Lothian NHS Board

Lothian NHS Board
Mainpoint
102 Westport
Edinburgh
EH3 9DN
Main Switchboard: 0131 242 1000

www.nhslothian.scot

Date 29/06/2026
Your Ref
Our Ref 11427

Enquiries to Richard Mutch
Extension 35687
Direct Line 0131 465 5687
loth.freedomofinformation@nhs.scot
richard.mutch@nhs.scot

Dear

FREEDOM OF INFORMATION – LABOUR

I write in response to your request for information in relation to latent phase of labour.

Question:

- Under the Freedom of Information Act 2000, I would like to request copies of any current clinical guidelines, protocols, or care pathways used by your organisation relating to the assessment and management of **the latent phase of labour (early labour)** within maternity services. **If this is contained within general intrapartum care clinical guidelines then please send a copy of these.**

Answer:

Enclosed are our only guidelines that mention latent labour.

I hope the information provided helps with your request.

If you are unhappy with our response to your request, \you do have the right to request us to review it. Your request should be made within 40 working days of receipt of this letter, and we will reply within 20 working days of receipt. If our decision is unchanged following a review and you remain dissatisfied with this, you then have the right to make a formal complaint to the Scottish Information Commissioner within 6 months of receipt of our review response. You can do this by using the Scottish Information Commissioner's Office online appeals service at www.itspublicknowledge.info/Appeal. If you remain dissatisfied with the Commissioner's response you then have the option to appeal to the Court of Session on a point of law.

If you require a review of our decision to be carried out, please write to the FOI Reviewer at the email address at the head of this letter. The review will be undertaken by a Reviewer who was not involved in the original decision-making process.

FOI responses (subject to redaction of personal information) may appear on NHS Lothian's Freedom of Information website at: https://org.nhslothian.scot/FOI/Pages/default.aspx

Yours sincerely

ALISON MACDONALD
Executive Director, Nursing
Cc: Chief Executive
Enc.

Lothian Intrapartum Fetal Monitoring Guideline (NICE + Physiology)

1. INTRODUCTION

The object of fetal monitoring is to identify significant fetal hypoxia. This guideline encompasses intermittent auscultation and continuous electronic fetal monitoring; it has been developed from NICE guidelines [1] with additional guidance on applied fetal physiology to enhance fetal monitoring interpretation. This includes fetal physiological responses to hypoxaemia, the pathophysiological responses to hypoxaemia and the pathophysiology of underlying changes in the fetal heart rate patterns observed on the cardiotocograph (CTG) and identified on the partogram. The overall aim is to consider the on-going risk assessment and the whole clinical picture, with consideration of the fetal reserve rather than sole emphasis on the CTG alone.

Professionals and practitioners should take this guideline fully into account, alongside the individual needs, preferences and values of their patients. It is not mandatory to apply the recommendations, and the guideline does not override the responsibility to make decisions appropriate to the circumstances of the individual, in consultation with them and their families and carers or guardians.

2. FETAL MONITORING OVERVIEW

Fetal monitoring in labour includes intermittent auscultation and continuous electronic monitoring.

A woman who is healthy and has had an uncomplicated pregnancy should be offered and recommended intermittent auscultation (IA) to monitor fetal wellbeing during labour. Clinical intervention should not be offered or advised where labour is progressing normally.

Low risk women at term who present with uterine activity but are not yet in established labour must have a fetal heart rate auscultated using a handheld doppler Sonicaid. If the woman is not in established labour, the fetal heart rate is normal, and the plan is for the woman to go home to establish in labour a CTG is not required however the choice to have a CTG should be offered to the woman. For women with a long latent phase of labour (eg. >12 hours) a CTG should be performed on re-presenting. If there is a 3rd admission within 24 hours obtain a CTG. If CTG is normal return to intermittent auscultation.
Following spontaneous rupture of membranes (SRM), about six out of ten women will go into labour naturally within 24 hours. Women can be offered option of induction of labour (IOL) once space available or after 24 hours. In the presence of meconium, blood-stained liquor or signs of infection, a CTG should be performed and IOL should be prioritised.

Electronic fetal monitoring should be offered and recommended in pregnancies where there are risk factors. Labouring women should be enabled to make decisions about care including monitoring by full discussion and explanation. Every woman's right to refuse any advice must be respected. It is important to ensure informed decision making and contemporaneous documentation of all discussions including risks clearly.

All staff involved in the interpretation of fetal monitoring within NHS Lothian should have completed the Lothian mandatory training requirements.

In any situation where continuous electronic fetal monitoring is necessary and the external transducer is not consistently recording the baseline then a fetal scalp electrode should be applied.

3. INTELLIGENT INTERMITTENT AUSCULTATION

Intermittent auscultation (IA) is defined as 'the use of intermittent auscultation monitoring for the evaluation of fetal well-being in normal labour and birth' [2]. Vigilance is needed in interpreting the findings to ensure signs of hypoxia or other indicators requiring investigation are not overlooked. This practice has been termed 'intelligent intermittent auscultation' (IIA) to highlight the extension beyond simply listening for the presence of the fetal heart, to requiring an understanding of fetal physiology as well as the intrapartum hypoxic process and how this may influence the features of the FHR [3].

For women with no risk factors for fetal hypoxia, IIA is the recommended method for intrapartum fetal monitoring; this is regardless of the birth setting. IA allows the woman to move more freely and facilitate the normal physiology of labour.

Always compare fetal heart rate with previously documented heart rates/ fetal monitoring traces.

3a. Criteria for Intermittent Auscultation:

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

- 37 – 41+6 weeks gestation
- Cephalic presentation
- Normal fetal growth (symphyseal-fundal height above the 10th centile or ultrasound confirming estimated fetal weight above 10th centile, where there has not been a tail off in growth of more than 20% since the last scan (as per Lothian SGA guideline).
- No risk factors identified for fetal hypoxia following completion of a clinical risk assessment in labour
- Normal fetal movements in last 24 hrs / less than 2 or more episodes of RFM in pregnancy
- Women booked under consultant care that are deemed to be low risk for labour
- Appropriate progress in labour
- Absence of meconium, fresh PV bleeding, hypertonus (contraction lasting >2 minutes) tachysystole (contracting >4:10) or abdominal pain out with contractions
- Normal maternal observations
- Woman's choice after appropriate counselling

Do not perform an admission CTG or offer continuous CTG monitoring to women at low risk of complications in suspected or established labour.

If there is difficulty auscultating fetal heart- escalate immediately for urgent real time ultrasound to check fetal viability.

3b. Procedure for Intermittent Auscultation

Intrapartum risk assessment should be performed to assess for current and developing maternal and fetal risks factors. Confirm with the woman which method of fetal monitoring has already been advised as part of her personalised care plan.

For women with no risk factors for fetal hypoxia in normal labour, intermittent auscultation is the method of choice because of the increased level of intervention associated with electronic fetal monitoring (NICE). A partogram is important for considering fetal heart rate monitoring alongside the overall labour progress.

Initial Assessment

- An abdominal palpation should be performed to determine the optimal area for auscultation.
- Auscultate using either a pinard stethoscope or a handheld doppler – Sonicaid
    - **A CTG monitor transducer should not be used as it is possible to record the maternal pulse in the absence of the fetal heart.**
- Following abdominal palpation to ascertain the optimal position for auscultation, the strength, duration and frequency of uterine contractions must be assessed; tachysystole always requires further evaluation, even in spontaneous labour.
- Auscultate the FHR for at least one minute immediately after palpation of uterine contraction.
- Palpate maternal pulse to differentiate between the two heart rates.
- Auscultate the FHR at each further assessment.
- Document both the maternal pulse and the FHR as a single figure in the maternal records or on the partogram.
- Record the date and time fetal movements were last felt by the mother. Auscultation of the FHR at the time of FMs should reveal acceleration, demonstrating a non-hypoxic fetus.

