow or late decelerations?	Yes	No
5	Any concerns with wider clinical picture? E.g. Meconium, temperature, fetal growth, fetal movements	Yes	No
Overall Impression: Normal/ Chronic hypoxia/ Other (Any shaded answers should prompt obstetric review and plan documented in notes)			

Appendix 4: CTG Data Set Sticker

TO BE ATTACHED TO ALL CTG TRACES

Addressograph here

Date/time commenced……

Reason for CTG…….....

Midwives name and signature…….

Maternal Pulse ……..bpm

Pinard/sonicaid auscultation……..bpm

Appendix 5: Intrapartum CTG Fresh Eyes Sticker

INTRAPRATUM CTG FRESH EYES						
Date:		Time:	Primary Midwife's Name:		Reviewer's Name and Role:	
Risk Factors:						Dilation at last VE:
Gestation:	Maternal HR:	Initial Baseline rate:	Contractions/10min:	Oxytocin Rate:		Liquor Colour:
Baseline Rate	110 - 160bpm _____ bpm Appropriate for gestational age	Rise in baseline >10%	Rise in baseline >10% /unstable baseline			**Consider non-hypoxic causes if some features abnormal or absent, see other diagnosis below**
Variability	5 - 25bpm Cycling present Acceleration with FMs/ stimulation	5 - 25bpm Cycling absent	<5 or >25bpm	<5 or >25bpm		
Decelerations	No repetative decelerations	Present (representative variable or late)	Present (repetitive variable or late)	More time spent decelerating than at the baseline	Prolonged Deceleration >3 mins	Agreement in interpretation with colleague: **Yes** **No:** If no, additional senior review required
Impression	**No fetal hypoxia**	**Gradually evolving hypoxia (compensated)**	**Gradually evolving hypoxia (decompensated)**	**Subacute hypoxia**	**Acute Hypoxia**	
Suggested clinical management	No intervention necessary	Conservative measures: Regular reviews 30-60 min (ensure plan documented)	Correct reversible causes; Immediate escalation; Urgent interventions; Delivery if no improvement by 15mins		Immediate escalation; Correct reversable causes; Delivery if irreversible cause	

Other diagnosis:	Suggested clinical management:
Chorioamnionitis (rise in baseline, reduced variability, absent cycling, possible lasck of decelerations, possible maternal tachycardia)	Septic screening; antibiotics; expedite delivery
Sinusoidal pattern >30 mins	Immediate escalation; Immediate delivery
Poor quality	1. Consider repositioning monitor 2. Consider maternal position 3. Consider FSE

Appendix 6: Fresh Eyes' CTG Interpretation

Monitoring of the fetal heart rate pattern and uterine contraction profile during labour is a critical component of modern obstetric and midwifery practice. The objective of this practice should be to maximise the probability of detection of a compromised baby, without increasing the number of unnecessary maternal interventions.

There are many variables which make CTG interpretation challenging and these range from individual interpretation, fatigue, lack of knowledge, familiarity (providing 1:1 care for an extended period and experiencing a lack of objectivity). Efforts made to support areduction in these variables include:

Lack of knowledge – All staff should evidence six hours of fetal monitoring training annually including attendance at a fetal surveillance study day.
Fatigue - is to be combated through staff taking regular meal breaks as necessary – the Delivery Suite Co-ordinator is responsible for ensuring this occurs.
Familiarity - is to be addressed through application of the following:

'FRESH EYES' procedure:

The individual practitioner providing care to a woman who requires continuous CTG monitoring is responsible for continual CTG interpretation and document any significant clinical event e.g. epidural insertion, vaginal examination, change of maternal position (clinical events along with Obstetrician's reviews must also be recorded on the CTG tracing).

Every hour the practitioner providing care to the woman must seek the assistance of a colleague (midwife or doctor) to systematically review the CTG trace with them, to categorise the trace and to decide upon an appropriate plan of care

The CTG interpretation sticker must be completed, signed by **both** practitioners, and fixed in the woman's obstetric notes. Ensure clear communication and documentation of plan.

Audit of compliance with this procedure is included in the Clinical Supervisor for Midwives annual record-keeping audit.

Appendix 7: Use of Fetal Scalp Electrode (FSE)

An FSE is used to provide a continuous CTG when a satisfactory trace cannot be obtained using an external abdominal transducer.

On removing an FSE either during labour or after birth, ensure that it is carefully disposed of in the appropriate sharps bin.

