

Greater Manchester and Eastern Cheshire SCN

Fetal Monitoring in Labour including Fetal Blood Sampling Guideline

June 2019
Draft Version 0.7



Document Control

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Title	<ul style="list-style-type: none">Fetal Monitoring in Labour including Fetal Blood SamplingVersion 0.7 June 2019
Supersedes	<ul style="list-style-type: none">Fetal monitoring in Labour including Fetal Blood SamplingVersion 0.6 May 2019
Author	<ul style="list-style-type: none">Originated / Modified By: Jennifer Sager/ Karen BancroftDesignation: Senior Project Manager/ Clinical Lead, Local Maternity System, GMEC Maternity Transformation Board
Ratification	<ul style="list-style-type: none">Ratified by: TBCDate of Ratification: TBC
Application	<ul style="list-style-type: none">All Maternity Staff
Circulation	<ul style="list-style-type: none">Issue Date: TBCCirculated by: joanne.langton@nhs.net
Review	<ul style="list-style-type: none">Review Date: March 2022Responsibility of: GMEC SCN
Date placed on the Intranet:	

Acknowledgements

On behalf of the Greater Manchester and Eastern Cheshire and Strategic Clinical Networks, I would like to take this opportunity to thank the contributors for their enthusiasm, motivation and dedication in the development of Fetal Monitoring in Labour guideline.

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1 What is this guideline for?

This guideline is based on the NICE Guideline on Intrapartum Care: Care of healthy women and their babies during childbirth (Updated 2017). This guideline covers the physiology of hypoxia and clarifies when electronic fetal monitoring (EFM) should be used as an appropriate method of monitoring the fetal heart but also standardises the classification of cardiotocographs (CTG) and provides guidance on actions to be taken when abnormalities are detected.

The guideline relates to the monitoring of the fetus in labour. It covers all care settings and is to be used by obstetric and midwifery staff so that they provide consistent and effective care in order to monitor the fetal condition in the intrapartum period.

2 Why do I need to know?

It is important to ensure that women and babies receive the best evidence-based care and that that is implemented across our region, to reduce variation in the quality of care delivered.

3 Pathophysiology of hypoxic labour

During labour the fetus employs various adaptive mechanisms in response to hypoxia, generally following a similar pathway as the physiological response to exercise. Intrapartum hypoxia generally follows one of three pathways:

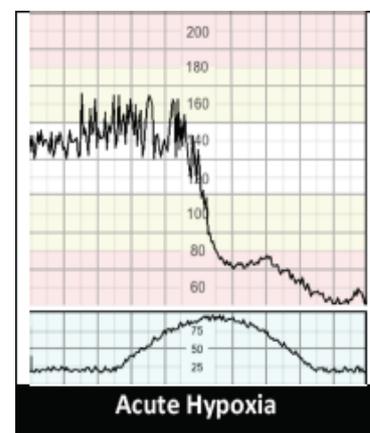
3.1 Acute Hypoxia

(Kamoshita et al. 2010, Leung et al.2009, Cahil et al. 2013)

Acute hypoxia presents as a prolonged deceleration lasting for more than 5 minutes or for more than 3 minutes if associated with reduced variability within the deceleration. Fetal pH drops at a rate of 0.01/min during the deceleration (Gull et al 1996).

Causes of acute hypoxia include:

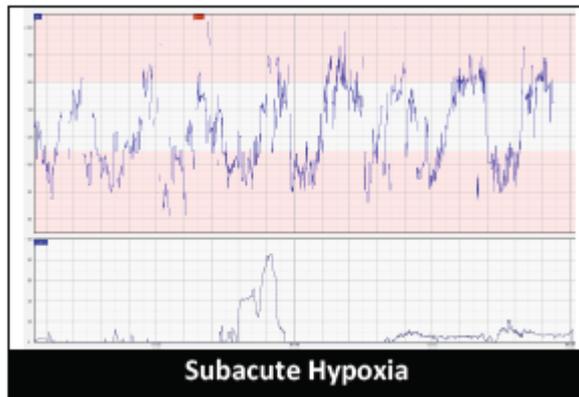
- 3 accidents:
- Cord prolapse
 - Placental Abruption
 - Uterine Rupture
- 2 iatrogenic:
- Maternal Hypotension (usually secondary to supine hypotension or epidural top-up)
 - Uterine hyperstimulation (by oxytocin/PGs) or spontaneous increased activity



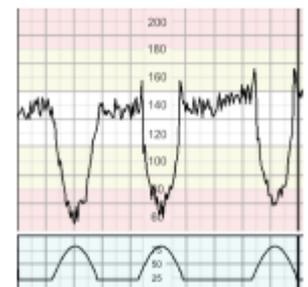
3.2 Subacute Hypoxia

(Albertson et al. 2016)

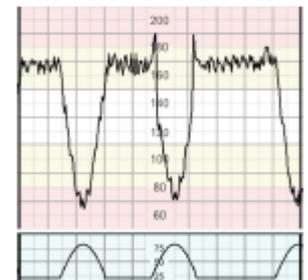
Subacute hypoxia presents as decelerations for most of the time on the CTG. This is almost invariably caused by uterine hyperstimulation. The fetal pH drops at a rate of 0.01 every 2-3 minutes. Management is by stopping or reducing uterotonics, avoiding supine position, starting IV fluids, administering tocolytics (if hyperstimulation persists despite previous measures) or expediting the delivery by assisted vaginal birth or caesarean section if hypoxia persists despite tocolysis.