In the first stage of labour

- Carry out intermittent auscultation immediately after a contraction for at least 1 minute, at least every 15 minutes, and record it as a single rate. Any delay may mean that the window of opportunity to hear deceleration may be missed, therefore failing to identify the first evidence of hypoxia [3].
- The maternal pulse should be palpated simultaneously to differentiate between the two heart rates and documented hourly or more frequently if any concerns [4].
- However, documentation of maternal pulse in the electronic clinical notes should be made at the initial assessment, then hourly throughout labour or more often if there are any concerns.
- Record any accelerations / decelerations heard in the maternal records
- In the event a FHR anomaly is detected, palpate the maternal pulse to differentiate between the two heart rates and document in the maternal records or on the partogram.

In the second stage of labour

- The FHR should be auscultated immediately after every contraction for one full minute and as a minimum, at least every five minutes and recorded as single rate on the partogram. Palpate the woman's pulse simultaneously to differentiate between the two heart rates and document maternal pulse in the electronic clinical notes every 15 minutes.
- If there are any concerns differentiating between the maternal and fetal heart rates seek help immediately and consider changing the method of monitoring fetal heart rate.

- Record accelerations and decelerations if heard. It is unusual to have accelerations in second stage; if present this should prompt assessment to ensure maternal heart rate is not being recorded.

3c. Management of FHR concerns with IIA / Understanding Physiology

During IIA there should be particular vigilance for a rising baseline FHR, suspected decelerations or persistent accelerations auscultated immediately following contractions.

Rising baseline: FHR baseline lowers with advancing gestational age as the autonomic nervous system matures, look back at previous FHR recordings for what is normal for each individual baby. A fetus exposed to 'gradually evolving hypoxia' (see below) will release stress hormones (catecholamines) this is reflected in a gradual rise in the FHR baseline. It is vital that this is recognised as this is an attempt by the fetus to compensate therefore action must be taken to improve the uterine environment. **The continuing catecholamine surge is energy intensive and if not identified and action taken, gradually evolving hypoxia develops into acute hypoxia**.

Accelerations: Persistent accelerations (transient fetal tachycardia) confirmed immediately following a contraction during IIA may have been preceded by a deceleration and can increase the risk of fetal acidosis [2]. In such circumstances, auscultate during the contraction to confirm presence of preceding decelerations. If confirmed, closer fetal monitoring using a CTG is recommended. If the trace is normal after 20 minutes, with no non-reassuring or abnormal features and no on-going risk factors, following review by an obstetrician, discontinue the CTG and return to IIA.

Decelerations: Evidence suggests that the type of deceleration cannot be established by using IIA. By auscultating the fetal heart after a contraction, any decelerations heard will warrant further investigation.

If there is suspicion of these features, 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. Particular vigilance for signs of evolving infection (maternal or fetal tachycardia, rising maternal temperature or a raised white cell count).
- If there is a suspicion of tachysystole (ie. more than four contractions in two consecutive 10-minute periods), a CTG should be commenced, and medical review should be sought.

If confirmed, further actions should include:

- Summoning help
- Advise continuous CTG, and explaining to the woman and her birth companion(s) why it is recommended
- Escalate to the Labour Ward coordinator and, if required, the Obstetrician
- Transferring the woman to Labour Ward (RIE), provided that it is safe and appropriate to do so.

4. CARES PEER REVIEW / Talk out Loud (TOL) Hourly / more frequently if any concerns

The principle underlying this intervention is that a maternal, fetal and staff wellbeing is assessed regularly during first and second stage of labour through discussion between the primary caring midwife and another midwife or doctor face to face. This discussion should be documented hourly using a structured proforma and should be more than a categorisation of the IIA or CTG.

CARES REVIEW	
Care of mum	Coping / mobility / hydration / nutrition / bladder care
Analgesia	Water / Entonox /morphine / epidural / effectiveness
Review	Partogram review / progress /cervical effacement and dilatation / station of the vertex / MEWS / contractions – effectiveness & frequency / liquor colour, vaginal bleeding / liquor colour / signs of chorioamnionitis
Escalation	Concerns identified / deviations from normality or original plan of care
Staff wellbeing	Break / drink / any concerns / up to date documentation / support

5. CONTINUOUS CTG MONITORING IN LABOUR

Before commencing CTG monitoring, a woman's consent should be obtained.

Women should be informed that continuous CTG is a way of continuously recording the baby's heartbeat and uterine contractions during labour. Decisions about whether to take any further action should be based on an assessment of individual factors including the findings of the CTG.

Where available and appropriate, telemetry monitoring should be offered [4]. Women should be encouraged and supported to be as mobile as possible and to change position as often as they wish. If available, offer telemetry monitoring to any woman who needs continuous CTG.

Fetal Scalp Electrode

Every effort must be made to obtain a high-quality CTG trace, so that appropriate interpretation is possible. If this is not the case other options should be explored such as the use of the fetal scalp electrode (FSE). Specific circumstances where FSE can be particularly beneficial include twins and maternal obesity. Risks to the fetus are uncommon, but can include infection or rarely, penetrating injury that could lead to osteomyelitis or intracranial injury to vascular injury.

Examples when the maternal heart rate can be misidentified as the FHR when using an FSE:

- Electrical impulses from the maternal heart rate can sometimes be transmitted to the monitor through a recently deceased fetus via the spiral FSE cable, appearing to be a fetal signal source.
- The recorded maternal heart rate (or any artefact) can be misinterpreted as a FHR (especially when over 100bpm)

Contra-indications for use of FSE

- Maternal BBV (eg. HIV, Hepatitis B, Hepatitis C)
- Fetal bleeding disorders (eg. haemophilia, maternal ITP)
- Malpresentation (eg. face or shoulder)
- Gestational age less than 34+0 weeks.

Indications for continuous CTG monitoring are in the following table:

TABLE - Indications for continuous cardiotocograph (CTG) in labour

Indications for continuous CTG from the onset of labour include the following:
Maternal risk factors

- Previous CS/ Previous stillbirth etc
- HTN – including chronic HTN, / PIH and PET
- Any vaginal blood loss other than a show
- Diabetes – type 1, type 2 and GDM (GDM on medication)
- Other maternal medical disease*
- Maternal BMI $\geq$ 40 kg/m^2

**Mild or well controlled conditions (eeg. Hypothyroidism, asthma) may not need continuous CTG, if in doubt discuss with senior obstetrician*

Fetal risk factors

- Small for gestational age (SGA) or suspected intrauterine growth retardation (IUGR) (growth below 10th centile and/or slowing growth velocity)
- Oligo/polyhydramnios (AFI <5 >20)
- Abnormal liquor and dopplers
- Reduced fetal movement – within 24h of onset of labour
- Multiple pregnancy
- Prolonged rupture of membranes over 24h before the onset of established labour
- Prematurity (below 37 weeks gestation)
- Postmaturity (over 41+6 weeks gestation)
- Recurrent antepartum haemorrhage
- Abnormal lie or presentation
- Any meconium – as this may indicate fetal compromise and may lead to meconium aspiration, consider additional fetal risk factors and offer CTG
- Blood stained liquor not associated with vaginal examination

This list is not exhaustive, if there is any doubt about method of monitoring, please discuss with a senior obstetrician.

For babies with a known fetal abnormality a plan regarding monitoring in labour should be documented by a Consultant Obstetrician.

NB. Do not offer continuous monitoring to women at low risk of complications in established labour. If the only reason or consultant-led care is not one that increases the risk of fetal acidosis in labour (eg the risk of third stage of postnatal complications), a clear management plan from a senior obstetrician regarding method of fetal monitoring should be documented.

Intrapartum indications for changing from intelligent intermittent auscultation to continuous CTG monitoring:

Abnormal maternal observations:

- Maternal pulse over 110 beats/minute on 2 occasions 30 minutes apart
- Temperature of 38^{o}C or above on a single reading, or 37.5^{o}C or above on 2 consecutive occasions 1 hour apart

Hypertension

- A single reading of either raised diastolic blood pressure of 110mmHg or more raised systolic blood pressure of 160mmHg, ideally measured between contractions
- Either raised diastolic blood pressure of 90mmHg or more or raised systolic blood pressure 140mmHg or more on 2 consecutive readings taken 30 minutes apart
- A reading of 2+ protein on urinalysis and a single reading of either raised systolic blood pressure (140mmHg or more) or raised diastolic blood pressure (90mmHg or more)

Suspected sepsis or suspected chorioamnionitis (with or without abnormal maternal observations)

Pain reported by the woman that differs from pain normally associated with contractions

Uterine activity: Ideally there should be a 60-90 second gap with good resting tone in between contractions to help uterus and fetus recover from contraction.

