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Pathophysiology of reduced or absent variability:
Fetal Behavioural States affecting Baseline Variability:
Fetal quiescence:
Active Sleep:
Wakefulness:
Sinusoidal pattern:
Pseudo-sinusoidal pattern:
Pathophysiology of pseudo-sinusoidal pattern:
Accelerations
Decelerations
Early Decelerations:
Variable Decelerations:
Pathophysiology of variable decelerations:
Late Decelerations:
Prolonged decelerations:
Contractions
Special circumstances:

Keywords
Monitoring
Education and Training
Supporting References

Intrapartum Care and Fetal Heart Rate Monitoring in Labour UHL Obstetric Guideline
Author: Guideline Working Party, Updated by Working Party
Written: December 2003
Contact: Julia Austin Consultant Midwife
Approved by: Maternity Service Governance Group
Guideline Register No: C60/2019

Please note that this may not be the most recent version of the document; a definitive version is in the Policy and Guidelines Library.
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INTRODUCTION AND WHO THE GUIDELINE APPLIES TO:

This guideline is for all Maternity Service staff caring for healthy women in normal labour. This includes antenatal assessment for place of birth.
BACKGROUND:

This document is based on the NICE Clinical Guideline 190 Intrapartum Care: Care of healthy women and their babies during childbirth. This guideline has been extensively reviewed within the Maternity Unit prior to implementation to ensure local requirements are reflected within this amended document. Please contact the Clinical Risk and Quality Manager for details.

RELATED UHL DOCUMENTS:

Maternity Responsible Clinician, Referral, Handover of Care and Transfer

Management of babies born through meconium stained liquor

PLACE OF BIRTH

Low risk women may be offered the choice to deliver at home, at St Mary’s Birth Centre or in either of the alongside birth centres at Leicester Royal Infirmary and Leicester General Hospital. They should receive information about these settings from the community midwife in the form of the Trust “Maternity Care” leaflet.

High risk women may also choose to birth away from the obstetric units at Leicester Royal Infirmary or Leicester General Hospital. In these circumstances, they should have an individualised care plan made after referral to, and discussion with an Obstetrician. This should occur as early in the pregnancy as possible (but after 24 weeks). Where a woman declines to see an Obstetrician, involvement of a senior midwife should be offered in a setting agreed with the woman.

The following tables give guidance to assist in helping women to plan their preferred place of birth.

<table>
<thead>
<tr>
<th>Medical Conditions Suggesting Increased Risk</th>
<th>Planned Birth at Obstetric Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease area</td>
<td>Medical condition</td>
</tr>
<tr>
<td><strong>Cardiovascular</strong></td>
<td>Confirmed cardiac disease</td>
</tr>
<tr>
<td><strong>Respiratory</strong></td>
<td>Hypertensive disorders</td>
</tr>
<tr>
<td>Asthma requiring an increase in treatment</td>
<td></td>
</tr>
</tbody>
</table>

Intrapartum Care and Fetal Heart Rate Monitoring in Labour UHL Obstetric Guideline
Author: Guideline Working Party, Updated by Working Party
Contact: Julia Austin Consultant Midwife
Approved by: Maternity Service Governance Group
Guideline Register No: C60/2019

Last Review: December 2019
Next Review: December 2022

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<table>
<thead>
<tr>
<th>Category</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haematological</td>
<td>Cystic fibrosis, Haemoglobinopathies (sickle cell disease, beta-thalassaemia major), History of thrombolic disorders, Immune thrombocytopenia purpura or other platelet disorder or platelet count below 100x10^9/litre, Von Willebrands disease, Bleeding disorder in the woman or unborn baby, Atypical antibodies which carry a risk of haemolytic disease of the newborn</td>
</tr>
<tr>
<td>Endocrine</td>
<td>Hyperthyroidism, Diabetes</td>
</tr>
<tr>
<td>Infective</td>
<td>Risk factors associated with GBS whereby antibiotics in labour are recommended, Hepatitis B / C with abnormal LFT’s, Carriers of / infected with HIV, Toxoplasmosis – women receiving treatment, Current active infection of chickenpox / rubella / genital herpes in the woman or baby, TB – undergoing treatment</td>
</tr>
<tr>
<td>Immune</td>
<td>SLE, Scleroderma</td>
</tr>
<tr>
<td>Renal</td>
<td>Abnormal renal function, Renal disease requiring supervision by a renal specialist</td>
</tr>
<tr>
<td>Neurological</td>
<td>Epilepsy, Myasthenia gravis, Previous CVA</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>Liver disease associated with current abnormal LFT’s</td>
</tr>
<tr>
<td>Psychiatric</td>
<td>Psychiatric disorder requiring current inpatient care</td>
</tr>
<tr>
<td>Factor</td>
<td>Additional information</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Previous complications</strong></td>
<td>Unexplained stillbirth/Neonatal death or previous death related to Intrapartum difficulty</td>
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<tr>
<td></td>
<td>Previous baby with neonatal encephalopathy</td>
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<tr>
<td></td>
<td>Pre eclampsia requiring pre term birth</td>
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<tr>
<td></td>
<td>Placental abruption with adverse outcome</td>
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<tr>
<td></td>
<td>Eclampsia</td>
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<td></td>
<td>Uterine rupture</td>
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<td></td>
<td>Primary PPH &gt;1500ml</td>
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<td></td>
<td>Score of 6 or more on the PPH risk assessment tool</td>
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<td></td>
<td>Retained placenta requiring manual removal in theatre</td>
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<td></td>
<td>Caesarean Section</td>
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<td></td>
<td>Shoulder Dystocia</td>
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<tr>
<td><strong>Current pregnancy</strong></td>
<td>Multiple pregnancy</td>
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<td></td>
<td>Placenta praevia</td>
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<td></td>
<td>Pre-eclampsia or pregnancy induced hypertension</td>
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<td></td>
<td>Preterm labour or preterm prelabour rupture of membranes</td>
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<tr>
<td></td>
<td>Placental abruption</td>
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<td></td>
<td>Anaemia – Hb less than 90g/l at onset of labour</td>
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<td></td>
<td>Confirmed IUD</td>
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<td></td>
<td>Induction of labour</td>
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<tr>
<td></td>
<td>Substance misuse</td>
</tr>
<tr>
<td></td>
<td>Alcohol dependency requiring assessment or treatment Onset of gestational diabetes</td>
</tr>
<tr>
<td></td>
<td>Malpresentation - breech or transverse lie</td>
</tr>
<tr>
<td></td>
<td>BMI at booking of &gt;35kg/m2 for primagravid women or &gt;40 for multiparous women with previous vaginal delivery</td>
</tr>
<tr>
<td></td>
<td>Recurrent ante partum haemorrhage</td>
</tr>
<tr>
<td></td>
<td>Small for gestational age in this pregnancy (less than 10th centile or reduced growth velocity on ultrasound)</td>
</tr>
<tr>
<td></td>
<td>Abnormal FHR / Doppler studies</td>
</tr>
<tr>
<td></td>
<td>Ultrasound diagnosis of oligo / polyhydramnios</td>
</tr>
</tbody>
</table>
## Previous gynaecological history
- Myomectomy
- Hysterotomy

### MEDICAL CONDITIONS REQUIRING INDIVIDUAL ASSESSMENT

<table>
<thead>
<tr>
<th>Disease area</th>
<th>Medical condition</th>
</tr>
</thead>
<tbody>
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<td>Cardiovascular</td>
<td>Cardiac disease without Intrapartum implications</td>
</tr>
<tr>
<td>Haematological</td>
<td>Atypical antibodies not putting the baby at risk of haemolytic disease</td>
</tr>
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<td></td>
<td>Sickle cell trait</td>
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<td></td>
<td>Thalassemia trait</td>
</tr>
<tr>
<td>Infective</td>
<td>Hepatitis B / C with normal LFT's</td>
</tr>
<tr>
<td>Immune</td>
<td>Non-specific connective tissue disorders</td>
</tr>
<tr>
<td>Endocrine</td>
<td>Unstable hypothyroidism that requires a change in treatment</td>
</tr>
<tr>
<td>Skeletal / neurological</td>
<td>Spinal abnormalities</td>
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<td></td>
<td>Previous fractured pelvis</td>
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<tr>
<td></td>
<td>Neurological deficits</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>Liver disease without current abnormal liver function</td>
</tr>
<tr>
<td></td>
<td>Crohn's disease / Ulcerative colitis</td>
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</table>

### OTHER FACTORS REQUIRING INDIVIDUAL ASSESSMENT WHEN PLANNING PLACE OF BIRTH

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<thead>
<tr>
<th>Factor</th>
<th>Additional information</th>
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</thead>
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<td>Previous pregnancy complications</td>
<td>Stillbirth or neonatal death with a known non-recurrent cause</td>
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<td></td>
<td>Pre-eclampsia developing at term</td>
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<td></td>
<td>Placental abruption with good outcome</td>
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<td></td>
<td>History of previous baby more than 4.5kg</td>
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<td></td>
<td>Extensive vaginal, cervical or third or fourth degree perineal trauma</td>
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<tr>
<td></td>
<td>Previous term baby with jaundice requiring exchange transfusion</td>
</tr>
<tr>
<td>Current pregnancy</td>
<td>Antepartum bleeding of unknown origin (single episode after 24wks gestation)</td>
</tr>
<tr>
<td></td>
<td>Blood pressure of 140 mmHg Systolic or 90 mmHg diastolic on 2 occasions</td>
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<tr>
<td></td>
<td>Clinical or ultrasound suspicion of macrosomia</td>
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<td></td>
<td>Para 4 or more</td>
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<td></td>
<td>Recreational drug use</td>
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<td>Safeguarding concerns present at 36 week risk assessment</td>
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<td>Under current outpatient psychiatric care</td>
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<td>Age over 40 at booking</td>
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<td>Fetal abnormality</td>
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<td>Previous gynaecological history</td>
<td>Major gynaecological surgery</td>
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<td>Cone biopsy or large loop excision of the transformation zone (LLETZ)</td>
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<td>Fibroids</td>
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</tbody>
</table>
**CARE THROUGHOUT LABOUR**

**COMMUNICATION**

**Women’s experience**

All healthcare professionals should ensure that in all birth settings there is a culture of respect for each woman as an individual undergoing a significant and emotionally intense life experience, so that the woman is in control, is listened to and is cared for with compassion, and that appropriate informed consent is sought.