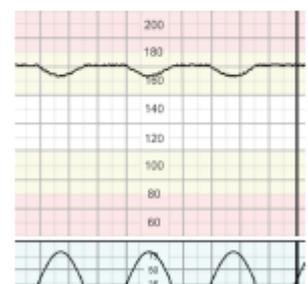
Gradually Progressive Hypoxia



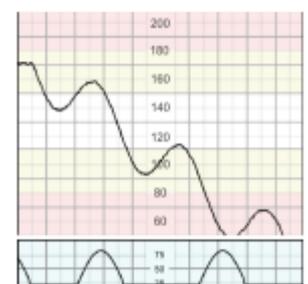
Decelerations



Rise in baseline



Reduced variability



Terminal heart failure

3.3 Gradually Evolving Hypoxia

(Richardson et al 1996)

This is the most common type of hypoxia in labour. During this process, the fetus undergoes the same changes that a normal adult would be expected to show during exercise. This tends to **present** with the following order:

1. Evidence of hypoxic stress (decelerations)
2. Loss of accelerations and lack of cycling
3. Exaggerated response to hypoxic stress (decelerations become wider and deeper)
4. Attempted redistributions to perfuse vital organs facilitated by catecholamines (first sign is a rise in baseline)
5. Further redistribution with vasoconstriction affecting the brain (reduced baseline variability)
6. Terminal heart failure (unstable/progressive decline in the baseline – “step ladder pattern to death”)

Important notes:

Stages 1 to 4 represent evidence of stress with maintained fetal compensation.

Stages 5 and 6 represent evidence of stress with fetal decompensation.

Stages 1 to 5 may be reversible although prolonged episodes of hypoxia can lead to fetal organ damage.

3.4 Chronic Hypoxia:

(Pulgar et al 2007)

This is an antenatal type of hypoxia with implications for intrapartum care.

Chronic hypoxia presents as a baseline rate at the upper end of normal associated with reduced variability and blunted responses (shallow decelerations). This represents a fetus with reduced reserve and increase susceptibility to hypoxic injury during labour. Careful consideration should be given when planning interventions potentially increasing the risk of hypoxia, with low threshold for surgical intervention.

4 Guidance on fetal monitoring in labour

4.1 Information & discussion

- All staff are responsible for ensuring that women have access to evidence-based information in order to make informed choices
- The woman should be given accurate information regarding fetal monitoring to allow her to make an informed decision regarding the most appropriate method to monitor her baby. Some of this information is best discussed antenatally. Discussion should include the recommendations for fetal monitoring that are indicated from the risk assessment
- Explain that continuous CTG is used to monitor the baby's heartbeat and the labour contractions
- Give details of the types of findings that may occur. Explain that a normal trace is reassuring and indicates that the baby is coping well with labour, but if the trace is not normal there is less certainty about the condition of the baby and further continuous monitoring will be advised
- Explain that decisions about whether to take any further action will be based on an assessment of several factors, including the findings from CTG
- The reasons for the woman's decisions should be recorded in her notes
- Any deviation from the guidelines should be documented in the notes
- All women with learning disabilities, visual or hearing impairments or those whose first language is not English must be offered assistance with interpretation where applicable, and where appropriate a telephone interpreter must be used. It is paramount that clear channels of communication are maintained at all times between all staff, the women and their families. Once any decisions have been made/agreed, comprehensive and clear details must be given to the woman thereby confirming the wishes of the women and their families
- The contents of any leaflet issued must be explained in full at the time it is issued. All communication difficulties (including learning difficulties) and language barriers must be addressed as outlined in the previous paragraph at the time the leaflet is issued
- Ensure the provision and discussion of information of the risks and benefits with

women during the antenatal, intrapartum and postnatal periods

- All details surrounding discussion of the risks and benefits together with explicit details of proposed management must be documented contemporaneously, in both hand-held notes and the main notes as appropriate (NMC 2009)

4.2 Overall Care

- CTG should not be offered to low-risk women at term as an initial assessment or when in established labour unless requested after above discussion.
- When a woman presents in labour, a risk assessment should be completed, ([Appendix 2](#)). This clearly indicates when and what type of fetal monitoring is required. The risk assessment should be repeated four hourly, on handover of care, or where there is a deviation from normal
- If continuous CTG is needed explain to the woman that it will restrict her mobility, particularly if conventional monitoring is used.
- Remain with the woman, as much as possible, in order to continue providing one-to-one support
- Encourage and help the woman to be as mobile as possible and to change position as often as she wishes
- Monitor the condition of the woman and the baby, and take prompt action if required ensuring that the focus of care remains on the woman rather than the CTG trace or intermittent auscultation findings

4.3 Intermittent Auscultation

4.3.1 Offer intermittent auscultation of the fetal heart rate to low-risk women in established labour in all birth settings:

- Use either a Pinnard stethoscope or Doppler ultrasound
- Carry out auscultation immediately after a contraction for at least 1 minute and record it as a single rate.
- Fetal heart auscultation as above should be done at least
 - Every 15 minutes in the first stage of labour
 - Every 5 minutes in the second stage of labour
- Record accelerations and decelerations if heard
- Record maternal pulse hourly or more often if a fetal heart rate abnormality is suspected, to differentiate between the two heart rates

4.3.2 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.

Review the whole clinical picture, including the woman's position and hydration, the strength and frequency of contractions and maternal observations

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

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

4.3.4 Other indications for advising continuous CTG and transfer to obstetric led care can be found in [Appendix 2](#)

4.4 Information to be given to women prior to commencing CTG

- Address any concerns that the woman has about continuous CTG
- Explain that continuous CTG 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 (see table 2) there will be less certainty about the condition of the baby and so continuous fetal 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 CTG
- If continuous CTG has been used because of concerns arising from intermittent auscultation but there are no non-reassuring or abnormal features on the CTG trace after 20 minutes (see [appendix 4](#)), remove the CTG and return to intermittent auscultation

4.5 Electronic Fetal monitoring (EFM)

EFM should be recommended and is indicated for all high-risk pregnancies as per the risk assessment ([Appendix 2](#)).

- Maternal pulse should be palpated prior to any form of fetal heart rate monitoring and should be recorded in birth notes
- Prior to starting EFM the fetal heart should be auscultated with a Pinnard stethoscope to determine the difference between the fetal and maternal heart rate
- If any fetal heart rate abnormality is identified on the CTG, monitoring should be continuous
- If the EFM is of poor quality, with a concern about loss of contact, then application of a fetal scalp electrode (FSE) should be considered.
Contraindications to FSE include
 - Women with HIV or hepatitis virus

- Maternal bleeding disorders where the fetus is at risk of bleeding e.g. ITP
- Suspected or confirmed fetal bleeding disorders e.g. haemophilia
- Prematurity (< 34 weeks)
- If the fetal heart looks to be 'mirroring' the maternal heart rate a Pinnard's stethoscope should be used to determine the difference between the maternal and fetal heart rate
- Twins - trace separation mode should be considered if fetal heart rates are not obviously different

4.6 Telemetry

Where telemetry is available it should be offered to any woman who needs continuous CTG during labour.