- Hypertonus (tonic contractions lasting longer than 120 seconds)
- Tachysystole (greater than 4 contractions in 10 minutes)

Oxytocin use

Use of regional analgesia (ie. epidural / remifentanil / PCA)

Confirmed delay in the first or second stage of labour

Fetal heart rate (FHR) abnormality confirmed during intermittent auscultation or identified on the partogram

- Decelerations audible immediately following a contraction
- Acceleration audible immediately following a contraction
- Rising baseline (consider gradually evolving hypoxia) – (refer to relevant pages)

5. CTG FEATURES AND INTERPRETATION

Interpretation of CTG patterns involves consideration of individual features of FHR pattern in the wider context of the whole CTG and the clinical picture. The following table describes the individual features of a CTG trace with a description of their applied physiology. Colours are indicated according to NICE classification eg. **amber** (previously 'non-reassuring') and **red** (previously 'abnormal')

Term & Definition with applied physiology
CONTRACTIONS - recorded as bell-shaped gradual increases in the uterine activity signal followed by roughly symmetrical decreases. Contractions are the main source of fetal hypoxic stress during labour, due to interruption of gas exchange in the placental unit. The intensity and duration of contractions should be assessed by manual palpation. A minimum of 60 seconds resting tone between contractions is needed for adequate placental gas exchange and therefore fetal recovery from the hypoxic stress of contractions. Remember Oxytocin increases the frequency of contractions and the baseline tone; use it sparingly. **Tachysystole**: more than four contractions in 10 minutes in two successive 10-minute periods without abnormalities of the FHR pattern. **Hyperstimulation**: more than four contractions in 10 minutes in two successive 10-mint periods with abnormalities of the FHR pattern [3]. **Hypertonus** is defined as a prolonged, tonic contraction for 120 seconds or more. **Tachysystole and hyperstimulation may occasionally be seen in spontaneous labour without the use of uterine stimulants and should still be treated proactively**
BASELINE RATE - the mean fetal heart rate excluding accelerations, decelerations and periods of marked FHR variability. The baseline must be stable for a minimum of 2 minutes in a 10-minute segment, otherwise the baseline is described as indeterminate. Baseline rate is the result of agreement reached between sympathetic and parasympathetic systems. • **Normal baseline:** 110 – 160bpm. Preterm fetuses will have values towards the upper end of this range and post term fetus towards the lower end. It is unusual to have baseline >150bpm at term; if present this should prompt clinical review and consideration of continuous CTG and fetal fitness for labour. • Indeterminate baseline: stable baseline cannot be identified. • Rising baseline: increase in baseline fetal heart rate of 20bpm of more could suggest signs of developing hypoxia/ infection. • **Tachycardia:** baseline >160bpm for >10 minutes. Causes include fetal infection, maternal pyrexia, fetal hypoxia, drug effects (eg. salbutamol), fetal arrhythmia. If there is a fetal tachycardia (>160bpm) with no other concerning features the underlying pathology is unlikely to be gradually evolving hypoxia and obstetric review should be obtained. Chronic hypoxia and sepsis should be considered. • **Bradycardia:** baseline <110bpm > 10 minutes. Causes: maternal hypothermia, beta-blockers, fetal arrhythmias such as atrioventricular block. 100-109 bpm; could potentially be normal in post term pregnancies especially if this has been stable throughout laobur in absence of other concerns. Under 100bpm is abnormal and should prompt urgent review.
Variability - oscillations of the FHR above and below the baseline in a one-minute segment of the trace, expressed in bpm. • **Normal variability:** 5-25 bpm

- **Reduced variability:** <5 bpm for more than 50 minutes or for more than 3 minutes during decelerations. Causes include cerebral hypoxia (usually preceded by a loss of accelerations, decelerations and a rise in baseline), previous cerebral infarction, infection and drugs such as diamorphine. A reduction in variability preceded by other fetal heart rate changes (eg. progressive gradually evolving hypoxia) especially rise in baseline fetal heart rate is a strong indicator for fetal compromise – should result in earlier escalation and review – do not wait 50 mins to act on abnormal variability.
- **Increased variability / saltatory pattern:** >25bpm for more than 10 minutes. May be associated with rapidly evolving hypoxia.
- **Sinusoidal pattern:** a regular, smooth, undulating signal, resembling a sine wave, with an amplitude of 5-15 bpm and a frequency of 3-5 cycles per minute. This pattern lasts more than 30 minutes and coincides with absent accelerations.

The pathophysiological basis of the sinusoidal pattern is not well understood, but it occurs in associated with severe fetal anaemia, fetal-maternal haemorrhage, TTTS and ruptured vasa praevia. It has also been described in cases of acute fetal hypoxia, infection, cardiac malformations, hydrocephalus and gastroschisis.

- **Pseudo-sinusoidal pattern:** a pattern resembling the sinusoidal pattern but with a more jagged 'saw-tooth' appearance. It's duration seldom exceeds 30 minutes, and it is characterised by normal CTG before and after. Causes include analgesia administration to mother, fetal sucking movement, fetal hypotension occurring secondary to acute fetomaternal haemorrhage and conditions such as ruptured vasa praevia.

If there is a stable baseline rate and normal variability, the risk of hypoxia is low.

Acceleration

Transient increase in FHR above the baseline of greater than 15bpm for 15 seconds or more, attributed to the integrity of the somatic nervous system and generally a sign of a health fetus. The absence of accelerations in an otherwise normal intrapartum CTG is of uncertain significance, but it is unlikely to indicate hypoxia or acidosis.

Accelerations coinciding with uterine contractions, especially in the second stage of labour, suggest possible erroneous recording of the maternal heart rate, since the FHR more frequently decelerates with a contraction, while the maternal heart rate typically increases. The frequency of accelerations are likely to reduce or even become absent as labour progresses. Loss of accelerations alone does not indicate fetal hypoxia.

Deceleration

This is a decrease in the FHR below the baseline of more than 15bpm for more than 15 seconds. A decrease of 10bpm in a trace with reduced variability should be considered significant.

Early decelerations: decelerations that are shallow, short-lasting, with normal variability within the deceleration and are coincident with contractions. They are believed to be caused by fetal head compression and do not indicate fetal hypoxia or acidosis.

Variable decelerations (V-shaped, baroreceptor mediated): decelerations that exhibit a rapid drop (onset to nadir in less than 30 seconds), good variability within the deceleration, rapid recovery to the baseline, varying size, shape and relationship to uterine contractions. These constitute the majority of decelerations during labour and they translate a baroreceptor-mediated response to increased arterial pressure, as occurs with umbilical cord compression. They are seldom associated with an important degree of fetal hypoxia / acidosis.

Late decelerations (U-shaped and/or with reduced variability, chemoreceptor mediated): decelerations with gradual onset and/or a gradual return to baseline and/or reduced variability within the deceleration. Gradual onset and return occur when more than 30 seconds lapses between the beginning/end of a deceleration and its nadir. These decelerations are indicative of a chemoreceptor-mediated response to fetal

hypoxaemia. In the presence of a tracing with no accelerations and reduced variability, the definition of late decelerations also includes shallow decelerations (those with an amplitude of 10-15bpm).

The longer and later the individual decelerations, the higher the risk of fetal compromise (particularly if the decelerations are accompanied by rise in baseline, a tachycardia or reduced or increased variability(saltatory)

Prolonged decelerations lasting more than 3 minutes. These are likely to include a chemoreceptor-mediated component and thus to indicate hypoxaemia. Decelerations exceeding 5 minutes, with FHR maintained at less than 80bpm and reduced variability within the deceleration are frequently associated with acute fetal hypoxia / acidosis and require immediate intervention.