**MOBILISATION**

Encourage and help the woman to move and adopt whatever positions she finds most comfortable throughout labour.

**SUPPORT**

Encourage the woman to have support from birth companion(s) of her choice.

**HYGIENE MEASURES**

Routine hygiene measures should be taken by staff caring for women in labour, including standard hand hygiene and single-use non-sterile gloves are appropriate to reduce cross-contamination between women, babies and healthcare professionals.

Trust procedure regarding infection control assessment and management should be followed at all times.

Tap water may be used if cleansing is required before vaginal examination. Prior to catheterisation, sterile water should be used to clean the vulva and external urethral orifice. Prior to instrumental delivery or suturing, either in the delivery room or the obstetric theatre, non-alcoholic antiseptic solution should be used to clean the lower vagina and vulva.

**INITIAL ASSESSMENT OF POTENTIAL LABOUR**

**INITIAL ASSESSMENT OF THE WOMAN**

When performing an initial assessment of a woman in labour, listen to her story and take into account her preferences and her emotional and psychological needs.

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:

- Review 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 had any vaginal loss.

**Vaginal examination:**

When conducting a vaginal examination:

- be sure that the examination is necessary and will add important information to the decision-making process
- recognise that a vaginal examination can be very distressing for a woman, especially if she is already in pain, highly anxious and in an unfamiliar environment
- explain the reason for the examination and what will be involved
- ensure the woman's informed consent, privacy, dignity and comfort
- explain sensitively the findings of the examination and any impact on the birth plan to the woman and her birth companion(s)
- If the woman appears to be in established labour, offer a vaginal examination. 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.

**Note about the presence of meconium:**

As part of any assessment, document the presence or absence of significant meconium. This is defined as dark green or black amniotic fluid that is thick or tenacious, or any meconium-stained amniotic fluid containing lumps of meconium.

If significant meconium is present, ensure that:

- healthcare professionals trained in fetal blood sampling are available during labour AND
- healthcare professionals trained in advanced neonatal life support are readily available for the birth.

If meconium is present, transfer the woman to obstetric-led care provided that it is safe to do so and the birth is unlikely to occur before transfer is completed. Follow the general principles for transfer of care described in the “Maternity Responsible Clinician, Referral, handover of care and transfer” guideline.

**Assessment 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.
Measuring fetal heart rate as part of initial assessment:

Offer auscultation of the fetal heart rate at first contact with a woman in suspected or established labour, and at each further assessment:

- Use either a Pinard stethoscope or Doppler ultrasound.
- Carry out auscultation immediately after a contraction for at least 1 minute and record it as a single rate.
- Record accelerations and decelerations if heard.
- Palpate the maternal pulse to differentiate between the maternal and fetal heartbeats.

Be aware that for women at low risk of complications there is insufficient evidence about whether cardiotocography as part of the initial assessment either improves outcomes or results in harm for women and their babies, compared with intermittent auscultation alone. Therefore, if a woman at low risk of complications requests cardiotocography as part of the initial assessment:

- discuss the risks, benefits and limitations of cardiotocography with her, and support her in her choice
- explain that, if she is in a setting where cardiotocography is not available, she will need to be transferred to obstetric-led care.

Offer continuous cardiotocography if any of the risk factors listed in the Fetal Heart Rate Monitoring section below are identified on initial or subsequent assessment, and explain to the woman why this is being offered.

Offer cardiotocography if intermittent auscultation indicates possible fetal heart rate abnormalities, and explain to the woman why this is being offered. If the trace is normal as per the Fetal Heart Rate Monitoring in Labour guideline after 20 minutes, return to intermittent auscultation unless the woman asks to stay on continuous cardiotocography.

If fetal death is suspected or maternal pulse and fetal heart are not distinct, offer real-time ultrasound assessment to check fetal viability.

WHEN TO TRANSFER FROM MIDWIFERY LED TO OBSTETRIC LED CARE

Transfer the woman to obstetric-led care, following the general principles for transfer of care described in the “Maternity Responsible Clinician, Referral, handover of care and transfer” guideline if any of the following are observed on initial assessment:

Maternal reasons for transfer:

- Pulse over 120 beats/minute on 2 occasions 30 minutes apart
- A single reading of either raised diastolic blood pressure of 110 mmHg or more or raised systolic blood pressure of 160 mmHg or more
- Either raised diastolic blood pressure of 90 mmHg or more or raised systolic blood pressure of 140 mmHg or more on 2 consecutive readings taken 30 minutes apart
• a reading of 2+ of protein on urinalysis and a single reading of either raised diastolic blood pressure (90 mmHg or more) or raised systolic blood pressure (140 mmHg or more)
• temperature of 38°C or above on a single reading, or 37.8°C or above on 2 consecutive readings 1 hour apart
• any vaginal blood loss other than a show
• rupture of membranes more than 24 hours before the onset of established labour
• the presence of meconium
• pain reported by the woman that differs from the pain normally associated with contractions
• any risk factors recorded in the woman’s notes that indicate the need for obstetric led care.

Fetal reasons for transfer:
• any abnormal presentation, including cord presentation
• transverse or oblique lie
• high (4/5–5/5 palpable) or free-floating head in a nulliparous woman
• suspected fetal growth restriction or macrosomia
• suspected anhydramnios or polyhydramnios
• fetal heart rate below 110 or above 160 beats/minute
• a deceleration in fetal heart rate heard on intermittent auscultation
• reduced fetal movements in the last 24 hours reported by the woman

If none of these are observed, continue with midwifery-led care unless the woman requests transfer.

If any of the factors are observed but birth is imminent, assess whether birth in the current location is preferable to transferring the woman to an obstetric unit and discuss this with the coordinating midwife. Follow the general principles for transfer of care described in the “Maternity Responsible Clinician, Referral, handover of care and transfer” guideline.

LATENT PHASE

NICE recommend that the latent phase of labour be defined as:
• a period of time, not necessarily continuous, when there are painful contractions: AND
• there is some cervical change, including cervical effacement and dilatation up to 4cm.

However it is difficult to objectively tell when the change from the latent to the active phase of labour occurs, leading to some dilemmas in the management of women. One especially difficult issue is how to define a prolonged latent phase. Studies have used figures from 12 to 24hrs and beyond at the point where a prolonged latent phase is diagnosed.

There is evidence that prolongation of the latent phase is associated with:

Please note that this may not be the most recent version of the document; a definitive version is in the Policy and Guidelines Library.
• subsequent labour abnormalities and need for caesarean section.
• significantly prolonged labour
• high levels of pain / anxiety in latent phase which were linked to an increase level of medical intervention in the active phase
• There have also been adverse outcomes for mothers and babies when the prolonged latent phase has not been adequately managed.

A leaflet is available for the woman which contains coping strategies for the latent phase of labour and this should be given.

Women planning to deliver in a birth centre should be invited in for assessment if they have telephoned 3 times to discuss whether they are in labour – even if their contractions are not yet regular and established

At every hospital attendance a full set of observations and fetal monitoring should be carried out prior to sending the woman home. A vaginal assessment should be made if the woman is complaining of regular contractions.

The assessment form in Appendix 1 should be completed at each attendance.

WHEN TO REFER FOR MEDICAL REVIEW DURING THE LATENT PHASE

Women should have a medical review on their 3rd admission with regular painful contractions and not yet in established labour. Some women may need medical review on their 1st and / or 2nd admission if there are any concerns about the clinical history and / or examination

Women should have a medical review if they have had 3 vaginal examinations and are not yet established in labour. (this may be during a single admission).

Women choosing to birth at home should be referred in to hospital for medical review on their 3rd visit by the community midwife

A CTG and full maternal assessment should be carried out prior to medical review and referral should be made using the SBAR tool.

As per the induction of labour guideline, women who have three admissions in the latent of labour, or where the latent phase has lasted over 20 hours, should be discussed with the Obstetric ST3 or above. It is reasonable to offer augmentation of labour under these circumstances after discussion with the woman about her preferences.