4.7 Principles for intrapartum CTG trace interpretation

- Do not make any decision about a woman's care in labour on the basis of CTG findings alone
- 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
- Ensure that the focus of care remains on the woman and baby rather than the CTG trace
- 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 (See individual Trust labour and birth guidance)
- A CTG must not be formally reviewed from the central viewing point in isolation and must be reviewed at the woman's bedside. If a CTG looks abnormal or an opinion is requested on a CTG, a CTG review, interpretation and action plan must be undertaken in the room and documented using a sticker or electronic wizard
- Ensure that the CTG trace is of high quality, and think about other options if this is not the case (e.g. fetal scalp electrode)
- Changes of maternal position should be recorded in the labour record
- Any loss of contact should be recorded in the labour record such as change of position, or when the trace is on hold due to going to the toilet etc.
- When reviewing the CTG trace, assess and document all 4 features (current baseline fetal heartrate, baseline variability, presence or absence of decelerations, presence of accelerations). Use sticker or equivalent electronic record, see 3.9
- If there are difficulties interpreting or classifying a CTG trace, **urgent senior obstetric review must be sought.**
- Any decision about changes to a woman's care in labour when she is on a CTG monitor should also take into account the following:
 - assessment of the woman's wellbeing, behaviour and views
 - the woman's Maternal Early Warning Score (MEWS)
 - whether there is significant meconium or blood in the amniotic fluid
 - any signs of vaginal bleeding

- any medication that has been taken
- the frequency of contractions
- the stage and progress of labour
- the woman's parity
- the fetal response to scalp stimulation
- the results of fetal blood sampling if undertaken

Be aware that if the baseline fetal heart rate is within normal limits, stable in the presence of normal baseline variability and with cycling present, the risk of fetal acidosis is low

4.8 CTG Features to consider

Baseline Rate

Reassuring	110 to 160 beats/minute
Non-reassuring	100 to 109 beats/minute 161 to 180 beats/minute
Abnormal:	Below 100 beats/minute Above 180 beats/minute

Always differentiate between fetal and maternal heartbeats.

Baseline Variability

Reassuring	5 to 25 beats/minute
Non-reassuring	Less than 5 beats/minute for 30 to 50 minutes More than 25 beats/minute for 15 to 25 minutes
Abnormal:	Less than 5 beats/minute for more than 50 minutes More than 25 beats/minute for more than 25 minutes
• Sinusoidal	

- Take the following into account when assessing fetal heart rate baseline variability:
 - Baseline variability will usually be 5 to 25 beats/minute intermittent periods of reduced baseline variability are normal, especially during periods of quiescence ('sleep')

Decelerations

When describing decelerations in fetal heart rate, specify:

- Their timing in relation to the peaks of the contractions
- The duration of the individual decelerations whether or not the fetal heart rate returns to baseline
- How long they have been present for
- Whether they occur with over 50% of contractions

- The presence or absence of a biphasic (W) shape
- The presence or absence of shouldering
- The presence or absence of reduced variability within the deceleration
Describe decelerations as 'early', 'variable' or 'late'. **Do not** use the terms 'typical' and 'atypical' because they can cause confusion
- **Early decelerations** are uncommon, benign and usually associated with head compression. Early decelerations with no non-reassuring or abnormal features on the CTG trace should not prompt further action
- **Variable decelerations** are very common. They can be a normal feature in an otherwise uncomplicated labour and birth. They are usually a result of cord compression and may resolve if the woman changes position or mobilises. They are believed to occur secondary to baro-receptor stimulation.
- **Late decelerations** are decelerations that start after a contraction and often have a slow return to baseline. The longer, the later and the deeper the individual decelerations, the more likely the presence of fetal acidosis (particularly if the decelerations are accompanied by tachycardia and/or reduced baseline variability). Consider taking action sooner than 30 minutes if there is concern about fetal wellbeing unless a normal FBS has been obtained within 30 minutes. Late decelerations are indicative of a chemo-receptor response to fetal hypoxia.

Categorisation of Decelerations:

- **Reassuring:**
 - No decelerations
 - Early decelerations
 - Variable decelerations with no concerning characteristics for less than 90 minutes
- **Non-reassuring:**
 - Variable decelerations with no concerning characteristics for 90 minutes or more
 - Variable decelerations with any concerning characteristics in up to 50% of contractions for 30 minutes or more
 - Variable decelerations with any concerning characteristics in over 50% of contractions for less than 30 minutes
 - Late decelerations in over 50% of contractions for less than 30 minutes, with no maternal or fetal clinical risk factors such as vaginal bleeding or significant meconium
- **Abnormal:**
 - Variable decelerations with any concerning characteristics in over 50% of contractions for 30 minutes (or less if there are any maternal or fetal clinical risk factors)
 - Late decelerations for 30 minutes (or less if there are any maternal or fetal clinical risk factors)
 - Acute bradycardia or a single prolonged deceleration lasting 3 minutes or more

Concerning characteristics of variable decelerations:

- Lasting more than 60 seconds
- Reduced baseline variability within the deceleration
- Failure to return to baseline
- Biphasic (W) shape
- No shouldering

Accelerations

- Take the following into account when assessing accelerations in fetal heart rate:
- The presence of fetal heart rate accelerations is generally a sign that the baby is healthy
- The absence of accelerations in an otherwise normal CTG trace does not indicate acidosis

Prolonged Deceleration:

- A prolonged deceleration (lasting 5 minutes or more or for more than 3 minutes if associated with reduced variability within the deceleration) should be managed according to the 3 minute rule:
- 0-3 minutes: If a deceleration is noted for more than 3 minutes with no signs of recovery the emergency alarm must be raised to summon the on-call team
- 3-6 minutes: Attempt to diagnose the cause of the deceleration. If an accident is diagnosed the aim would be for immediate delivery as soon as safely possible in the fastest route possible (assisted vaginal delivery/Caesarean section). If an iatrogenic cause is diagnosed immediate measures must be utilised to correct the changes. This includes avoiding supine position, stopping uterine stimulants, starting IV fluids, and administering tocolytics.
- 6-9 minutes: Signs of recovery should be noted (return of variability and improvement in heart rate). If no signs of recovery are noted, preparation for immediate delivery MUST be started.
- 9-12 minutes: By this point in time the deceleration has either recovered, or preparation for an assisted vaginal delivery/caesarean section is in progress aiming for a delivery of the fetus by 12-15 minutes.