Cycling - This refers to alteration between different fetal behavioural states:

Fetal quiescence reflecting deep sleep (no eye movements): Deep sleep can last up to 50 minutes and is associated with a stable baseline, very rare accelerations, and borderline variability

Active sleep (rapid eye movements): This is the most frequent behavioural state and is represented by a moderate number of accelerations and normal variability.

Wakefulness: Active wakefulness is less common and represented by a large number of accelerations and normal variability. In this pattern, accelerations may be so frequent as to cause difficulties in baseline estimation (confluence of accelerations).

This alternation of different behavioural states is called **cycling**. Cycling is a hallmark of fetal neurological responsiveness and absence of hypoxia/acidosis. Transitions between the different patterns become clearer after 32−34 weeks of gestation, consequent to fetal nervous system maturation.

6. PHYSIOLOGY OF FETAL HYPOXIA IN LABOUR

Contractions are the main source of intrapartum hypoxic stress for the fetus. Gas exchange in placenta is impaired during a contraction when blood flow into the intervillous space is interrupted, causing retention of CO_2 and lowering the pH of the fetal blood. The frequency, duration and strength of contractions must be considered when interpreting the CTG.

All fetuses will experience stress during labour and will have to undertake episodes of anaerobic metabolism (the production of energy without oxygen). Every fetus will have their own unique physiological reserve, which may be modified by a combination of both antenatal and intrapartum risk factors.

Fetal reserves may be compromised if:

- The retro placental pool is reduced (growth restriction with placental insufficiency, diabetes, placental damage due to abruption or smoking)
- The fetal metabolic rate is increased (maternal pyrexia and sepsis)
- More ‘episodic’ anaerobic metabolism is required than normal, for example with increased contraction frequency or strength, increased baseline tone, longer labour during IOL or augmentation of labour.

During labour the fetus employs various adaptive mechanisms in response to hypoxia, these generally follow a similar pathway as the physiological response to exercise.

Chronic Hypoxia presents as a baseline rate usually (but not always) at the upper end of the normal range, with reduced variability and blunted responses (infrequent accelerations and lack of cycling). It is frequently associated with shallow decelerations. This may be due to placental insufficiency and there may be associated intrauterine growth restriction. This represents a fetus with reduced reserve and increased susceptibility to hypoxic injury during labour. Careful consideration should be given when planning interventions potentially increasing the risk of hypoxia, with a low threshold for surgical intervention. **Concerns about chronic hypoxia should be discussed with the MW in charge and Senior obstetrician/ obstetric consultant or ST6-7 and the anaesthetist and anaesthetist on call**. **Consider direct transfer to theatre for delivery.**

Antenatal fetal monitoring is normal / abnormal. All abnormal monitoring should be escalated, and serious consideration should be given to assess suitability for induction/ labour and type and frequency of monitoring. See Antenatal Fetal monitoring guideline.

Gradually Evolving Hypoxia is the most common type of hypoxia in labour. During this process, the fetus undergoes the same changes that an adult would normally be expected to show during exercise and is reflected in some characteristic FHR pattern changes.

- **Compensated hypoxia (no/low hypoxia)** includes evidence of hypoxic stress (decelerations) followed by loss of accelerations and lack of cycling. An exaggerated compensatory response to hypoxic stress can present as decelerations become wider and deeper. Finally attempted redistribution to perfuse vital organs facilitated by catecholamines can be seen with a rise in baseline.
- **Decompensated hypoxia (potentially significant signs of hypoxia)** evolves with further redistribution with vasoconstriction affecting the brain (reduced baseline variability). Terminal heart failure (unstable/ progressive decline in the baseline - “step ladder pattern to death”) **pH drops 0.01 every 20-30 minutes.**

Subacute Hypoxia presents on the CTG by the fetus spending most of the time in decelerations. This is almost invariably caused by uterine hyperstimulation. **pH drops 0.01 every 2-3 minutes.**

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. **pH drops 0.01 every 1 minute.**

The principles of management are optimising fetal wellbeing and uterine environment by either reducing or eliminating hypoxic stress. This is done by optimising uteroplacental perfusion and reducing the strength or frequency of uterine contractions to allow adequate time for fetal resuscitation during uterine quiescence. These can be achieved by:

- Avoiding the supine position
- Correcting dehydration
- Stopping uterotonic medication and restarting as required and safe to do so.
- Administering tocolytics (see below) if hyperstimulation persists despite previous measures
- Expediting delivery if evidence of hypoxia persists despite tocolysis

There are three irreversible causes of acute hypoxia (ie. fetal bradycardia) that if identified should prompt immediate delivery: cord prolapse, uterine rupture and placental abruption. After excluding these three causes by clinical assessment, the **'rule of 3'** should be employed:

- (up to) 3 minutes – call for help
- 6 minutes – move to theatre if not deliverable in the room
- 9 minutes – prepare for assisted delivery if cervix fully dilated OR category 1 caesarean section
- 12 minutes – aim to deliver the baby

Where the CTG was normal prior to the deceleration and variability is preserved in the first two minutes of the deceleration, >95% of decelerations will recover to baseline and counselling for the parents should acknowledge this.

A fetal tachycardia is likely to develop after a significant deceleration and if the precipitating cause has been corrected (ie. uterine hypertonicity or maternal hypotension) then this should be expected to resolve within 30-60 minutes.

NB; The pH of the fetus has been shown to drop at the rate of 0.01 every minute (RCOG). The 3-minute rule does NOT apply if there were CTG concerns prior to bradycardia, reduced variability during the bradycardia or if intrapartum accidents are apparent. Management should be immediate delivery by the safest / quickest route.

6a. Underlying causes and conservative measures

Clinicians should be aware of possible underlying causes for fetal hypoxia and should start 1 or more of the following conservative measures base on an assessment of the most likely cause(s).

- **Maternal position** (as this can affect uterine blood flow and cord compression), encourage woman to mobilise, to adopt an alternative position, and to avoid being supine
- **Hypotension**: do not offer IV fluids to treat FHR abnormalities unless the woman is hypotensive or has signs of sepsis. If the woman is hypotensive secondary to an epidural top-up, start IV fluids, move her to left lateral and call an anaesthetist to review.
- **Excessive contraction frequency:** reduce contraction frequency by reducing or stopping oxytocin (if used) and consider offering tocolytic drug (see below).

6b. Tocolysis

Single dose 250 micrograms terbutaline subcutaneous injection is recommended where tocolysis is indicated. A second dose can be considered after a minimum of 15 minutes however, it would be preferable to wait 30 minutes, if possible, to lessen maternal side effects (eg. arrhythmias, palpitations, headache or nausea). Women should be told they can expect to be aware of their heart beating faster following terbutaline administration and verbal consent should be obtained to proceed.

Cautions: maternal tachycardia, maternal thyrotoxicosis, diabetes, hypokalaemia, cardiovascular disease.

Contraindications: placental abruption, placenta praevia, antepartum haemorrhage, severe pre-eclampsia / eclampsia, IUD, intra-uterine infection, hypersensitivity to sympathomimetic amines eg. ephedrine.

The following table summarises how CTG features change in response to varying degrees of hypoxia.

6c. CTG Interpretation with Applied Physiology

All CTGs should be defined and documented as normal, suspicious or pathological based on the individual features of the CTG according to classification from NICE guidance.

This guideline recommends consideration of applied physiology using when reviewing CTG traces and an additional comment on the stage of hypoxia when documenting CTG reviews ***(eg. 'Overall normal with no features of hypoxia', or 'overall suspicious with signs of compensated gradually evolving hypoxia').***

Clinicians are also encouraged to consider by how much a fetal pH may have reduced based on the duration spent in any categories of hypoxia (eg. 90 minutes of CTG with features of compensated gradually evolving hypoxia would be in-keeping with drop of pH 0.03-0.04 and 20 minutes of sub-acute hypoxia may equate to drop of pH 0.1).