Following the review a plan must be made with consideration to the woman’s wishes. These may include:

• Returning to midwifery led care
• Augmentation with appropriate analgesia as above.
• Transfer to antenatal ward
CARE THROUGHOUT LABOUR

SUPPORT IN LABOUR

Provide a woman in established labour with supportive one-to-one care.

Do not leave a woman in established labour on her own except for short periods or at the woman's request.

CONTROLLING GASTRIC ACIDITY

Do not offer either H₂-receptor antagonists or antacids routinely to low-risk women.

Proton Pump Inhibitors (Omeprazole) should be given on admission and then every 24 hours until delivery to all women who have, or develop, risk factors that make a general anaesthetic more likely.

All women in labour who have, or develop risk factors that make a general anaesthetic more likely (or progressing to Caesarean section) should be given 40mg Omeprazole orally on admission and then 20mg Omeprazole every 24 hours until delivery.

Women undergoing induction of labour should have 40mg Omeprazole at the time of initial admission for induction (prior to foley catheter or prostaglandin use) and then 20mg Omeprazole every 24 hours until delivery.

Where women are undergoing category 1, 2 or 3 Caesarean section and they have only had one dose of 40mg Omeprazole, a further dose of 20mg omeprazole can be given IF the last dose given was more than 12 hours previously. Alternatively, the Anaesthetist may choose to administer an IV infusion of omeprazole/ranitidine for women who are at particularly high risk of aspiration.

EATING AND DRINKING IN LABOUR

All women may drink during established labour. This may include water, clear fluids such as squash, and isotonic sports drinks e.g. Lucozade Sport, Powerade.

Women may be informed that isotonic sports drinks (containing no more than 30kcal/100mls) may be more beneficial than water.

Low risk women (those without any risk factors) may drink clear fluids (as above) and eat a light diet throughout their labour. Women at risk of requiring operative intervention (see below) should not eat solid food.

Once a decision has been made to transfer to theatre for LSCS, assisted vaginal delivery, or another operative procedure, women should be kept NBM (Nil by Mouth – including fluids)

• Women at risk include:
  • Body Mass Index >40 at booking
- Multiple pregnancy
- Breech
- Intra-uterine growth restriction
- Previous postpartum haemorrhage or retained placenta
- Previous Caesarean section/ Uterine surgery
- Oxytocin augmentation
- Significant antepartum haemorrhage
- Abnormal CTG, especially if fetal scalp pH measurements required
- Any meconium staining of liquor
- Women with epidural
- Women receiving opioids including IM Pethidine
- Slow progress during labour
- Previous difficult Intubation
- Contraindication for Regional Anaesthesia

**PAIN RELIEF IN LABOUR: NON-REGIONAL**

**Non-pharmacological analgesia:**

If a woman chooses to use breathing and relaxation techniques in labour, support her in this choice.

If a woman chooses to use massage techniques in labour that have been taught to birth companions, support her in this choice.

Offer low risk women the opportunity to labour in water for pain relief. For women labouring in water, follow the UHL Water Birth guideline.

Do not use injected water papules.

Do not offer acupuncture, acupressure or hypnosis, but do not prevent women who wish to use these techniques from doing so.

Women may be offered aromatherapy in keeping with the “Aromatherapy for Low Risk women in Pregnancy, Labour and Postnatally” UHL guideline. Support the playing of music of the woman’s choice in labour.

Support women who bring choose to use transcutaneous electrical nerve stimulation (TENS) in early or established labour. The Home Birth team may provide TENS machines (which they maintain), but women planning hospital birth will need to provide their own equipment.

**Inhalational analgesia:**

Ensure that Entonox (a 50:50 mixture of oxygen and nitrous oxide) is available in all birth settings as it may reduce pain in labour. Inform the woman that it may make her feel nauseous and light-headed. See also UHL “Entonox Administration Policy”.

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Intrapartum Care and Fetal Heart Rate Monitoring in Labour UHL Obstetric Guideline  Page 16 of 65  
Contact: Julia Austin Consultant Midwife  Last Review: December 2019  
Approved by: Maternity Service Governance Group  Next Review: December 2022  
Guideline Register No: C60/2019  
Please note that this may not be the most recent version of the document; a definitive version is in the Policy and Guidelines Library.
Intrapartum Care and Fetal Heart Rate Monitoring in Labour UHL Obstetric Guideline

Intravenous and intramuscular opioids:

Ensure that pethidine, diamorphine or other opioids are available in all birth settings. Inform the woman that these will provide limited pain relief during labour and may have significant side effects for both her (drowsiness, nausea and vomiting) and her baby (short-term respiratory depression and drowsiness which may last several days).

Inform the woman that pethidine, diamorphine or other opioids may interfere with breastfeeding.

If an intravenous or intramuscular opioid is used, also administer an antiemetic.

Women should not enter water (a birthing pool or bath) within 2 hours of opioid administration or if they feel drowsy.

**FIRST STAGE OF LABOUR**

Do not offer or advise clinical intervention if labour is progressing normally and the woman and baby are well.

In all stages of labour, women who have left the normal care pathway because of the development of complications can return to it if/when the complication is resolved.

Individualised care should be given. Some women do not follow the usual pattern of labour and can progress rapidly but on vaginal assessment do not appear to be in established labour. As a result they may progress to delivery without adequate monitoring or analgesia. Avoid reliance on VE findings and discuss with a senior midwife if unsure, or the findings do not align with the clinical picture. Attention to previous labour history can act as an aid in identifying precipitate labour in multiparous women.

**DURATION OF THE FIRST STAGE**

Inform women that, while the length of established first stage of labour varies between women:

- first labours last on average 8 hours and are unlikely to last over 18 hours
- second and subsequent labours last on average 5 hours and are unlikely to last over 12 hours.

**OBSERVATIONS DURING THE ESTABLISHED FIRST STAGE**

Do not routinely use verbal assessment using a numerical pain score.

Use a pictorial record of labour (partogram) once labour is established.

Where the partogram includes an action line, use the World Health Organization recommendation of a 4-hour action line.

Record the following observations during the first stage of labour:
• half-hourly documentation of frequency of contractions
• hourly pulse
• 4-hourly temperature and blood pressure
• frequency of passing urine
• offer a vaginal examination 4-hourly or if there is concern about progress or in response to the woman's wishes (after abdominal palpation and assessment of vaginal loss).

If any of the indications for transfer are met, transfer the woman to obstetric-led care. Follow the general principles for transfer of care described in the “Maternity Responsible Clinician, Referral, handover of care and transfer” guideline.

Give ongoing consideration to the woman's emotional and psychological needs, including her desire for pain relief.

Encourage the woman to communicate her need for analgesia at any point during labour.

### POSSIBLE ROUTINE INTERVENTIONS IN THE FIRST STAGE

Do not routinely offer the package known as active management of labour (one-to-one continuous support; strict definition of established labour; early routine amniotomy; routine 2-hourly vaginal examination; oxytocin if labour becomes slow).

In normally progressing labour, do not perform amniotomy routinely.

Do not use combined early amniotomy with use of oxytocin routinely.

### DELAY IN THE FIRST STAGE

**Suspected delay in the first stage:**

If delay in the established first stage is suspected, take the following into account:

- parity
- cervical dilatation and rate of change
- uterine contractions
- station and position of presenting part
- the woman's emotional state

Offer the woman support, hydration, and appropriate and effective pain relief.

If delay in the established first stage is suspected, assess all aspects of progress in labour when diagnosing delay, including:

- cervical dilatation of less than 2 cm in 4 hours for first labours
- cervical dilatation of less than 2 cm in 4 hours or a slowing in the progress of labour for second or subsequent labours
- descent and rotation of the baby's head
- changes in the strength, duration and frequency of uterine contractions.
If delay in the established first stage of labour is suspected, amniotomy should be considered for all women with intact membranes, after explanation of the procedure and advice that it will shorten her labour by about an hour and may increase the strength and pain of her contractions.

Whether or not a woman has agreed to an amniotomy, advise all women with suspected delay in the established first stage of labour to have a vaginal examination 2 hours later, and diagnose delay if progress is less than 1 cm.

**Confirmed delay in the first stage of labour:**

For all women with confirmed delay in the established first stage of labour:

Transfer the woman to obstetric-led care for an obstetric review and a decision about management options, including the use of oxytocin (follow the general principles for transfer of care described in the “Maternity Responsible Clinician, Referral, Handover of Care and Transfer” guideline. **For a multiparous woman with confirmed delay in the established first stage of labour, an obstetrician should perform a full assessment, including abdominal palpation and vaginal examination, before a decision is made about using oxytocin.**

Offer all women with delay in the established first stage of labour support and effective pain relief. Explain to the woman that using oxytocin after spontaneous or artificial rupture of the membranes will bring forward the time of birth but will not influence the mode of birth or other outcomes.

Inform the woman that oxytocin will increase the frequency and strength of her contractions and that its use will mean that her baby should be monitored continuously. Offer the woman an epidural before oxytocin is started. If oxytocin is used, ensure that the time between increments of the dose is no more frequent than every 30 minutes. Increase oxytocin until there are 4–5 contractions in 10 minutes. See also Trust “Induction of Labour” guideline.

Advise the woman to have a vaginal examination 4 hours after starting oxytocin in established labour:

- If cervical dilatation has increased by less than 2 cm after 4 hours of oxytocin, further obstetric review is required to assess the need for caesarean section.
- If cervical dilatation has increased by 2 cm or more, advise 4-hourly vaginal examinations.