Important Note:

- Do not follow the 3-minute rule if the deceleration is preceded by reduced variability and lack of cycling. Immediate preparation should be made to expedite delivery by the safest route possible (Williams and Galemeau, 2002).
- If there is normal variability and cycling before and during the first 3 minutes of the deceleration, it is likely that 90% will recover within 6 minutes and 95% within 9 minutes, if acute accidents have been excluded.

4.9 Fresh Eyes Approach

A **Fresh Eyes** approach should be adopted. This is where another member of staff, a co-ordinator or another labour ward practitioner, will review the CTG.

As a minimum it must be done as follows:

- Every hour and when the intrapartum risk assessment in the partogram is revisited
- If there is any change in the CTG
- If there is any difference of opinion between two professionals

The fresh eyes review should be done using a structured approach (as identified in section 3.11) using a sticker ([Appendix 6](#)) or the electronic CTG assessment. NB a review of the full CTG trace must be undertaken

4.10 Review and Escalation of Concerns

- All clinicians involved in any aspect of care, even if offering an opinion on the EFM tracing should document their involvement in the labour record and on the trace or electronic record
- If there are concerns about a CTG, the co-ordinator of the labour ward and/or obstetrician should be informed, and they should then review the trace and assess it using the sticker or electronic wizard. If there are continuing concerns then an ST3 or above (or equivalent) obstetrician should be asked to attend and review the trace. Their findings should be documented in the labour records together with a clear plan of care. If the woman is on the antenatal ward or triage and is unable to be reviewed she must be transferred to the labour ward for face to face review. DO NOT remove the CTG trace and take to the labour ward for review
- If the ST3 or above (or equivalent) obstetrician is unable to review or there are concerns with the interpretation of the trace then the Labour Ward consultant or consultant on call for Obstetrics should be contacted. If neither are available, please see [Appendix 3](#) for further escalation
- **If there are any concerns regarding the interpretation and the plan of care based on the CTG trace then any clinician can contact the Labour Ward consultant or consultant on call for Obstetrics for a second opinion.** (See flow chart [Appendix 3](#))

4.11 Conservative measures

If the CTG is suspicious or pathological consider measures below:

- Encourage the woman to mobilise or adopt an alternative position (and to avoid being supine)
- Offer intravenous fluids if the woman is hypotensive, or if there is a significant risk of dehydration.
- Consider a reduce in contraction frequency by reducing or stopping oxytocin if it is being used and/or offering a tocolytic drug (subcutaneous terbutaline 0.25 mg)

4.12 Intrauterine resuscitation

- Do not use maternal facial oxygen therapy for intrauterine fetal resuscitation (it can be used for maternal indications)
- Do not offer amnioinfusion for intrauterine fetal resuscitation

4.13 Response to fetal scalp stimulation

- If the CTG is pathological, offer digital fetal scalp stimulation. The acceleration of fetal heart rate is a reassuring feature and this should be taken into account when reviewing the entire clinical picture. Thus, if scalp stimulation leads to acceleration in fetal heart rate this is reassuring and it would be normal practice only to continue with fetal blood sampling if there is not a reassuring response, or if the CTG returns to pathological, within the next 30 minutes

4.14 Fetal blood sampling

- A fetal blood sample is indicated if the trace is interpreted as pathological. It needs to be performed taking into account the whole clinical picture and ensuring the woman is fully informed
- Be aware that for women with sepsis or significant meconium, fetal blood sample results may be falsely reassuring, and always discuss with a consultant obstetrician:
 - whether fetal blood sampling is appropriate
 - any results from the procedure if carried out
- Before carrying out or repeating fetal blood sampling, start conservative measures and offer digital fetal scalp stimulation. Only continue with fetal blood sampling if the CTG trace remains pathological
- When offering fetal blood sampling, explain the following to the woman:
 - Why the test is being advised
 - The blood sample will be used to measure the level of acid in the baby's blood, to see how well the baby is coping with labour
 - The procedure will require her to have a vaginal examination using a small device similar to a speculum
 - A sample of blood will be taken from the baby's head by making a small scratch on the baby's scalp. This will heal quickly after birth, but there is a small risk of infection
 - The procedure can help to reduce the need for further, more serious interventions
 - What the different outcomes of the test may be (normal, borderline and abnormal) and the actions that will follow each result
 - There is a small chance that it will not be possible to obtain a blood sample (especially if the cervix is less than 4 cm dilated). If a sample cannot be obtained and the CTG has not improved expediting the birth with either a caesarean section or instrumental birth (forceps or ventouse) may be needed

- If a FBS cannot be obtained but there are fetal heart rate accelerations in response to the procedure, this is encouraging and in these circumstances expediting the birth may not be necessary
- Take fetal blood samples with the woman preferably in the left-lateral position
- Measure pH and Base Excess when performing fetal blood sampling
- All results should be documented in the maternal case notes or on K2

Do not to perform FBS if:

The CTG classification warrants urgent intervention (see table 2)

The clinical picture demands early delivery, e.g. fetal growth restriction + significant meconium at <3 cm dilation

During or soon after an episode of prolonged bradycardia, if the episode is preceded by a reassuring trace and base line returns to normal. Allow 15 minutes before attempting FBS

Spontaneous vaginal delivery is imminent or easy instrumental vaginal delivery is possible

Maternal infection e.g. HIV, hepatitis viruses and active herpes simplex virus, sepsis

Maternal bleeding disorders where the fetus may also be at risk of bleeding

Known or suspected fetal bleeding disorders e.g. haemophilia

Prematurity (< 34 weeks)