The following table demonstrates how NICE and Physiological CTG guidance fits in with the mnemonic 'Dr C BraVADO' which is recommended as a systematic approach to assessing individual features of a CTG trace.

Fetal scalp stimulation (either digital during VE or with application of FSE) can be a useful adjunct to assessment of fetal wellbeing. Fetal scalp stimulation that results in fetal heart rate acceleration and reactive response is a reassuring sign and is unlikely to be associated with fetal hypoxia.

6d. Fetal Blood Sampling
NICE is unable to make a recommendation about fetal blood sampling because of limited evidence. In NHS Lothian, fetal blood sampling is available and could be used at the discretion of the supervising Consultant if considered to be important for decision making.
However, where there is a good understanding of the physiology behind the CTG and FHR pattern, it is not necessary to carry out FBS as this is unlikely to change management.

It should not be used in failure to progress/ chorioamnionitis/ meconium-stained liquor/ significant risk factors for fetal compromise (IUGR/PET/ subacute/ acute hypoxia).

A Cochrane systematic review in 2013 demonstrated no available evidence of a correlation between fetal scalp pH and improvement in long term outcomes.
More recent reviews also demonstrated that contrary to a past position, there is a suggestion that FBS may increase the number of CS and instrumental births. Evidence has also shown rare, but potentially serious fetal complications. The Physiological CTG guideline do not recommend the use of FBS as an adjunct technique for the assessment of fetal wellbeing.
FBS may be associated with fetal injury, delay in indicated delivery due to time taken to obtain result and results may be contaminated or unreliable in the context of chorioamnionitis and meconium.

Other Contraindications to FBS

- Maternal infection (eg. HIV, hepatitis, HSV) or suspected chorioamnionitis
- Active / ongoing APH
- Fetal bleeding disorders (eg. haemophilia)
- Prematurity (< 34 weeks)
- Face presentation

- Where there is clear evidence of acute fetal compromise (eg. prolonged deceleration greater than 3 minutes), urgent preparations to expedite birth should be made
- If the whole clinical picture indicates that the birth should be expedited
- Relative contraindication: previous caesarean section

pH	Interpretation	Action
$\geq$ 7.25	Normal	Repeat sample no more than 60 minutes later if still indicated by the CTG trace, or sooner if there are further abnormalities.
7.21 – 7.24	Borderline (pre-acidotic range)	If the FBS is borderline and there are no accelerations in response to fetal scalp stimulation, consider taking a second FBS no more than 30 minutes later if this is still indicated by the CTG.
$\leq$ 7.20	Abnormal (acidotic range)	Inform ST6/7 or Consultant. Expedite birth, urgent delivery within 30 minutes is recommended.

If FBS is attempted and a sample cannot be obtained, but the associated fetal scalp stimulation results in fetal heart rate acceleration and reactive response, a decision should be made whether to continue the labour or expedite the birth in light of the clinical circumstances and in discussion with the woman and a senior obstetrician.

Hypoxia Type	Key Features	Pathophysiology	Management
No Hypoxia	• Baseline appropriate for GA • Normal variability and cycling • No repetitive decelerations		• Consider whether the CTG needs to continue • If continuing CTG, hourly review
Evidence of Hypoxia			
Chronic **Antenatal**	a. Baseline rate at the upper end of normal b. Reduced variability and absence of cycling c. Usually shallow, chemoreceptor decelerations	a. Catecholamine release b. Vasoconstriction-fetal central nervous system (CNS) compromise c. Acidosis secondary to placental insufficiency	• Avoid further stress • If classified as abnormal antenatal CTG, likely needs delivery – should be discussed with LW coordinator, ST6/7 or Consultant Obstetrician. • Expedite delivery, if delivery not imminent
Gradually evolving hypoxia **Intrapartum** *Most common type of hypoxia. Develops over hours.* *Stages c-f may be reversible although prolonged episodes of hypoxia can lead to fetal organ damage.*	**Fetal Compensated** a. Stable baseline b. Normal variability c. Variable decelerations d. Accelerations disappear e. Rise in FHR **pH drops 0.01 every 20-30 minutes**	a. Adequate oxygenation to CNS b. Adequate oxygenation to myocardium c. Baroreceptor mediated decelerations secondary to cord compression d. Conservation of energy e. Catecholamine release to redistribute blood flow to perfuse vital organs	• a-e If intermittent auscultation is being performed and rising baseline is identified, continuous monitoring is recommended • Likely to respond to conservative measures • Regular review every 30-60 mines to assess for signs of further hypoxic change, and that the intervention resulted in improvement. • Other causes eg. reduced placental reserve MUST be considered and addressed accordingly. Refer to management of **suspicious** CTG unless features meet **pathological** classification.
	Fetal Decompensation f. Changes to variability g. Unstable baseline h. Progressive drop in FHR or bradycardia	f. Vasoconstriction-redistribution of blood flow to myocardium-CNS compromised g. Oxygenation to myocardium affected h. Pre-terminal or terminal heart failure	• Needs urgent intervention to reverse the hypoxic insult (remove prostaglandin pessary, stop oxytocin infusion, tocolysis) f-h Refer to management of **pathological** CTG
Sub-Acute hypoxia **Intrapartum**	a. More time spent decelerating than at the baseline b. May be associated with saltatory pattern Common cause – hyperstimulation **pH drops 0.01 every 2-3 minutes**	Retroplacental pool lacking regeneration between contractions thus increase the need for the fetus to perform anaerobic metabolism. Decelerations invariably present with presence of concerning characteristics.	**First stage** • Remove prostaglandins / stop oxytocin infusion • If no improvement, needs urgent tocolysis • If still no improvement within 10-15 minutes, review situation and expedite delivery Refer to management of **pathological** CTG
			Second stage • Stop maternal active pushing during contractions until improvement is noted. • If no improvement is noted, consider tocolysis if delivery is not imminent or expedite birth by operative vaginal delivery. Refer to management of **pathological** CTG
Acute hypoxia **Intrapartum**	Sudden FHR bradycardia or a single prolonged deceleration lasting 3 minutes or more **pH drops 0.01 every 1 minute**	**a. Intrapartum accidents** • Cord prolapse • Placental abruption • Uterine rupture **b. Iatrogenic** • Maternal hypotension • Hyperstimulation / hypertonus • Prolonged cord compression	**Preceded by reduced variability and lack of cycling or reduced variability within the first 3 minutes** Immediate delivery by the safest and quickest route
			Preceded by normal variability and cycling and normal variability during the first 3 minutes of the deceleration • Exclude the 3 intrapartum accidents • Correct reversible causes • If no improvement by 9 minutes or any of the accidents diagnosed, immediate delivery by the safest and quickest route. Refer to management of **pathological** CTG.