**SECOND STAGE OF LABOUR**

**DEFINITION OF THE SECOND STAGE**

For the purposes of this guideline, use the following definitions of labour:

**Passive second stage of labour:**
the finding of full dilatation of the cervix before or in the absence of involuntary expulsive contractions.

Onset of the active second stage of labour:

- the baby is visible
- expulsive contractions with a finding of full dilatation of the cervix or other signs of full dilatation of the cervix
- active maternal effort following confirmation of full dilatation of the cervix in the absence of expulsive contractions.

**Observations During the Second Stage**

Carry out the following observations in the second stage of labour, record all observations on the partogram and assess whether transfer of care may be required:

- half-hourly documentation of the frequency of contractions
- hourly blood pressure
- continued 4-hourly temperature
- frequency of passing urine
- offer a vaginal examination hourly in the active second stage, or in response to the woman's wishes (after abdominal palpation and assessment of vaginal loss).

In addition:

- Continue to take the woman's emotional and psychological needs into account.
- Assess progress, which should include the woman's behaviour, the effectiveness of pushing and the baby's wellbeing, taking into account the baby's position and station at the onset of the second stage. These factors will assist in deciding the timing of further vaginal examination and any need for transfer to obstetric led care.
- Perform intermittent auscultation of the fetal heart rate immediately after a contraction for at least 1 minute, at least every 5 minutes. Palpate the woman's pulse every 15 minutes to differentiate between the two heartbeats. Where CEFM is being used but pulse oximetry is not available the maternal pulse should be palpated every 15 minutes as above.
- Ongoing consideration should be given to the woman's position, hydration, coping strategies and pain relief throughout the second stage.

**Duration of the Second Stage and Definition of Delay**

For a nulliparous woman:

- birth would be expected to take place within 3 hours of the start of the active second stage in most women
- diagnose delay in the active second stage when it has lasted 2 hours and refer the woman to a healthcare professional trained to undertake an operative vaginal birth if birth is not imminent.
For a multiparous woman:

- birth would be expected to take place within 2 hours of the start of the active second stage in most women
- diagnose delay in the active second stage when it has lasted 1 hour and refer the woman to a healthcare professional trained to undertake an operative vaginal birth if birth is not imminent.

For a nulliparous woman, suspect delay if progress (in terms of rotation and/or descent of the presenting part) is inadequate after 1 hour of active second stage. Offer vaginal examination and then offer amniotomy if the membranes are intact.

For a multiparous woman, suspect delay if progress (in terms of rotation and/or descent of the presenting part) is inadequate after 30 minutes of active second stage. Offer vaginal examination and then offer amniotomy if the membranes are intact.

If full dilatation of the cervix has been confirmed in a woman without regional analgesia, but she does not get an urge to push, carry out further assessment after 1 hour.

**OXYTOCIN IN THE SECOND STAGE**

Consideration should be given to the use of oxytocin, with the offer of regional analgesia, for nulliparous women if contractions are inadequate at the onset of the second stage.

Oxytocin should only be started for multiparous women with secondary arrest of labour after full and careful assessment by a Specialty Registrar or above, the findings of which must be documented in the notes.

**THE WOMAN’S POSITION AND PUSHING IN THE SECOND STAGE**

Discourage the woman from lying supine or semi-supine in the second stage of labour and encourage her to adopt any other position that she finds most comfortable. Avoid lithotomy where possible when pushing as this increases the risk of more serious perineal trauma.

Inform the woman that in the second stage she should be guided by her own urge to push.

If pushing is ineffective or if requested by the woman, offer strategies to assist birth, such as support, change of position, emptying of the bladder and encouragement.

**INTRAPARTUM INTERVENTIONS TO REDUCE PERINEAL TRAUMA**

The OASI bundle should be offered to all women having a vaginal delivery.
Prevention of third and fourth degree tears:

Evidence for routine protective effect of episiotomy is conflicting. However, Mediolateral episiotomy should be considered in instrumental deliveries and for all women with risk factors for third and fourth degree tears.

Where episiotomy is indicated, the mediolateral technique is recommended, with careful attention to ensure that the angle is 60 degrees away from the midline when the perineum is distended at crowning. Provide tested effective analgesia before carrying out an episiotomy, either using existing epidural analgesia or 1% lignocaine locally.

Manual perineal protection (MPP) at crowning can result in better outcomes. Recent interventional studies have demonstrated successful reduction in obstetric anal sphincter injury rates, all of which have described manual perineal protection/‘hands on’ techniques, see RCOG guidance). For spontaneous births MPP should be used unless the woman objects or her chosen birth position does not allow it. For assisted births, MPP should always be used.

Perineal protection includes:

1. Left hand slowing down the delivery of the head
2. Right hand protecting the perineum (Finnish Grip)
3. Mother NOT pushing when head is crowning (communicate)
4. Think about episiotomy (risk groups and correct angle)

Warm compression during the second stage of labour reduces the risk of anal sphincter injuries. A swab dampened with warm tap water may be used. It must be warm to the touch but not hot. They must not be heated using a microwave. Heat packs MUST NOT be used.

Delay in the second stage:

Delay in the second stage is where birth is not imminent after 2 hours in the active second stage of labour for nulliparous women or one hour in multiparous women. If there is delay in the second stage of labour, or if the woman is excessively distressed, support and sensitive encouragement and the woman's need for analgesia/anaesthesia are particularly important.

An obstetrician should assess a woman with confirmed delay in the second stage (after transfer to obstetric-led care, following the general principles for transfer of care described in the “Responsible Clinical, Referral, Handover of Care and Transfer “guideline before contemplating the use of oxytocin.

After initial obstetric assessment of a woman with delay in the second stage, maintain ongoing obstetric review every 15–30 minutes.
EXPEDITING BIRTH

If the birth needs to be expedited for maternal or fetal reasons, assess both the risk to the baby and the safety of the woman. Assessments should include:

- 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, including the 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.

Record the time at which the decision to expedite the birth is made.

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.

- Active management of the third stage involves a package of care comprising the following components:
  - routine use of uterotonic drugs
  - deferred clamping and cutting of the cord
  - controlled cord traction after signs of separation of the placenta.

- Physiological management of the third stage involves a package of care that includes the following components:
  - no routine use of uterotonic drugs
  - no clamping of the cord until pulsation has stopped
  - delivery of the placenta by maternal effort.
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. Follow the UHL guideline “Retained Placenta – Guidelines for Management” on managing a retained placenta.

OBSERVATIONS IN THE THIRD STAGE

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

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

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 (following the general principles for transfer of care described in the “Maternity Responsible Clinician, Referral, Handover of Care and Transfer” guideline.
- carry out frequent observations to assess whether resuscitation is needed.

ACTIVE AND PHYSIOLOGICAL MANAGEMENT OF THE THIRD STAGE

Explain to the woman antenatally about what to expect with each package of care for managing the third stage of labour and the benefits and risks associated with each.

Explain to the woman that active management:

- shortens the third stage compared with physiological management
- is associated with nausea and vomiting in about 100 in 1,000 women
- is associated with an approximate risk of 13 in 1,000 of a haemorrhage of more than 1 litre
- is associated with an approximate risk of 14 in 1,000 of a blood transfusion.

Explain to the woman that physiological management:

- is associated with nausea and vomiting in about 50 in 1,000 women
- is associated with an approximate risk of 29 in 1,000 of a haemorrhage of more than 1 litre
- is associated with an approximate risk of 40 in 1,000 of a blood transfusion.

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

Discuss with the woman at the initial assessment in labour about the different options for managing the third stage and ways of supporting her during delivery of the placenta, and ask if she has any preferences. Calculate the woman’s risk of
PPH using the PPH risk assessment tool (see appendix) and use this to decide how to manage the third stage. Recalculate the risk of PPH score at the beginning of the second stage and immediately postpartum and use this to categorise the risk of a PPH (green, amber or red). Use the score to offer the woman treatment that will reduce (approximately halve) her risk of having a massive obstetric haemorrhage (blood loss >2000ml).

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.

Document in the records the decision that is agreed with the woman about management of the third stage.

For active management, administer 1ml of syntometrine by intramuscular injection immediately after the birth of the baby and before the cord is clamped and cut. Use syntocinon alone only when ergometrine is contra-indicated for example if the woman has hypertension or pre eclampsia, or if the woman specifically requests this.

After administering syntometrine or syntocinon, clamp and cut the cord.

- Do not clamp the cord earlier than 1 minute from the birth of the baby unless there is concern about the integrity of the cord or the baby has a heart rate below 60 beats/minute that is not getting faster.
- Clamp the cord at 60seconds post delivery for women who wish to donate cord blood to Antony Nolan.
- Consider delaying cord clamping for two to four minutes (until the cord is white) to maximise blood transfer from the placenta to the baby.
- If the woman requests that the cord is clamped and cut later than 5 minutes, support her in her choice.

After syntometrine or syntocinon and cutting the cord, wait for signs of separation of the placenta. Then use either controlled cord traction or modified Brandt Andrews manoever to deliver the placenta.

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

Advise a change from physiological management to active management if either of the following occur:

- haemorrhage
- the placenta is not delivered within 1 hour of the birth of the baby.