4.15 Classification of fetal blood sample results

Use the classification of fetal blood sample results shown in table below:

pH Value	Interpretation
≥ 7.25	Normal
7.21–7.24	Borderline
≤ 7.20	Abnormal

Interpret fetal blood sample results taking into account any previous pH measurement, the rate of progress in labour and the clinical features of the woman and baby

Inform the consultant obstetrician if any fetal blood sample result is abnormal and expedite the birth

Discuss with the consultant obstetrician if:

- a fetal blood sample cannot be obtained **or**
- a third fetal blood sample is thought to be needed

If the fetal blood sample result is normal and there are no accelerations in response to fetal scalp stimulation, offer repeat sampling no more than 1 hour later if this is still indicated by the CTG trace

If the fetal blood sample result is borderline and there are no accelerations in response to fetal scalp stimulation, offer repeat sampling no more than 30 minutes later if this is still indicated by the CTG trace. Take into account the time needed to take a fetal blood sample when planning repeat sampling

If the CTG trace remains unchanged and the fetal blood sample result is stable and normal, (that is, pH is unchanged) after a second test, further samples may be deferred unless additional non-reassuring or abnormal features are seen

4.16 When a fetal blood sample cannot be obtained

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 in light of the clinical circumstances and in discussion with the consultant obstetrician and the woman. If a fetal blood sample is indicated but a sample cannot be obtained and there is no improvement in the CTG trace, advise the woman that the birth should be expedited. This is a category 1 delivery

4.17 Monitoring in Preterm Labour

In preterm labour at 26+0 weeks gestation and over, electronic fetal monitoring should be carried out

If the gestation is less than 26 weeks the decision on whether to monitor the fetal heart in labour should be made following discussions with the parents, obstetricians and paediatricians (See Trust Guidelines for the Management of Preterm Labour)

4.18 Continuous EFM in presence of Oxytocin

- Administration of Oxytocin in labour should be in accordance with the Trust's Induction of labour guidance and necessitates continuous electronic fetal heart rate monitoring. Any concerns with the fetal heart tracing should be escalated to the Labour Ward co-ordinator and/or senior obstetrician
- If the trace is classified as pathological the infusion should be discontinued and a full assessment of the fetal condition should be undertaken by the senior obstetrician at the bed side
- A clear plan of care should be made, communicated with the woman and staff and must be documented in the maternal records

4.19 Hyperstimulation Protocol

Uterine hyperstimulation is defined as a single contraction lasting 2 minutes or more, or 5 or more contractions in a 10-minute period, associated with an abnormal CTG. Tachysystole is defined similarly but without associated CTG changes.

- Uterine hyperstimulation causing a suspicious or pathological CTG trace should be treated initially by switching off the oxytocin infusion if in use, and by tocolysis (if hyperstimulation is due to prostaglandins, spontaneous labour, or if switching off the oxytocin infusion proves insufficient)

- If hyperstimulation occurs immediately after prostaglandin administration, remove the propress or prostin gel from the vagina (May use a saline washout with a bladder syringe to attempt to remove prostin gel)
- Terbutaline 0.25 milligrams given subcutaneously is the first choice of tocolysis and is available from the main drug cupboard on the Labour Ward

4.20 Cord blood gases

- Paired cord blood gases do not need to be taken routinely. They should be taken when there has been concern about the baby either in labour or immediately following birth, e.g.
 - Category 1 and 2 emergency C-section/ instrumental vaginal delivery
 - A fetal blood sampling has been performed in labour
 - Baby born in poor condition
 - Shoulder dystocia
 - Premature delivery
- If cord blood samples are taken this should be undertaken as soon as possible following delivery and these results should be reported to the paediatrician to ensure correct treatment for the baby
- In the case of twins ensure, that the order of birth is clearly identified
- An additional clamp to facilitate double-clamping of the cord should be available at all birth settings
- If cord pH is <7.10 or base deficit >12 an adverse clinical event should be reported
- Results should be documented in maternal record and any print outs placed in an envelope and/ or filed in the maternal records

4.21 Record keeping

To ensure accurate record keeping for CTG:

Make sure that date and time clocks on the CTG monitor are set correctly
Label traces with the woman's name, date of birth and hospital number or NHS number, the date and the woman's pulse at the start of monitoring

Relevant intrapartum events (for example, vaginal examination, fetal blood sampling and siting of an epidural) should be documented on the CTG trace/ electronic trace and in the maternal records

Keep CTG traces for 25 years and, if possible, store them electronically. In cases where there is concern that the baby may experience developmental delay, photocopy CTG traces and store them indefinitely in case of possible adverse outcomes

All paper traces should be placed in an envelope and stored in the maternal records. The trace should always be returned to the notes

5 How will we know if the guideline is being used effectively?

This varies from Trust to Trust so audit against the guideline will be undertaken according to the Departmental plan.

- Audit standards will include:
 - Auscultation: appropriateness of risk assessment, frequency, timing, duration of auscultation, escalation
 - CTG: appropriateness of risk assessment, interpretation, escalation
 - Appropriateness of management of any abnormalities.

6 Definitions

The simple application of equipment does not constitute monitoring. Fetal heart rate monitoring can either be intermittent through auscultation or continuous using a CTG used for Electronic Fetal Monitoring (EFM).

Intermittent auscultation is when monitoring is undertaken using a Pinard's Stethoscope or a Doppler. It is undertaken by appropriately trained staff.

EFM is defined as a continuous recording of the fetal heart rate and contraction monitoring with periodic interpretation of that recording by appropriately trained staff in the context of the pregnancy and labour.

Significant meconium stained amniotic fluid (MSAF) is defined as dark green or black amniotic fluid that is thick or tenacious, or any meconium stained amniotic fluid containing lumps of meconium.