	NICE			PHYSIOLOGICAL CTG				
	Reassuring	**Non-reassuring**	**Abnormal**	**No hypoxia**	**Chronichypoxia**	**Gradually evolving hypoxia (GEH)**	**Subacute hypoxia**	**Acute hypoxia**
Contractions	< 5:10	>4:10, Hypertonus	>4:10			**Compensated** / **Decompensated**		
Baseline rate	110 – 160bpm	• Increase in baseline >20bpm from start of labour • Indeterminate baseline • 100 – 109bpm	• < 100bpm • > 160bpm • Increase in baseline by 20bpm or more in active second stage	110 – 150bpm Appropriate for gestation	Higher than expected for GA	Rise in baseline / Unstable 'wandering' or rising baseline or progressive decline >160bpm for 10 mins		
Variability	Normal 5-25bpm	• Reduced <5bpm for 30 -50 min • >25bpm for <10 mins may represent worsening fetal condition, especially if assoc. with other signs of fetal compromise	• <5bpm for > 50 min • >25bpm for > 10 min • <3bpm (ie. absent variability) • Sinusoidal for > 10 min	Normal 5-25bpm with cycling present	<5bpm for >50 min and / or absence of cycling Sinusoidal	No cycling / Reduced <5bpm in association with any other abnormality	Saltatory >25bpm	
Accelerations	• Abrupt increase in FHR >15bpm above baseline for 15s. • Accelerations even with reduced variability is usually a sign of fetal wellbeing. • Absence in otherwise normal CTG is of uncertain significance.				Abrupt increase in FHR >15bpm above baseline for 15s Absence in otherwise normal CTG is of uncertain significance.			
Decelerations (examples of concerning features: >60secs; drop in 60 beats from baseline/ dropping to 60bpm; reduced variability during deceleration, Overshoot)	**None or early** **Variable** - With no concerning characteristics	**Repetitive decelerations** • with any concerning characteristics <30 min **Repetitive late decelerations** • <30 min no maternal or fetal clinical risk factors such (PV bleeding or meconium)	**Variable w**ith concerning characteristics for 30 minutes (or less if risk factor eg. PV bleeding / meconium) **Late** for 30 minutes (or less if any clinical risk factors eg IUGR/PV bleed / meconium/ chorioamnionitis), especially if associated with other signs of fetal compromise **Acute bradycardia**	No repetitive decelerations	Shallow or unprovoked decelerations	Early or variable decelerations present (hypoxic stress) / Decelerations become deeper and wider (exaggerated response to hypoxic stress).	Repetitive decelerations with more time spent during deceleration than at the baseline. Many be associated with saltatory pattern (increased variability)	Prolonged >3min
Overall Impression	**NORMAL** All 4 features are white	**SUSPICIOUS** • 1 feature is amber **AND** • 3 white features	**PATHOLOGICAL** • 1 red feature **OR** • 2 or more features amber	**No hypoxia**	**Chronic hypoxia**	**Compensated GEH** / **Decompensated GEH**	**Subacute hypoxia**	**Acute hypoxia**
Plan	No intervention	• Review SBAR and cosider scalp stimulation • Assess for new risk factors • Correct underlying cause (eg. hypotension, dehydration, hyperstimulation) • Reduce contraction frequency & strength by stopping oxytocin infusion +/- tocolysis	• Exclude acute events • Correct underlying cause • Consider expediting birth if no improvement.	No intervention	Manage as for abnormal antenatal CTG **Prepare for urgent delivery as soon as possible**	Optimise contractions and reduce oxytocin infusion +/- tocolysis +/- if tachysystole. / Take urgent action to reduce hypoxic stress and improve fetal oxygenation. Stop PGE_2 / oxytocin / stop active pushing unless spontaneous delivery imminent / change position +/- tocolysis. **Expedite birth if no improvements**	Take urgent action to reduce hypoxic stress and improve fetal oxygenation. Stop PGE_2 / oxytocin / stop active pushing unless spontaneous delivery imminent / change position +/- administer tocolysis. If still no evidence of improvement **Prepare for urgent delivery as soon as possible**	3-minute rule (ie. management of fetal bradycardia). If no improvement **Prepare for urgent delivery as soon as possible**
Escalation SBAR: maternal and fetal risks, partogram, labour progress.	Nil	*** **Please consider other intrapartum risk factors which may require earlier intervention**** If no improvement escalate to • Charge midwife • Medical staff (ST3+)	Escalate to charge midwife immediately. If no improvement, escalate to medical staff (ST3+)	Nil	Escalate to Charge midwife or medical staff (ST3+) immediately.	If ongoing discuss with Charge midwife at and medical staff / If ongoing discuss with Charge midwife and medical staff (ST3+)	Escalate to charge midwife Escalate to medical staff (ST3+) at if no improvment.	Escalate to charge midwife and medical staff (ST3+) immediately.

Any uncertainty regarding fetal monitoring should be discussed with the colleagues – TEACH / TREAT ASSESS WHOLE CLINICAL SITUATION – NOT JUST FETAL MONITORING for decision making.
During clinical assessment and escalation, talk to women and birthing partner and take their concerns into account.

7. DOCUMENTATION OF CTG INTERPRETATION

7a. Fresh eyes 'Buddy review' and CARES review

Intrapartum CTGs should be assessed at least hourly face to face during the first and second stage of labour through discussion between the primary caring midwife and another midwife or doctor. This joint review should be documented in the electronic progress notes and a (purple / yellow) sticker should be completed and added to the paper CTG.

Alongside the hourly assessment of fetal wellbeing via a buddy review of the CTG, an hourly assessment of the overall clinical picture should be undertaken by the primary caring midwife and another midwife or doctor – this is a CARES review. The principle underlying this intervention is that maternal, fetal and staff wellbeing is assessed regularly during first and second stage of labour through discussion between the primary caring midwife and another midwife or doctor. This discussion should be documented using a structured proforma and should be more than a categorisation of the CTG (or IA). Midwives may choose to discuss CARES review with colleagues outside of the birthing room to minimise disruption to the birthing environment.

NB. ONLY Obstetrician ST3+ can independently review a CTG. ST1 and ST2 doctors should request a senior medical opinion to verify their interpretation and promote development of CTG interpretation skill.

CARES REVIEW	
Care of mum	Coping / mobility / hydration / nutrition / bladder care
Analgesia	Water / Entonox / Morphine / epidural / effectiveness
Review	Partogram review / MEWS/ Progress – effacement/station/dilation and descent, liquor colour/ contractions – effectiveness, frequency and strength / Classification of CTG - rise in baseline/ additional risk factors such as oxytocin, epidural, vaginal bleeding / liquor colour / signs of chorioamnionitis
Escalation	Concerns identified / deviations from normality or original plan of care
Staff wellbeing	Break / drink / any concerns / up to date documentation / support

7b. Special Circumstances

Do not make any decision about a woman's care in labour based on CTG findings alone. Take into account any antenatal and intrapartum risk factors, the current wellbeing of the woman and the fetus and the progress of labour when interpreting the CTG trace. Look at the CTG from the beginning and also review previous CTGs, to ascertain the usual features such as baseline rate.

Persistently suspicious CTG: Currently there is no set guidance regarding management of persistently suspicious CTGs if there is no improvement following conservative measures. However, If the **ONLY** feature causing the CTG to classify as suspicious is the presence of variable decelerations without any concerning characteristics, with no maternal/fetal clinical risk factors, normal variability and no rise in baseline evident, this should provide reassurance that the fetus is coping with the hypoxic stress. In such cases the CTG should continue to be observed closely and reviewed regularly by the obstetrician and individualised plan made. Escalation should occur immediately if additional non-reassuring features are identified. Application of fetal physiology is beneficial in such situations and provided the above conditions are met, it may not be necessary to perform fetal blood sampling. If there is a stable

baseline and baseline rate between 110-160bpm with normal variability, continue usual care as the risk of fetal acidosis is low.

Maternal pyrexia: Fetal temperature is 0.3-0.5°C higher than maternal temperature. If there is pyrexia, the metabolic demands of the fetal tissues are increased and so the risk of hypoxia is elevated. There is evidence of a synergistic effect of infection and hypoxia, increasing the risks of perinatal brain injury and cerebral palsy. This should be considered especially when using oxytocin; a prolonged labour should be avoided. Do not offer intravenous fluids to treat fetal heart rate abnormalities unless the woman is hypotensive or has signs of sepsis as this can lead to delayed intervention/ hyponatremia.

Suspected chorioamnionitis: It must be remembered that CTG monitoring is a test for fetal hypoxia and that the role of CTG in chorioamnionitis is less clear. There is a lack of evidence that specific features on the CTG trace can identify cases of clinical or subclinical chorioamnionitis. If fetal tachycardia and reduced variability are seen without preceding or on-going decelerations, then consideration should be given to infection as the primary case. This is because fetal tachycardia will be almost always preceded by decelerations in cases of intrapartum hypoxia. Where chorioamnionitis is suspected there is no place for FBS (which is intended as a test of fetal hypoxia) and this investigation should **not** be used.