Offer a change from physiological management to active management if the woman wants to shorten the third stage.

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

Contact an obstetric doctor (ST3 or above if the third stage is longer than 30mins with active management or 60mins with physiological management, sooner if there are any signs of haemorrhage.
ROUTINELY WEIGH ALL BLOOD LOSS AFTER THE BIRTH. A SENIOR MIDWIFE AND OBSTETRIC DOCTOR (ST3 OR ABOVE) SHOULD BE INFORMED WHEN BLOOD LOSS IS >1000ML. THE OBSTETRIC DOCTOR (ST3 OR ABOVE) AND ANAESTHETIST SHOULD BE INFORMED AND ATTEND THE BEDSIDE WHEN BLOOD LOSS IS >1500ML. CARE OF THE NEWBORN BABY

INITIAL ASSESSMENT OF THE NEWBORN BABY AND MOTHER—BABY BONDING

Record the Apgar score routinely at 1 and 5 minutes for all births.

Record the time from birth to the onset of regular respirations.

If the baby is born in poor condition (on the basis of abnormal breathing, heart rate or tone):

- follow the UHL guideline on neonatal resuscitation and
- take paired cord-blood samples for blood gas analysis, after clamping the cord using 2 clamps.

Continue to evaluate and record the baby's condition until it is improved and stable.

Do not take paired cord blood samples (for blood gas analysis) routinely.

Ensure that a second clamp to allow double-clamping of the cord is available in all birth settings.

Encourage women to have skin-to-skin contact with their babies as soon as possible after the birth. If the woman declines or is undergoing further interventions the father of the baby may do this.

In order to keep the baby warm, dry and cover him or her with a warm, dry blanket or towel while maintaining skin-to-skin contact with the woman.

Avoid separation of a woman and her baby within the first hour of the birth for routine postnatal procedures, for example, weighing, measuring and bathing, unless these measures are requested by the woman, or are necessary for the immediate care of the baby.

Encourage initiation of breastfeeding as soon as possible after the birth, ideally within 1 hour.

Record body temperature and birth weight soon after the first hour following birth.

 Undertake an initial examination to detect any major physical abnormality and to identify any problems that require referral.

Ensure that any examination or treatment of the baby is undertaken with the consent of the parents and either in their presence or, if this is not possible, with their knowledge.
NEONATAL RESUSCITATION

In the first minutes after birth, evaluate the condition of the baby – specifically respiration, heart rate and tone – in order to determine whether resuscitation is needed according to nationally accredited guidelines on neonatal resuscitation.

All relevant healthcare professionals caring for women during birth should attend annually a course in neonatal resuscitation that is consistent with nationally accredited guidelines on neonatal resuscitation.

In all birth settings:
- bear in mind that it will be necessary to call for help if the baby needs resuscitation, and plan accordingly
- ensure that there are facilities for resuscitation, and for transferring the baby to another location if necessary
- develop emergency referral pathways for both the woman and the baby, and implement these if necessary.

If a newborn baby needs basic resuscitation, start with air.

Minimise separation of the baby and mother, taking into account the clinical circumstances.

Throughout an emergency situation in which the baby needs resuscitation, allocate a member of the healthcare team to talk with, and offer support to, the woman and any birth companion(s).

CARE OF BABIES IN THE PRESENCE OF MECONIUM

In the presence of any degree of meconium:
- do not suction the baby's upper airways (nasopharynx and oropharynx) before birth of the shoulders and trunk
- do not suction the baby's upper airways (nasopharynx and oropharynx) if the baby has normal respiration, heart rate and tone
- do not intubate if the baby has normal respiration, heart rate and tone.

If there has been significant meconium and the baby does not have normal respiration, heart rate and tone, follow nationally accredited guidelines on neonatal resuscitation, including early laryngoscopy and suction under direct vision.

If there has been significant meconium and the baby is healthy, closely observe the baby within a unit with immediate access to a neonatologist.

Meconium of any grade is NOT considered to be significant if:
- The baby is vigorous at birth
- The baby is clinically well within the first hour of life

Initial management
All babies born through meconium-stained liquor should have observations taken and documented by the midwife at 1 and 2 hours of age.

While there are differences between the NICE guidance and this guideline in how to define significant meconium, the recommended UHL management algorithm has been subject to audit to ensure safe practice.

If any of the following are observed after any degree of meconium, ask a neonatologist to assess the baby (transfer both the woman and baby if they are at home or in a freestanding midwifery unit, following the general principles for transfer of care.

- respiratory rate above 60 per minute
- the presence of grunting
- heart rate below 100 or above 160 beats/minute
- capillary refill time above 3 seconds
- body temperature of 38°C or above, or 37.5°C on 2 occasions 30 minutes apart
- oxygen saturation below 95% (measuring oxygen saturation is optional after non-significant meconium)
- presence of central cyanosis, confirmed by pulse oximetry if available.

Explain the findings to the woman, and inform her about what to look out for and who to talk to if she has any concerns.

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BABIES BORN TO WOMEN WITH PRELABOUR RUPTURE OF THE MEMBRANES AT TERM

Ensure that any baby born to a woman with prelabour rupture of the membranes (more than 24 hours before the onset of established labour) has been reviewed by a neonatal doctor or advanced nurse practitioner. Use their assessment to guide whether NEWS observations are necessary. Where there are any concerns about a baby, refer promptly to a neonatologist for review, emphasising that the baby has a significant risk factor for sepsis (prolonged rupture of membranes).

If there are no signs of infection in the woman, do not give antibiotics to either the woman or the baby, even if the membranes have been ruptured for over 24 hours.

If there is evidence of infection in the woman, follow the pyrexia in labour guideline.

Advise women with prelabour rupture of the membranes to inform their healthcare professionals immediately of any concerns they have about their baby's wellbeing in the first 5 days after birth, particularly in the first 12 hours when the risk of infection is greatest.

Do not perform blood, cerebrospinal fluid and/or surface culture tests in an asymptomatic baby.

Refer a baby with any symptom of possible sepsis, or born to a woman who has evidence of chorioamnionitis, to a neonatal care specialist immediately.
CARE OF THE WOMAN AFTER BIRTH

INITIAL ASSESSMENT

Carry out the following observations of the woman after birth:

- Record her temperature, pulse and blood pressure. Transfer the woman (with her baby) to obstetric-led care if any of the relevant indications listed in the section "when to transfer from midwife led care of obstetric led care" on page 9 are met.
- Uterine contraction and lochia.
- Examine the placenta and membranes: assess their condition, structure, cord vessels and completeness. Transfer the woman (with her baby) to obstetric-led care if the placenta is incomplete.
- Early assessment of the woman's emotional and psychological condition in response to labour and birth.
- Successful voiding of the bladder. Assess whether to transfer the woman (with her baby) to obstetric-led care after 6 hours if her bladder is palpable and she is unable to pass urine.

If transferring the woman to obstetric-led care, follow the general principles for transfer of care.

PERINEAL CARE

DEFINITION AND ASSESSMENT OF TRAUMA

Define perineal or genital trauma caused by either tearing or episiotomy as follows:

- first degree – injury to skin only
- second degree – injury to the perineal muscles but not the anal sphincter
- third degree – injury to the perineum involving the anal sphincter complex:
  - 3a – less than 50% of external anal sphincter thickness torn
  - 3b – more than 50% of external anal sphincter thickness torn
  - 3c – internal anal sphincter torn.
- fourth degree – injury to the perineum involving the anal sphincter complex (external and internal anal sphincter) and anal epithelium.

Before assessing for genital trauma:

- explain to the woman what is planned and why
- offer inhalational analgesia
- ensure good lighting
- position the woman so that she is comfortable and so that the genital structures can be seen clearly
Perform the initial examination gently and with sensitivity. It may be done in the immediate period after birth.

If genital trauma is identified after birth, offer further systematic assessment, including a rectal examination.

Include the following in a systematic assessment of genital trauma:

- further explanation of what is planned and why
- confirmation by the woman that tested effective local or regional analgesia is in place
- visual assessment of the extent of perineal trauma to include the structures involved, the apex of the injury and assessment of bleeding
- a rectal examination to assess whether there has been any damage to the external or internal anal sphincter if there is any suspicion that the perineal muscles are damaged.

Ensure that the timing of this systematic assessment does not interfere with mother–baby bonding unless the woman has bleeding that requires urgent attention.

Assist the woman to adopt a position that allows adequate visual assessment of the degree of trauma and for repair. Only maintain this position for as long as necessary for systematic assessment and repair. If it is not possible to adequately assess the trauma, transfer the woman (with her baby) to obstetric-led care, following the general principles for transfer of care.

Seek advice from a more experienced midwife or obstetrician if there is uncertainty about the nature or extent of the trauma. Transfer the woman (with her baby) to obstetric-led care (following the general principles for transfer of care if the repair needs further surgical or anaesthetic expertise).

Document the systematic assessment and its results fully, possibly pictorially.

All relevant healthcare professionals should attend training in perineal/genital assessment and repair, and ensure that they maintain these skills.

Undertake repair of the perineum as soon as possible to minimise the risk of infection and blood loss.

**WHEN CARRYING OUT PERINEAL REPAIR:**

- ensure that tested effective analgesia is in place, using infiltration with up to 20 ml of 1% lidocaine or equivalent
- top up the epidural or insert a spinal anaesthetic if necessary.