7 List of Abbreviations and Terms used

APH	Antepartum Haemorrhage
BMI	Body Mass Index
bpm	beats per minute
C	Centigrade
CTG	Cardiotocograph
EFM	Electronic Fetal Monitoring
FBS	Fetal Blood Sampling
FHR	Fetal Heart Rate
FSE	Fetal Scalp Electrode
HIV	Human Immunodeficiency Virus
IOL	Induction of Labour
IUD	Intrauterine Device
IUGR	Intrauterine Growth Restriction
LSCS	Lower Segment Caesarean Section
LWP	Labour Ward Practitioner
MEWS	Maternity Early Warning Score
Mg	Milligram
MHR	Maternal Heart Rate
Mins	Minutes
MLU	Midwifery Led Unit
MSAF	Meconium Stained Amniotic Fluid
NHSLA	NHS Litigation Authority
NICE	National Institute of Clinical Excellence
pH	potential of hydrogen
Secs	Seconds
VE	Vaginal Examination
%	Percentage
<	Less than
>	More than

Appendix 1 – Equality Impact Assessment

Equality Impact Assessment for Guidelines for Fetal Monitoring including Fetal Blood Sampling

For each of the Protected Characteristics & equality & diversity streams listed answer the questions below using Y to indicate yes and N to indicate no:	Age	Disability	Ethnicity / Race	Gender	Gender Reassignment	Marriage & Civil Partnership	Pregnancy & Maternity	Religion/Belief	Sexual Orientation	Human Rights	Carers	Please explain your justification
Does the practice covered have the potential to affect individuals or communities differently or disproportionately, either positively or negatively (including discrimination)?	N	N	N	Y	N	N	Y	N	N	N	N	
Is there potential for, or evidence that, the proposed practice will promote equality of opportunity for all and promote good relations with different groups?	N	N	N	Y	N	N	Y	N	N	N	N	
Is there public concern (including media, academic, voluntary or sector specific interest) in the document about actual, perceived or potential discrimination about a particular community?	N	N	N	Y	N	N	Y	N	N	N	N	
Your Name:	Your Designation:					Signed:					Date:	

To be completed by the relevant Equality Champion following satisfactory completion & discussion of answers above with author

Equality Champion:	Directorate: obstetrics and gynaecology	Signed:	Date:
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Appendix 2 - Admission and Intrapartum Risk Assessment

Carry out an initial assessment to determine if midwifery led care in any setting is suitable for the woman, irrespective of any previous plan. The assessment should comprise the following:

Assessment of the woman:

- Review of the antenatal notes (including all antenatal screening results) and discuss these with the woman.
- Ask her about the length, strength and frequency of her contractions.
- Ask her about any pain she is experiencing and discuss her options for pain relief.
- Record her pulse, blood pressure and temperature, and carry out urinalysis.
- Record if she has any vaginal loss.
 - Observations of the unborn baby:
- Ask the woman about the baby's movements in the last 24 hours.
- Palpate the woman's abdomen to determine the fundal height, the baby's lie, presentation, position, engagement of the presenting part, and frequency and duration of contractions.

Assessment of the fetus:

- Auscultate the fetal heart rate for a minimum of 1 minute immediately after a contraction. Palpate the woman's pulse to differentiate between the heartbeats of the woman and baby.

In addition:

- If there is uncertainty about whether the woman is in established labour, a vaginal examination may be helpful after a period of assessment, but is not always necessary.
- If the woman appears to be in established labour, offer a vaginal examination.
- Discuss, agree and document a management plan

The woman should be given accurate information regarding fetal monitoring to allow her to make an informed decision regarding the most appropriate method to monitor her baby. The reasons for the woman's decisions should be recorded in her notes. Any deviation from the guidelines should also be documented.

Risk status should be continually revisited and documented (see over) at least **four hourly** and at **handover of care**. The midwife must inform the Labour Ward Co-ordinator of any change in risk status

Low Risk Woman – suitable for Intermittent Auscultation

A woman who is healthy and has had an otherwise uncomplicated pregnancy (normal pregnancy)

- Gestation 37+ 0 weeks or more
- MEOWS zero on admission

Exclusion criteria:

If any of the following risk factors are present then continuous electronic fetal monitoring should be recommended. This list is not exhaustive and the full clinical findings should be considered:

Maternal problems

- Previous caesarean section or other significant uterine surgery such as myomectomy
- Pre-eclampsia (≥ 2 + proteinuria and a single systolic blood pressure of 140 mmHg or more or a diastolic blood pressure of 90 mmHg or more)
- Hypertension
 - Single systolic BP of 160 mmHg or more or a diastolic BP of 110 mmHg or more
 - OR 2 consecutive readings 30 minutes apart (between contractions) of a systolic BP of 140 mmHg or more or a diastolic BP of 90 mmHg or more
- Placenta praevia
- Post term pregnancy ($\geq 42+0$ weeks' gestation)
- Prolonged membrane rupture (greater than 24 hours unless in established labour on MLU)
- Induction of labour
- Diabetes on metformin or insulin
- Other maternal medical disease, including drug abuse
- APH (bleeding after 24 weeks gestation)
- Previous stillbirth
- BMI of 40 or above. BMI of 35 – 39.9 can have intermittent auscultation if no other risk factors.

Fetal problems

- IUGR
- Prematurity
- Oligohydramnios
- Polyhydramnios
- Abnormal umbilical cord Doppler velocimetry
- Multiple pregnancies
- Malpresentation
- History of reduced fetal movements in last 7 days, unless normal scan subsequently
- Fetal anomaly (discuss with senior obstetrician where appropriate)

Intrapartum risk factors

- Oxytocin augmentation
- Confirmed delay in the first stage of labour or delay in the second stage
- Epidural or Remifentanyl analgesia
- Vaginal bleeding in labour
- Maternal pyrexia ($\geq 38.0^{\circ}\text{C}$ once or $\geq 37.5^{\circ}\text{C}$ twice)
- Fetal heart rate less than 110bpm or greater than 160 bpm
- Suspected decelerations
- Significant meconium stained amniotic fluid (MSAF)
- Maternal tachycardia of $> 100\text{bpm}$
- Pain, not associated with contractions
- Suspected chorioamnionitis / sepsis
 - Contractions lasting > 60 secs or > 5 contractions in 10 mins

Appendix 3 - Example of Checklist for Risk Assessment for Continuous Intrapartum Monitoring

Date and Time	Admission				
Low risk					

Maternal problems					
Previous caesarean section or other significant uterine surgery such as myomectomy					
Hypertension					
Pre-eclampsia					
Placenta praevia					
Post term pregnancy (42+0 weeks gestation)					
Prolonged membrane rupture (greater than 24 hours unless in established labour on MLU)					