Contra-indications for the use of a Fetal Scalp Electrode

- Maternal infection (i.e. HIV, hepatitis viruses, herpes simplex virus);
- Placenta praevia is present or suspected;
- When woman is a confirmed carrier of haemophilia and fetus is affected or status is unknown;
- Mal presentation (i.e. face, breech, shoulder, or any other presentation) or when it is not possible to identify fetal presenting part.

Do not use a FSE if the woman is less than 34+0 weeks pregnant unless all of the following apply:

- It is not possible to monitor the fetal heart rate using either external CTG or intermittent auscultation;
- It has been discussed with a senior obstetrician;
- The benefits are likely to outweigh the potential risks;
- The alternatives (immediate birth, intermittent ultrasound and no monitoring) have been discussed with the woman and are unacceptable to her.

Appendix 8: Conservative Measures Table

Conservative Measures
1. If there are any concerns about the baby's wellbeing, think about the possible underlying causes and start one or more of the following conservative measures based on an assessment of the most likely cause(s): • Encourage the woman to mobilise or adopt a left-lateral position, and in particular avoid being supine • Offer intravenous fluids if hypotensive • Offer paracetamol if the woman has a raised temperature • Reduce contraction frequency by: ○ reducing or stopping oxytocin if it is being used (the consultant obstetrician should decide whether and when to restart oxytocin) and/or ○ Offering a tocolytic drug (a suggested regimen is subcutaneous terbutaline 0.25mg). 2. Inform the coordinating midwife and an obstetrician whenever conservative measures are implemented. 3. Do not use maternal facial oxygen therapy for intrauterine fetal resuscitation, because it may harm the baby (but it can be used where it is administered for maternal indications such as hypoxia or as part of pre-oxygenation before a potential anaesthetic).

Appendix 9: CTG Trace Interpretation

CTG Trace Interpretation

Overall Care

1. Do not make any decision about a woman's care in labour based on cardiotocography (CTG) findings alone.

2. Take into account any antenatal and intrapartum risk factors, the current wellbeing of the woman and unborn baby, and the progress of labour when interpreting the CTG trace.

3. Remain with the woman at all times in order to continue providing one-to-one support.

4. Ensure that the focus of care remains on the woman rather than the CTG trace.

5. Make a documented systematic assessment of the condition of the woman and the unborn baby (including CTG findings) hourly, or more frequently if there are concerns.

Principles for intrapartum CTG trace interpretation

1. When reviewing the CTG trace, assess and document all 4 features (baseline fetal heart rate, baseline variability, presence or absence of decelerations, presence of accelerations).

2. It is not possible to categorise or interpret every CTG trace. Senior obstetric input is important in these cases.

Accelerations

1. The presence of fetal heart rate accelerations is generally a sign that the unborn baby is healthy.

2. If a fetal blood sample is indicated and the sample cannot be obtained, but the associated scalp stimulation results in fetal heart rate accelerations, decide whether to continue the labour or expedite the birth considering the clinical circumstances and in discussion with the woman.

3. The appearance of accelerations in an intrapartum trace which had previously been absent, particularly when coinciding with contractions, should prompt further investigation to differentiate between maternal and fetal heart rates.

Appendix 10: Fetal Blood Sampling

Fetal blood sampling (FBS) can be performed in the presence of pathological FHR trace, unless there is clear evidence of acute compromise.

FBS should be performed in the left lateral position and classified as below:

- ≥ 7.25 Normal
- 7.21 – 7.24 Borderline
- ≤ 7.20 Abnormal

A normal FBS should be repeated no more than 1 hour later if the FHR trace remains pathological, or sooner if there are further abnormalities.

After borderline FBS, sampling should be repeated no more than 30 minutes and refer to point 10.

If uterine hypercontractibility occurs in association with oxytocin infusion and a non-reassuring or abnormal CTG is present, the oxytocin infusion should be reduced or discontinued.

In the presence of an abnormal fetal heart rate pattern and uterine hypercontractibility that is not secondary to oxytocin infusion, tocolysis should be considered. A suggested regime is subcutaneous terbutaline 0.25 milligrams.

Umbilical cord acid base status should be assessed by collection of paired blood samples in heparinised syringes from the umbilical artery and vein as a minimum following emergency caesarean section, instrumental delivery, where a fetal blood sampling has been performed in labour, where there have been any concerns in labour or where baby requires resuscitation following birth.

Appendix 11: Dawes Redman CTG Algorithm