Meconium: Meconium-stained liquor (MSL) can be present in a normal post term fetus without an indication that the baby has experienced hypoxia. Clear liquor has antibacterial properties, however in the presence of meconium these properties are reduced. Risks of meconium-stained liquor include chorioamnionitis and meconium aspiration syndrome (MAS). Any developing hypoxia increases the risk of fetal gasping in utero and this increases the risk of MAS. CTG monitoring should be considered in labours complicated by MSL because of its association with hypoxia and infection. Fetal tachycardia (≥160 bpm), in the presence of MSL has a relative risk of 51 for the development of chorioamnionitis, in comparison to clear liquor. MSL does not alter the way CTG should be interpreted and if FHR monitoring is normal and labour is progressing appropriately, then no specific action is required. With thick meconium and possible infection, a care review of labour progress is prudent with delivery considered if the interval until spontaneous delivery is likely to take many hours.

Prematurity: Fetuses under 32 weeks are neurologically immature therefore they may exhibit blunted responses eg. accelerations or decelerations only 10bpm from the baseline. They may also have lower reserves therefore changes may occur more rapidly. This should be considered when reviewing the trace overall and care planning should be individualised.

In theatres: Prior to emergency delivery the FHR should be continually recorded during and after the regional anaesthesia is sited. This is especially important if the delivery is being performed for fetal indication (e.g. for abnormal FHR). It is the responsibility of the midwife and obstetrician to ensure that the FHR is being adequately recorded in theatre and archived on K2 Guardian. If there are concerns about adequate monitoring the theatre team should be notified in case a change of position or interruption to the anaesthetic procedure is required to establish the fetal wellbeing. It is acceptable to remove a CTG prior to induction of a general anaesthetic in order to carry out abdominal preparation and drape placement, as the delivery is imminent, and this will reduce the duration of fetal exposure to anaesthetic agents.

Inadvertent recording of the maternal heart rate: It is possible to pick up maternal signal sources such as the aorta or other large vessels (eg. when siting epidural). Misidentification can also occur if maternal heart rate higher than normal (eg. sepsis). A maternal heart rate can exhibit features that are very similar to those of a FHR trace, including accelerations and decelerations.

Inadvertent recording of the maternal heart rate should be suspected in the following situations:

1) Sudden shift in the baseline rate
2) Sudden improvement of a previously pathological
3) Accelerations that coincide with the contractions especially in the second stage of labour

Fetal demise: FHR detection by monitor may not always indicate that the fetus(es) is alive, confirm fetal life before monitoring and continue to confirm that the fetus(es) are the signal source for the recorded heart rate. If fetal death is suspected despite the presence of an apparently recorded FHR, offer real-time ultrasound assessment to check fetal viability. Fetal movement profile annotations on a trace may not always indicate a live fetus. The body of a deceased fetus can move and cause the monitor to annotate fetal body movements.

AUTHORS

1. Laura Stirrat
2. Nirmala Mary
3. Rosie Townsend
4. Andrew Brown

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Second and Third stage of labour
Maternity Services Lothian
Guidelines

1. INTRODUCTION:
The principles of caring for women in the second stage of labour should include a safe and private environment with one to one support from a midwife and other carers if desired. Positive body language, communications, interactions, support, and optimisation of maternal position have shown to improve birth experience and reduce the need for interventions and use of analgesia
Monitoring the progress of labour requires more than an assessment of cervical changes and descent of the presenting part. Weight should be given to other observations such as abdominal palpation, uterine contractions and a woman's changing behaviour.

2. AIM: To provide safe and appropriate guidance for all those involved with caring for women in the second stage of labour. This guideline covers the care of healthy women and their babies during labour at 37-42 weeks gestation.

3. GUIDELINE

3.1 Second stage:

Passive second stage of labour is defined as the time from confirmation of full dilatation of the cervix prior to involuntary expulsive contractions.

The *active* second stage of labour is defined as:
- either when the presenting part is visible, or
- expulsive contractions (with confirmation of full dilatation of the cervix or other signs of full dilatation),
- active maternal effort (with confirmation of full dilatation) in the absence of expulsive contractions.

DELIVERY SHOULD OCCUR WITHIN 4 HOURS IN NULLIPAROUS WOMEN AND 2 HOURS IN PAROUS WOMEN.

Management of second stage: 4 hourly temperature, hourly BP, half hourly contractions, frequency of passing urine.
Offer hourly vaginal examination assessing position, station, caput and moulding and abdominal palpation in active second stage to ensure adequate progress.

Take women's emotional and psychological needs into account.
Consideration should be given to women's position, hydration and coping strategies. Assess progress taking into account women's behaviour, effectiveness in pushing, fetal position and station at the onset of second stage, and fetal wellbeing. Upright or lateral position is more effective than supine position for pushing. Refrain from active pushing until there is an urge to push.
Consideration should be given to allowing ease of maternal movement.

If the diagnosis of second stage was a visible vertex, then birth would be expected to be earlier than described above. If full dilatation of the cervix has been confirmed in a woman

without an epidural and she does not get an urge to push, further assessment should take place after 1 hour. If a low risk woman is expulsive with no other signs of second stage and the vertex is not visible after 30-45 minutes, it would be reasonable to undertake vaginal examination to confirm full dilatation.

Fetal Monitoring:
Low risk women should have intermittent auscultation of FHR immediately after contraction for 1 minute at least every 5 mins. Comment should be made regarding the baseline rate, presence/ absence of accelerations and decelerations, strength, length and frequency of contractions.
Palpate women's pulse every 15 mins to differentiate between the 2 heart beats.

High risk women – continuous electronic fetal monitoring. If for any reason, it is not possible to obtain a good technical trace, consideration should be given to application of an FSE.

3.2 Delay in active second stage:

Nulliparous women: suspect delay at 1 hour, diagnose at 2hrs if birth not imminent.
Suspect delay if progress is inadequate in terms of rotation and /or descent of presenting part with hourly assessments.

Parous women: suspect delay at 30mins, diagnose at 1hour if birth not imminent.
Suspect delay if progress is inadequate in term of rotation and /or descent of presenting part after 30 minutes and at 30 mins intervals.

Commence continuous CTG if there are concerns with intermittent auscultation or at the point that delay is diagnosed.

An obstetrician should assess a woman with confirmed delay in the second stage within 15-30 minutes. They should reassess every 15-30 minutes to ensure adequate progress.

Recommendations and strategies for dealing with suspected delay:

- Further verbal support
- Optimise position and make optimal use of their contractions
- Emotional and psychological needs should be taken into consideration and any specific fears addressed. Lack of privacy and suboptimal support may adversely affect progress; support, sensitive encouragement and reassess the need for analgesia/anaesthesia.
- The use of aromatherapy oils such as clary sage or rose should be considered to enhance uterine activity. For some women, nipple or clitoral stimulation may be an appropriate suggestion to increase oxytocin production.
- Advice and support from senior midwifery colleagues should be routinely offered.
- If membranes are intact with suspected/ diagnosed delay, perform amniotomy.

- When the vertex is on the perineum, consider hot compresses applied to the perineum during contraction or infiltration with 1% lidocaine. If delivery can be expedited by episiotomy, an explanation of the potential benefits should be given and consent sought.
- **When a diagnosis of delay has been confirmed, women should be referred to an obstetrician to make an assessment and plan.**

Practice recommendations:

- Whilst in the passive phase attention should be paid to monitoring the strength and frequency of uterine activity. Consideration should be given to the use of oxytocin for nulliparous women if contractions are inadequate at this time, with the option of regional analgesia if required.

- *The most stressful period of labour for the fetus is the active pushing phase; thus, shortening this phase minimizes fetal stress and promotes fetal well-being.*

- *Fetal heart rate abnormalities - consider stopping pushing or stopping/ reducing oxytocin or use of terbutaline (250micrograms). If fetal heart rate abnormalities persist, a medical review to consider assisted delivery should take place.*

  *Women without an epidural should be encouraged to push/ bear down in upright positions and with frequent changes of position (associated with reduction in episiotomies and fewer heart rate abnormalities). Epidural analgesia **is** associated with a longer second stage and an **increased** chance of instrumental deliveries. It is also associated with side effects of **fever**, motor blockade, increased risk of hypotension, urinary retention and oxytocin augmentation. If mobile epidural analgesia is available this may be beneficial.*
- *Forcing women's legs back against their abdomen during pushing should be avoided as this increases the risk of perineal lacerations.*

- *Any woman with infibulated genital mutilation may have difficulty with vaginal examinatio**n,** catheterisation and application of fetal scal**p electrod**es. Inform her of the risks of delay in the second stage, possible spontaneous **lace**ration, anterior episiotomy and the possible need for defibulation in labour.*

- *<u>Perineal protection for prevention of 3rd degree tears</u>*
  Risk assessment should take place throughout labour, especially during second stage. Risk factors include, primiparity, large baby, previous perineal trauma/OASI. If the risk is significant, consider RMLE.