If the woman reports inadequate pain relief at any point, address this immediately.

Advise the woman that in the case of first-degree trauma, the wound should be sutured in order to improve healing, unless the skin edges are well opposed.
Advise the woman that in the case of second-degree trauma, the muscle should be sutured in order to improve healing.

If the skin is opposed after suturing of the muscle in second-degree trauma, there is no need to suture it.

If the skin does require suturing, use a continuous subcuticular technique.

Undertake perineal repair using a continuous non-locked suturing technique for the vaginal wall and muscle layer.

Use an absorbable synthetic suture material to suture the perineum.

Offer rectal non-steroidal anti-inflammatory drugs routinely after perineal repair of first- and second-degree trauma provided these drugs are not contraindicated.

Observe the following basic principles when performing perineal repairs:

- Repair perineal trauma using aseptic techniques.
- Clean the perineum and vagina with antiseptic solution (pink or yellow sachets) and then apply sterile drapes.
- Check equipment and count swabs and needles before and after the procedure.
- Good lighting is essential to see and identify the structures involved.
- Ensure that difficult trauma is repaired by an experienced practitioner in theatre under regional or general anaesthesia.
- Insert an indwelling catheter for 6 hours after spinal anaesthetic or theatre epidural top-up hours to prevent urinary retention.
- Ensure that good anatomical alignment of the wound is achieved and that consideration is given to the cosmetic results.
- Carry out rectal examination after completing the repair to ensure that suture material has not been accidentally inserted through the rectal mucosa.
- After completion of the repair, document an accurate detailed account covering the extent of the trauma, the method of repair and the materials used.
- Give the woman information about the extent of the trauma, pain relief, diet, hygiene and the importance of pelvic-floor exercises.

**EDUCATION AND TRAINING**

None
MONITORING

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SUPPORTING REFERENCES

Management of Third and Fourth Degree Tears Green Top Guideline No 29. RCOG.(2015)

KEYWORDS

Labour. Intrapartum care, vaginal examination, pre labour rupture of membranes, eating and drinking in labour, pain relief, meconium, assessment of the newborn

CONTACT AND REVIEW DETAILS

Guideline Lead (Name and Title): N Ling
Executive Lead: I Scudamore

Details of Changes made during review: Format changed. Insertion of OASI care bundle and perineal repair guidance
Appendix 1

**Addressograph label here**

**Managing prolonged latent phase of labour for women with low risk pregnancies**

A vaginal examination should be offered in the presence of **regular** painful contractions to confirm the active phase of labour. A full explanation and rationale for the procedure should be provided as part of verbal consent.

**Primigravida**: active labour should be confirmed where there is cervical dilatation and full effacement with **regular** painful contractions, increasing in length, strength and frequency. **Multigravida**: Date and time of 1st assessment: active labour should be confirmed where there is cervical dilatation with **regular** painful contractions, increasing in length, strength and frequency.

Dilation should only be used as a guide. The assessment should always take in the whole clinical picture.

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**1st Assessment**
This should include a medical review if there are any concerns about the clinical picture

**2nd Assessment**
This should include a medical review if there are any concerns about the clinical picture

**3rd Assessment**
This should include a medical review

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**Woman not in active labour refer to algorithm.**

If following a third vaginal examination the woman is not in active labour, a full assessment including continuous electronic fetal monitoring should be carried out and referral for medical review using **SBAR**.

**Discussed with:**

**Plan:**
INTRODUCTION AND SCOPE

INTRODUCTION

This is the first UHL fetal monitoring guideline that relies on physiology-based interpretation as well as using FIGO classification for the assessment of fetal wellbeing. Previous guidance has been mainly based solely on pattern recognition. We aim to encompass a pathophysiological approach to explain how a fetus defends itself against Intrapartum hypoxic ischaemic insults and highlight the signs that suggest progressive loss of compensation.

The purpose of Intrapartum surveillance, in general, is a timely detection of babies who may be hypoxic, so that additional assessments of fetal wellbeing may be used or the baby can be delivered by caesarean or instrumental vaginal birth, to prevent perinatal/neonatal morbidity or mortality (NICE 2017 FIGO 2015).

As a result of a greater understanding and incorporation of physiology into the interpretation we expect to see a reduction in unnecessary intervention as well as a reduction in fetal hypoxic neurological injury, stillbirth and early neonatal death.

SCOPE

This guideline applies to all Healthcare professionals providing care for pregnant women in labour.

FETAL HEART RATE FEATURES AND PATHOPHYSIOLOGY

BASELINE HEART RATE

Baseline heart rate is the mean fetal heart rate rounded to increments of five beats per minute during a ten-minute segment, excluding accelerations, deceleration and periods of marked FHR variability. The baseline must be measurable for a minimum of 2 minutes in a ten-minute segment otherwise, the baseline for that segment is described as indeterminate.

In tracings with unstable FHR signals, review of previous segments and evaluation of longer time periods may be necessary to determine the baseline (FIGO 2015).

Normal baseline:
Normal baseline has a value between 110 and 160 bpm. (FIGO 2015) Preterm fetuses tend to have values toward the upper end of this range and post-term fetuses towards the lower end. Some experts consider the normal baseline values at term to be between 110 -150 bpm. However, It is important to note the normal baseline range for the individual fetus, by reviewing previous fetal heart rate traces if available or antenatal records. This is good clinical practice.
Tachycardia:
Tachycardia has a baseline value above 160bpm lasting more than 10 minutes.

Bradycardia:
Bradycardia has a baseline value below 110bpm lasting more than 10 minutes. **Values between 90 and 110 bpm may occur in a normal fetus, especially in a postdate pregnancy.** It is mandatory to confirm that this is not the maternal heart beat and that the trace shows normal baseline variability. (NICE 2017) **A senior obstetrician review is required before classifying the trace as normal. This is good clinical practice.**

VARIABILITY

This refers to the oscillation in the FHR signal, evaluated as the average bandwidth amplitude of the signal in 1-minute segments; (FIGO 2015), and the fluctuations should be irregular in amplitude and frequency. Variability is documented in beats per minute.

Normal:

![Normal Variability](image)

A bandwidth amplitude of 5 – 25 bpm.
Reduced:

A bandwidth amplitude below 5 bpm for more than 50 minutes in baseline segments, or for more than 3 minutes, during decelerations (FIGO 2015).

Absent Variability:

The amplitude range is undetectable with or without fetal decelerations.

Increased Variability (Saltatory Pattern):

A bandwidth value exceeding 25 bpm, lasting more than 30 minutes.

Pathophysiology of increased variability:

The pathophysiology of this pattern is incompletely understood, but it may be seen linked with recurrent decelerations, when hypoxia/acidosis evolves very rapidly. It is presumed to be caused by fetal autonomic instability/hyperactivity. (FIGO 2015).

Intervention may be required sooner if this pattern is seen during the second stage or during decelerations. A Saltatory pattern for more than 30 minutes may indicate hypoxia even without decelerations.

Pathophysiology of reduced or absent variability:

Hypoxic stress may develop over hours rather than minutes during labour and this may provide the fetus with the opportunity to utilise its compensatory mechanisms to avoid hypoxic injury. The CTG would initially show decelerations followed by
disappearance of accelerations as the fetus attempts to conserve energy by limiting muscle activity that may increase oxygen requirement. If the hypoxic insult continues, the fetus then releases catecholamines to increase the heart rate and its cardiac output to supply vital organs. The decelerations due to hypoxic stress are followed by a rise in the baseline heart rate due to release of adrenaline and noradrenaline from the adrenal glands. Despite the fetal efforts to compensate, if the hypoxic insult persists, then decompensation ensues, resulting in reduced perfusion of the brain leading to a loss of baseline variability. The CTG would now be termed ‘pre-terminal’ as the final event is reduction of myocardial oxygenation that results in gradual reduction of fetal heart rate, signifying myocardial acidosis and failure of the autonomic centres of the brain to maintain a stable baseline heart rate.

In both long standing hypoxia and pre-terminal traces the fetus has exhausted all its reserves or is unable to compensate. In long standing hypoxia the hypoxic insult has occurred at some point during the ante natal period and the CTG would probably show a higher baseline with reduced variability and shallow decelerations with uterine contractions. During labour, uterine contractions may cause further episodes of hypoxia and therefore worsen any existing cerebral damage.

**Fetal Behavioural States affecting Baseline Variability:**

This refers to periods of:

**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 Movement). This is the most frequent behavioural state and is represented by a moderate number of accelerations and normal variability.

**Wakefulness:**

Active wakefulness is rarer 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).

The alternation of different behavioural states (**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.
Sinusoidal pattern:

A regular, smooth, undulating signal, resembling a sine wave, with 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.

Pathophysiology of sinusoidal pattern:

The pathophysiological basis of the sinusoidal pattern is not completely understood, but it occurs in association with severe fetal anaemia, and is found in anti-D alloimmunisation, and ruptured vasa praevia. It has also been described in cases of acute fetal hypoxia, infection, cardiac malformations, hydrocephalus, and gastroschisis (FIGO 2015).
**Pseudo-sinusoidal pattern:**

A pattern resembling the sinusoidal pattern, but with a more jagged “saw-tooth” appearance, rather than the smooth sine-wave form. Its duration seldom exceeds 30 minutes and it is characterized by normal patterns before and after (FIGO 2015).