Induction of labour					
Diabetes on insulin/metformin					
Other maternal medical disease, including drug abuse					
APH (bleeding after 24 weeks gestation)					
Previous Stillbirth					
BMI of 40 or above					

Fetal problems					
IUGR					
Prematurity					
Oligohydramnios					
Polyhydramnios					
Abnormal umbilical cord doppler velocimetry					
Multiple pregnancies					
Malpresentation					
History of reduced fetal movements in last 7 days)					
Fetal anomaly (discuss with obstetric senior obstetrician where appropriate)					

Intrapartum risk factors					
Oxytocin augmentation or delay in labour					
Epidural or Remifentanyl anaesthesia					
Vaginal bleeding in labour					
Maternal pyrexia ($\geq 38^{\circ}\text{C}$ once or $\geq 37.5^{\circ}\text{C}$ twice)					
Fetal heart rate less than 110 bpm or greater than 160 bpm					
Suspected decelerations of fetal heart rate					
Significant Meconium stained amniotic fluid (MSAF)					
Maternal tachycardia of $> 120\text{bpm}$					
Pain, not associated with contractions					
Suspected chorioamnionitis / sepsis					
Contractions lasting > 60 secs or > 5 contractions in 10 mins					
Signature and Name					

Appendix 4 - Description of the CTG trace individual features

Description	Feature		
	Baseline (beats/minute)	Baseline Variability (beats/minute)	Decelerations
Reassuring	110-160	5 to 25	None or early Variable decelerations with no concerning characteristics* for less than 90 minutes
Non-reassuring	100-109† OR 161-180	Less than 5 for 30 to 50 minutes OR More than 25 for 15 to 25 minutes	Variable decelerations: With no concerning characteristics for 90 minutes or more OR Variable decelerations with any *concerning characteristics in up to 50% of contractions for 30 mins or more OR Variable decelerations with any *concerning characteristics in over 50% of contractions for less than 30 minutes OR Late decelerations in over 50% contractions for less than 30 minutes, with no maternal or fetal clinical risk factors such as vaginal bleeding or significant meconium
Abnormal	Below 100 OR Above 180	Less than 5 for over 50 minutes OR More than 25 for more than 25 mins OR Sinusoidal	Variable decelerations with any *concerning characteristics in over 50% of contractions for 30 minutes (or less if any maternal or fetal clinical risk factors) OR Late decelerations for 30 minutes (or less if any maternal or fetal clinical risk factors) OR Acute bradycardia, or a single prolonged deceleration lasting 3 minutes or more

* Regard the following as concerning characteristics of variable decelerations:

- Lasting more than 60 seconds
- Reduced baseline variability within the deceleration
- Failure to return to baseline
- Biphasic (W) shape
- No shouldering

† Although a baseline fetal heart rate between 100 and 109 beats/minute is a non-reassuring feature, continue usual care if there is normal baseline variability and no variable or late decelerations.