- *Management at crowning stage – good communication with women to educate regarding force and timing of pushing is essential. Consider offering warm compresses during contraction when head is crowning. Advancement of head should be controlled with the non-dominant hand whilst manual protection is applied with dominant hand. The extended thumb and index finger should be firmly applied to the perineum (to pinch the perineal raphe together) and flexed fingers will help control the extension of head. This should be continued for delivery of shoulders.*

- *Episiotomy – If episiotomy appears to be indicated, early infiltration is advisable. The episiotomy incision should start within 1cm of the fourchette and is at least 60 degrees angle with the non-dominant hand protecting head.*

- *PR examination – all women should have a rectal examination before and after any repair*

3.3 Expediting birth

If there are maternal or fetal concerns, assess the safety of the woman and baby by:

- the degree of urgency
- clinical findings on abdominal and vaginal examination
- choice of mode of birth (and whether to use forceps or ventouse if an instrumental birth is indicated)
- anticipated degree of difficulty/ likelihood of success if instrumental birth is attempted
- location
- any time that may be needed for transfer to obstetric -led care
- the need for additional analgesia or anaesthesia
- the woman's preferences.

Talk with the woman and her birth companion(s) about why the birth needs to be expedited and what the options are.

Inform the team about the degree of urgency and record the time at which the decision is made.

3.4 Operative vaginal delivery- see operative vaginal delivery guideline

Think about offering instrumental birth if there is concern about the baby's wellbeing or there is a prolonged second stage. Recognise that on rare occasions the woman's need for help in the second stage may be an indication to assist by offering instrumental birth when supportive care has not helped.

The choice of instrument depends on a balance of clinical circumstance and practitioner experience.

Please give a single dose of intravenous prophylactic antibiotics to all women AFTER operative vaginal deliveries. 1.2g IV coamoxiclav (1.5g cefuroxime + 500mg metronidazole if minor penicillin allergy, or 600mg clindamycin if severe penicillin allergy).

Advise the woman to have either tested effective anaesthesia or a pudendal block combined with local anaesthetic to the perineum during instrumental birth, if delivery in the labour room is appropriate. If no epidural then transfer to theatre is required if spinal anaesthesia is preferred.

If trial of forceps is proposed then transfer to theatre is required for regional anaesthesia.

Advise the woman to have a caesarean section if vaginal birth is not possible.

3.5 Third stage of labour

Recognise that the time immediately after the birth is when the woman and her birth companion(s) are meeting and getting to know the baby. Ensure that any care or interventions are sensitive to this and minimise separation or disruption of the mother and baby.

Definition of the third stage:
The third stage of labour is the time from the birth of the baby to the expulsion of the placenta and membranes.

Management of the third stage of labour
Discuss the different options for managing the third stage, ways of supporting her during delivery of the placenta and ask if she has any preferences.

Advise the woman to have active management of the third stage, because it is associated with a lower risk of a postpartum haemorrhage and/or blood transfusion.

If a woman at low risk of postpartum haemorrhage requests physiological management of the third stage, support her in her choice and document this in the records.

Record the following observations for a woman in the third stage of labour:

- MEWS , her general physical condition, as shown by her colour, respiration and her own report of how she feels.
- vaginal blood loss

Active management of the third stage involves a package of care that is associated with a shortened third stage, nausea and vomiting in 10% of women, approximate1.3% risk of haemorrhage > 1L and a 1.4% risk of a blood transfusion:

- routine use of uterotonic drugs- administer 10 IU of oxytocin by intramuscular injection with the birth of the anterior shoulder or immediately after the birth of the baby and ***before*** the cord is clamped and cut. If additional risk factors for PPH then use Syntometrine® 1ml by intramuscular injection unless contraindicated (5IU oxytocin + 500mcg ergometrine).
- delayed clamping and cutting of the cord (ideally 1-5 minutes)
- controlled cord traction after signs of separation of the placenta.

Physiological management of the third stage involves a package of care that is associated with a longer third stage, nausea and vomiting in about 5% of women, approximate 2.9% risk of haemorrhage >1L and a 4% risk of a blood transfusion :

- no routine use of uterotonic drugs
- no clamping of the cord until pulsation has stopped
- delivery of the placenta by maternal effort.

Advise a change from physiological management to active management if:

- haemorrhage occurs
- the placenta is not delivered within 1 hour of the birth of the baby.
- the woman wishes to shorten the third stage.

Record the timing of cord clamping in both active and physiological management.

If there is postpartum haemorrhage, a retained placenta or maternal collapse, or any other concerns about the woman's wellbeing, transfer her to obstetric-led care and carry out frequent observations to assess whether resuscitation is needed.

Do not use either umbilical oxytocin infusion or prostaglandin routinely in the third stage of labour.

3.6 Prolonged third stage

Diagnose a prolonged third stage of labour if it is not completed within 30 minutes of the birth with active management or within 60 minutes of the birth with physiological management.

When there is no sign of placental separation and in the absence of active bleeding:

- offer skin to skin
- encourage breastfeeding,
- nipple stimulation.
- ensure bladder empty
- consider aromatherapy oils

MAINTAIN ONGOING ASSESSMENT OF BLOOD LOSS AND MATERNAL MEWS

3.7 Retained placenta

A retained placenta is one that remains inside the uterus following the birth of the baby, occurring in 2-3% of vaginal deliveries and **increases the risk of postpartum haemorrhage.**

Risk factors for retained placenta include:

- Previous retained placenta
- Multiparity
- Maternal age > 35 years
- Induced and preterm labour
- Uterine fibroids
- Prolonged rupture of membranes
- Previous uterine instrumentation (including caesaerean section and uterine curettage)
- Elevated 2nd trimester serum markers (AFP>2.5 MoM; hCG>4MoM)

Refer to medical staff when prolonged third stage diagnosed **or** sooner if bleeding**.**

Secure intravenous access and explain to the woman why this is needed, send FBC, G&S. Give intravenous oxytocic agents and intravenous fluid resuscitation if the woman is bleeding excessively.
If there is concern about the woman's condition:

- offer a vaginal examination to assess the need to undertake manual removal of the placenta
- explain that this assessment can be painful and advise her to have analgesia.

If the woman reports inadequate analgesia during the assessment, stop the examination and address this immediately.

Practice recommendations:

- *Do not use umbilical vein agents if the placenta is retained.*
- *Do not use intravenous oxytocic agents routinely to deliver a retained placenta.*
- *If uterine exploration is necessary and the woman is not already in an obstetric unit, arrange urgent transfer*
- *Do not carry out uterine exploration or manual removal of the placenta without an anaesthetic or antibiotic prophylaxis.*
- *If postpartum haemorrhage is also present then manage both conditions simultaneously and expediate transfer of patient to an obstetric unit and/or theatre as appropriate, with senior obstetric and anaesthetic medical staff informed and ideally present.*

4.ASSOCIATED DOCUMENTS
NHS Lothian Operative Vaginal Delivery Guidelines 2020

5.REFERENCES
Pathways for Maternity Care (NHS Quality Improvement Scotland, 2009),
NICE CG190 Intrapartum care for healthy women and babies. published Dec 2014, updated Feb 2017
RCM Evidence based guidelines for midwifery-led care in labour.

6.AUTHOR/S:

Author 1: Dr Jacqui Laurie

Author 2: Dr Nirmala Mary/ Shona Cowan

Author 3: Mrs Donna Swinney

Author 4: Lothian Maternity Guideline Group

This section to be completed by document control.