**Pathophysiology of pseudo-sinusoidal pattern:**

Some authorities consider a “pseudo-sinusoidal pattern” as the presence of accelerations with sinusoidal patterns. This pattern has been described after analgesic administration to the mother, and during periods of fetal sucking and other mouth movements. It is sometimes difficult to distinguish the pseudo-sinusoidal pattern from the true sinusoidal pattern, leaving the short duration of the former as the most important variable to discriminate between the two (FIGO 2015).

The presence of “saw toothed” or “Poole shark-teeth” pattern is termed “atypical sinusoidal pattern” by some authorities, caused by fetal hypotension occurring secondary to acute feto-maternal haemorrhage and conditions such as ruptured vasa praevia.
ACCELERATIONS

Accelerations are abrupt increases in the FHR above the baseline, of more than 15 bpm in amplitude, and lasting more than 15 seconds but less than 10 minutes. (Onset to peak in less than 30 seconds). An acceleration must start from and return to a stable baseline.

Before 32 weeks of gestation, amplitude and duration of accelerations may be lower (10 seconds and 10 bpm of amplitude). 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.
Decelerations are decreases in the FHR below the baseline, of more than 15 bpm in amplitude, and lasting more than 15 seconds. Decelerations are considered to be a reflex response to protect the myocardial workload when a fetus is exposed to a hypoxic or a mechanical stress, to help maintain an aerobic metabolism within the myocardium. They are divided into:-

**Early Decelerations:**

Early decelerations are decelerations that are gradual (onset to nadir ≥30s) and return to the baseline. They coincide with contractions, and show normal variability within the deceleration. They are likely to be seen in the late first stage and second stage of labour and are believed to be caused by fetal head compression. They do not indicate fetal hypoxia/acidosis (FIGO 2015).

**Variable Decelerations:**

Variable decelerations are V-shaped decelerations that exhibit a rapid drop (onset to nadir ≤30s) followed by a rapid recovery to the baseline. The precipitous fall and rise of the baseline due to cord compression means there is no time to exhibit good variability within the trough of the deceleration. These decelerations vary in size, shape, and relationship to uterine contractions.
**Pathophysiology of variable decelerations:**

Variable decelerations constitute the majority of decelerations during labour, and they represent a baroreceptor-mediated response to increased arterial pressure, as occurs with umbilical cord compression (FIGO, 2015). They are believed to occur secondary to baroreceptor and/or peripheral chemo-receptor stimulation. They are seldom associated with fetal hypoxia/acidosis, unless they evolve to exhibit a U-shaped component (“sixties” criteria) with a reduced or an increased variability within the deceleration (see late decelerations below), and/or their individual duration exceeds 3 minutes (FIGO 2015) (see prolonged decelerations below).

**Variable decelerations meet the “sixties” criteria if two or more of the following are present:** drops by 60bpm or more, reaches 60bpm or less, for the duration of 60 seconds or longer.

**Late Declarations:**

Late decelerations are decelerations with a gradual onset and/or a gradual return to the baseline and/or reduced or increased variability within the deceleration. Gradual onset and return occurs when more than 30 seconds elapses between the beginning/end of a deceleration and its nadir. When contractions are adequately monitored, late decelerations start more than 20 seconds after the onset of a contraction; have a nadir (lowest point) after the acme,(highest point of the contraction) and return to the baseline after the end of the contraction (FIGO 2015).

**Pathophysiology of late decelerations:**

These decelerations are indicative of a chemoreceptor-mediated response to fetal hypoxaemia. On a trace showing no accelerations and reduced variability, the definition of late decelerations also includes those with amplitude of 10-15 bpm (shallow decelerations).
Prolonged decelerations:

Prolonged decelerations are decelerations lasting more than 3 minutes. These are likely to include a chemoreceptor mediated component and thus indicate hypoxaemia. Decelerations exceeding 3 minutes, with fetal heart rate maintained at less than 80bpm and reduced variability within the deceleration, are frequently associated with acute fetal hypoxic acidosis and require urgent intervention. (FIGO 2015). See 3 minute rule.

CONTRACTIONS

Contractions are recorded as bell-shaped, gradual increases in the uterine activity signal, followed by roughly symmetrical decreases. When using the tocograph transducer, only the frequency of contractions can be reliably evaluated (FIGO 2015). The intensity and duration of contractions may be assessed by manual palpation. Frequency of contractions cannot be assessed reliably by the tocograph transducer and so manual palpation for 10 minutes every hour is required.

Tachysystole:
Tachysystole presents an excessive frequency of contractions and is defined as the occurrence of five or more in 10 minutes, in two successive 10-minute periods or averaged over a 30-minute period.

Hyperstimulation:
Hyperstimulation refers to an exaggerated response to uterine stimulants, presenting as an increase in frequency of the contractions, strength of uterine contraction, increased uterine tone between contractions and/or prolonged contractions for over 2 minutes. These may lead to fetal heart rate changes. Therefore, any increased uterine activity (frequency, duration of strength) associated with CTG changes should be considered as uterine hyperstimulation. This described picture of hyperstimulation may occasionally be seen in spontaneous labour without the use of uterine stimulants. (To avoid over complication, the term hyperstimulation will be used to include both iatrogenic and spontaneous increased uterine activity).
Other factors that are present during labour such as prolonged rupture of membranes, (defined as spontaneous rupture of membranes for greater than 24 hours), chorioamnionitis, anhydramnious, meconium-stained liquor, maternal infection or pyrexia, and the speed of evolution of hypoxia are likely to modify the responses of the fetus as well as affect the perinatal outcome.

Physiology of meconium stained liquor:

Meconium stained liquor (MSL) can be present in a normal post term fetus without an indication that the baby has experienced hypoxia. In a preterm fetus, <30/40, the presence of meconium signifies that there is likely infection, such as listeria, ureaplasma or rotavirus. Clear liquor has antibacterial properties however in the presence of meconium these properties are restricted. With thick meconium, E coli has the ability to grow rapidly, whereas Group B Streptococcus proliferates even in clear liquor. Fetal tachycardia (≥160 bpm), in the presence of MSL the woman is 51 times more likely to develop chorioamnionitis, in comparison to clear liquor.

MSL is associated with complications in the new-born. The most severe complication is meconium aspiration syndrome (MAS). Aspiration of meconium can occur in-utero with fetal gasping, or after birth, with the first breaths of life.

There is still no effective, safe or prophylactic measure for MAS once the meconium has passed below the vocal cords into the lungs. Evidence shows that when the placental oxygen supply is interrupted, the fetus attempts to breathe. Should these attempts fail to provide an alternative oxygen supply, and if hypoxia continues, the respiratory centre becomes unable to continue initiating breathing and the breathing stops, usually within 2 to 3 minutes. In view of this, extra vigilance should be taken to observe for signs of hypoxia in the presence of meconium. A lower threshold for expediting delivery should be considered when there is meconium and signs of hypoxia as a CTG cannot predict if a fetus will gasp or when this would happen.

If a fetus has passed meconium, the mother should be informed that there is a risk of meconium already being present in the lungs. Most meconium will be expelled from the fetal lungs as the baby passes down the birth canal but 1-3% of live births, the baby will develop MAS. See page 27 for management of babies born through meconium.

Oxytocin and Hyperstimulation:

Care should be taken when using prostaglandins or oxytocin to augment or stimulate labour. One of the iatrogenic causes of prolonged decelerations includes prolonged or frequent uterine contractions secondary to oxytocin. If this cause is identified, immediate action should be taken to improve utero-placental oxygenation by stopping oxytocin and changing maternal position to reduce the stress the baby is experiencing. (FIGO 2015). Consideration should also be given to starting acute tocolysis using a beta-adrenergic agonist such as terbutaline. (NICE 2017).
CEFM is necessary with oxytocin augmentation. If the fetal heart rate is normal, oxytocin should be titrated to achieve contractions at a rate of 3-4:10. It should be reduced if contractions occur 5:10 or more. If evidence/suspicion of fetal decompensation occurs, oxytocin infusion should be stopped and an urgent assessment of the fetal condition should be undertaken and documented by an obstetrician. In the event of acute hypoxia, oxytocin should be stopped, and the 3-minute rule initiated. A full assessment of the fetal condition must be undertaken and documented by an obstetrician BEFORE oxytocin is recommenced.

**Pyrexia:**

Heat transmission during pregnancy results in fetal temperature being 0.3-0.5ºc higher than maternal temperature. The umbilical circulation transfers 85% of the heat produced by the fetus to the maternal circulation. The remaining 15% is dissipated through the fetal skin to the amnion and is then transferred through the uterine wall to the maternal abdomen. If there is pyrexia, the metabolic demands of the fetal tissues are increased and so the risk of hypoxia is elevated. This should be considered especially when using oxytocin, and a prolonged labour should be avoided. The combination of maternal pyrexia with cord acidosis (indicative of fetal acidosis) greatly increases the risk of neonatal encephalopathy. Evidence suggests that acidosis and pyrexia represent two separate causal pathways of neonatal encephalopathy leading to a cumulative effect.