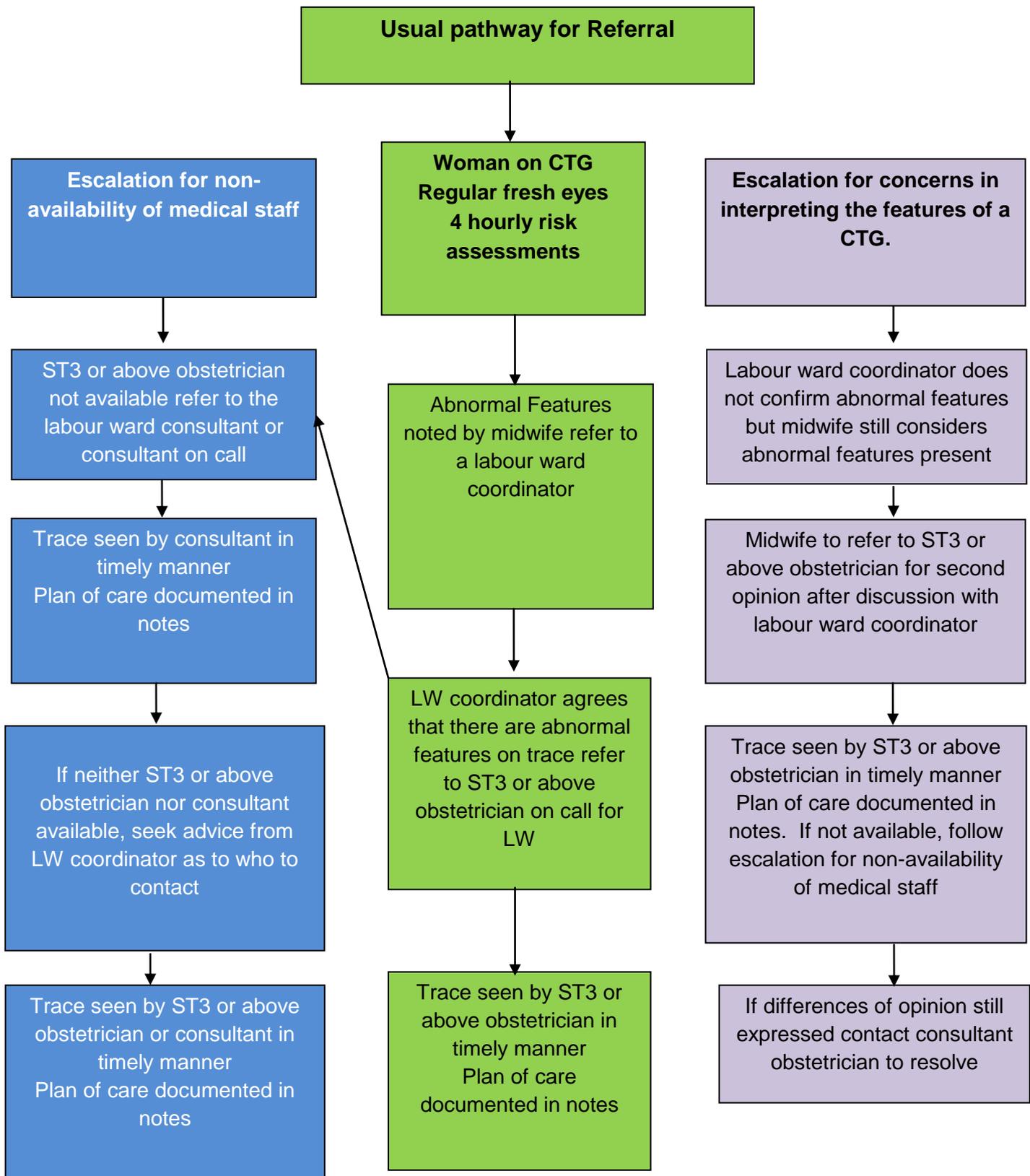
Appendix 5 - Interpretation of the CTG

Category	Definition	Management
Normal	All features are reassuring	<ul style="list-style-type: none"> Continue CTG. If CTG was started because of concerns arising from intermittent auscultation, remove CTG after 20 minutes if there are no ongoing risk factors.
Suspicious	1 non-reassuring feature AND 2 reassuring features	<ul style="list-style-type: none"> Correct any underlying causes, such as hypotension or uterine hyperstimulation. Perform a full set of maternal observations Start 1 or more conservative measures Inform coordinating midwife and obstetrician Document a plan for reviewing the whole clinical picture and the CTG findings
Pathological	1 abnormal feature OR 2 non-reassuring features	<ul style="list-style-type: none"> Obtain a review by an obstetrician and a senior midwife <ul style="list-style-type: none"> Exclude acute events (e.g. cord prolapse, suspected placental abruption or suspected uterine rupture) Correct any underlying causes, such as hypotension or uterine hyperstimulation. Start 1 or more conservative measures If the CTG is still pathological after implementing conservative measures within 15 minutes: <ul style="list-style-type: none"> Obtain a further review by an Obstetrician and a senior midwife Offer digital fetal scalp stimulation and document the outcome If the CTG is still pathological after Fetal scalp stimulation: <ul style="list-style-type: none"> Consider an FBS Consider expediting birth Take the woman's preferences into account
Need for urgent intervention	Acute bradycardia or a single prolonged deceleration persisting for 3 minutes or more	<ul style="list-style-type: none"> Urgently call Labour ward co-ordinator and obstetric help. If there has been an acute event (e.g. cord prolapse, suspected placental abruption or suspected uterine rupture, expedite birth Correct any underlying causes, such as hypotension or uterine hyperstimulation Start one or more conservative measures Make preparations for urgent birth Expedite birth if bradycardia persists for 9 minutes. If heart rate recovers before 9 minutes, reassess decision to expedite birth in discussion with woman

Appendix 6 - Intrapartum sticker example

Labour CTG	Reassuring features	Non-reassuring features	Abnormal features
Baseline rate bpm (110-160 bpm) bpm (100-109) or (161-180 bpm) bpm (Less than 100bpm or more than 181 bpm.)
Rising baseline rate even within normal limits may be of concern if other non-reassuring or abnormal features present.			
Variability	5 -25	Less than 5 bpm for 30-50 mins OR more than 25 bpm for 15 to 25 minutes	Less than 5 bpm for more than 50 mins OR more than 25 for more than 25 mins OR Sinusoidal.
Decelerations	None or early Variable decelerations with no *concerning characteristics for less than 90 minutes	Variable decelerations: With no concerning characteristics for 90 minutes or more OR With any concerning characteristics in up to 50% of contractions for 30 minutes or more OR With any concerning characteristics in over 50% of contractions for less than 30 minutes or more OR Late decelerations in over 50% of contractions for less than 30 minutes, with no maternal or fetal clinical risk factors	Variable decelerations With any concerning characteristics in over 50% contractions for 30 minutes (or less if any maternal or fetal clinical risk factors) OR Late decelerations for 30 mins. OR Acute bradycardia or single prolonged deceleration lasting 3 minutes or more.
CTG Classification	Normal – All 3 features are normal/ reassuring	Suspicious - 1 non-reassuring feature AND 2 normal/ reassuring features Suggests need for conservative measures, senior review and correct underlying causes.	Pathological - abnormal feature OR non-reassuring features Exclude acute event. Senior review, continue conservative / corrective measures AND further testing
Dilatation last VE:		Contractions: /10 mins	Liquor colour: Mat pulse:
Plan: Document below		Time:	Name & Signature:

Appendix 7 - Escalation Pathway for Abnormal CTG Trace



References and Bibliography

1. American Academy of Family Physicians (2000). Advanced Life Support in Obstetrics (ALSO) Course syllabus. Fifth edition. ALSO.
2. National Institute for Clinical Excellence (NICE) (2017 update) Intrapartum care for healthy women and babies. Clinical Guideline (CG) 190
3. NHS Litigation Authority (2013). Clinical Negligence Scheme for Trusts Maternity Clinical Risk Management Standards Version 1, 2013/14, NHSLA March 2013.
4. Practical obstetric Multi-Professional Training Course manual 2nd edition (2012). Ed Winter C, Crofts J, Lawton C, Barnfield S, Draycott T. RCOG Press London.
5. Nursing and Midwifery Council (NMC) (2009) The Code for Nurses and Midwives. Accessed online <https://www.nmc.org.uk/standards/code/>
6. American Academy of Family Physicians (2000). Advanced Life Support in Obstetrics (ALSO) Course syllabus. Fifth edition. ALSO.
7. National Institute for Clinical Excellence (NICE) (2017 update) Intrapartum care for healthy women and babies. Clinical Guideline (CG) 190
8. NHS Litigation Authority (2013). Clinical Negligence Scheme for Trusts Maternity Clinical Risk Management Standards Version 1, 2013/14, NHSLA March 2013.
9. Practical obstetric Multi-Professional Training Course manual 2nd edition (2012). Ed Winter C, Crofts J, Lawton C, Barnfield S, Draycott T. RCOG Press London.
10. Nursing and Midwifery Council (NMC) (2009) The Code for Nurses and Midwives. Accessed online <https://www.nmc.org.uk/standards/code/>