There is no clear evidence to suggest when a fetus should be delivered if there is maternal or fetal infection. In view of the lack of clear evidence/guidance on a safely acceptable time frame for delivery, a clear discussion with the mother should be undertaken with agreed management plan and time frame documented from this. Measures, such as paracetamol, IV fluids and IV antibiotics, should be used to treat any pyrexia and infection. Evidence shows that an intrapartum maternal dose of cefuroxime, 1500mg, I.V. produces effective fetal concentrations for prophylaxis, but not treatment. Intrapartum fever, even when unlikely to be caused by infection, is associated with a fourfold increase in the risk of unexplained, early-onset seizures in term infants.

**Antepartum Haemorrhage:**

Major placental abruption is one of the 4 major intrapartum accidents and may present as a single and sudden drop in the baseline rate (acute hypoxia). In this case, delivery must be expedited as it is most likely to be the evidence of a placental abruption and is irreversible (FIGO 2015). It is also important to note that the use of tocolytics in APH may aggravate placental separation causing worsening fetal hypoxia. Vasa praevia occurs when the fetal vessels run through the free placental membranes. Consider rupture of these vessels as a diagnosis when performing ARM.

**Epidural:**

Epidural can cause a sudden drop in maternal blood pressure which causes redistribution of maternal blood away from the placenta resulting in inadequate
placental perfusion. It will present as a single and sudden drop in the baseline rate (acute hypoxia). In this instance, it is reversible and should be corrected by changing the maternal position and IV fluids + IV ephedrine (to be administered by the anaesthetic team).

This vasodilation can also cause an increase in maternal temperature as a result of altered thermoregulation (RCOG 2015).

**Scar Rupture:**

If a woman has had a previous lower segment caesarean section and begins to labour, the risk of uterine scar rupture is between 0.07% to 0.5% ; RCOG 2015) and must be considered. This is the third major intrapartum accident and may present as a single and sudden drop in the baseline rate (acute hypoxia). In this case, delivery must be expedited as it is irreversible (FIGO 2015).

**Subclinical Chorioamnionitis:**

Research has shown that only 8-12% of women with histologically confirmed chorioamnionitis would demonstrate tachycardia and pyrexia during labour. Therefore, any increase in the baseline fetal heart rate without preceding decelerations should arouse the suspicion of an on-going subclinical chorioamnionitis. Other clinical parameters, such as presence of meconium, rate of progress of labour, history of prolonged rupture of membranes or prolonged labour and absence of cycling should be considered whilst making management decisions.

**Preterm:**

There is paucity of evidence/guidelines on the use of CTG in Preterm babies. This has resulted in some authors advising against continuous monitoring in extreme prematurity (24-28 weeks). The key factors affecting FHR characteristics in the preterm fetus are immaturity of the central and peripheral nervous systems, reduced placental reserve, immature adrenal gland and myocardium, and reduced amount of Wharton’s jelly in the umbilical cord. CTG findings include:

Immaturity of the autonomic nervous system will result in a higher baseline heart rate and reduced variability.

Immaturity of the somatic nervous system may result in less acceleration, being less frequent and of smaller amplitude (10bpm) and for a shorter duration (10sec). This is especially more evident at gestations before 30 weeks.

Fetal heart rate decelerations in the absence of uterine contractions often occur in the normal preterm fetus between 20 and 30 week’s gestation. Variable decelerations have been shown to occur in 70-75% of intrapartum preterm fetuses, in comparison to 30-50% of term fetuses.

Immaturity of the central nervous system results in a less developed cycling pattern, this is especially more evident in extreme prematurity.
Effect of medication on the CTG:

It is important to consider the effect of any medication administered to the mother during labour and anticipate the changes it may cause on the CTG trace. This is even more important when medications are given for the purpose of improving fetal conditions. In such cases, we would need to consider what to look for as signs of improvement, what may occur if our intervention did not work or if the situation is worsening, how soon to expect changes and how long should they last for.

FETAL HYPOXIA IN 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:

ACUTE HYPOXIA

Acute hypoxia presents as a prolonged deceleration lasting for more than 3 minutes or for more than 3 minutes if associated with reduced variability within the deceleration (FIGO 2015). Fetal pH drops at a rate of 0.01/min during the deceleration.

Causes of hypoxia:

4 accidents:

- Cord prolapse
- Vasa Praevia
- Placental Abruption
- Uterine Rupture

2 iatrogenic:

- Maternal Hypotension (usually secondary to supine hypotension or epidural top-up)
- Uterine hyperstimulation (by oxytocin/Prostaglandins) or spontaneous increased activity
Management - the 3 minute rule:

Management of a prolonged deceleration follows 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 Notes:

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.

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.

SUBACUTE HYPOXIA

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.

If sub acute hypoxia is encountered in the second stage of labour, unless delivery is imminent, ask the woman to stop pushing to allow the recovery of the fetal status. If no improvement is seen within 10 minutes, expedite delivery. Once stable, recommence directed pushing. If subacute hypoxia recurs, expedite delivery.

**GRADUALLY EVOLVING HYPOXIA**

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 catecholamine’s (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)

**Important notes:**

- Stages 1-4 represent evidence of stress with maintained fetal compensation.
- Stages 5&6 represent evidence of stress with fetal decompensation.
- Stages 1-5 may be reversible although prolonged episodes of hypoxia can lead to fetal organ damage.
- Management of gradually progressive hypoxia is by improving fetal conditions with the first signs of redistribution to avoid internal organ damage. This is achieved by keeping the levels of stress to which a fetus is subjected to just short of the catecholamine response (Stage 4).
CHRONIC HYPOXIA

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 increased 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.

ASSESSMENT AND MANAGEMENT

INITIAL ASSESSMENT

All women that have existing medical or obstetric conditions should have an obstetric review during pregnancy with a full plan of care formulated for labour and birth. This should include the suitability for different birth settings and the type of fetal monitoring required when in labour. The care plan should be explained to and agreed by the woman.

The assessment should be as per “measuring fetal heart as part of initial assessment” section on page 12 of Intrapartum care guideline

INTERMITTENT AUSCULTATION

INCLUSION CRITERIA

Continuous electronic fetal monitoring (CEFM) in low risk women is associated with an increased level of intervention without any improvement in outcome. Women who are healthy and have had an uncomplicated pregnancy should be offered and
recommended intermittent auscultation to monitor fetal well-being. This should be performed using a Doppler ultrasound or pinard stethoscope. (NICE 2017). A woman must be fully informed of the risks and benefits of intermittent auscultation (IA) and CEFM. If during labour, she chooses not to be monitored by the recommended method a full discussion of the potential impact on her and the fetus should be documented and the labour ward coordinator and senior obstetrician should be informed. This discussion must be clearly documented in the woman’s records.

METHOD

There does not appear to be any good evidence from trials to recommend any particular frequency and duration of IA. Therefore, it is more a ‘custom of practice’ than ‘evidence-based approach’. Auscultation should be carried out every 15 minutes in the first stage and every 5 minutes in the second stage – a practice adopted from the randomised controlled trials comparing IA and CEFM. On assessing the woman and establishing that she is low risk and is suitable for IA the method is as follows:

- Ask about fetal movements over the preceding 24 hours.
- Perform a full abdominal palpation to determine the lie, presentation and position of the baby.
- At the initial assessment use a pinard stethoscope on the mother’s abdomen in line with the fetal scapula to establish the real sounds of the fetal heart (FH).
- On first auscultation listen for at least one full minute in between contractions when the baby is at rest to establish a baseline FH rate.
- If in early labour, auscultate during fetal movements or following stimulation of the baby. An acceleration should be noted, and the presence of chronic hypoxia can be excluded. This is more difficult to demonstrate later in labour.
- The maternal pulse should be palpated simultaneously while auscultating FH to differentiate between the two, as it is possible to inadvertently pick up maternal heart rate from surrounding vessels. This should be done on the initial assessment and every hour and throughout if a FH abnormality is detected.
- During the first stage and passive second stage of labour the FH should be auscultated immediately after a contraction for at least 1 minute every 15 minutes. The midwife must ensure the auscultation is after a contraction by palpating the latter part of the contraction rather than asking the woman if it has ended. This is to ensure any late decelerations are not being missed. Passive second stage is defined as the findings of full dilatation of the cervix prior to or in the absence of involuntary expulsive contractions or active maternal effort.
- During active second stage of labour, the FH should be auscultated every 5 minutes. Active second stage is defined as the onset of involuntary expulsive contractions or active maternal effort following confirmation of full dilatation.
• Count the FH and document as a single number, and not as an average. If using a Doppler do not rely on the range shown on the screen, as there have been instances where the machine has miscalculated the FH rate. (NICE 2014)
• Record acceleration and decelerations, if heard. (NICE 2014)
• None of the literature suggests that variability can be determined by IA. (NICE 2014)
• An observed rise in baseline rate, slow recovering decelerations or persistent accelerations (overshoot) after contractions should be confirmed by listening through the next 3 contractions to clarify the suspected pattern. Confirmation of an abnormality warrants a move to CEFM and transfer to obstetric-led care (see section criteria for change). (FIGO 2015).
• Although a CTG machine utilises the same technology as the handheld Doppler, it should not be used in a low risk labour for intermittent auscultation, as this is inappropriate use of resources. (Good Clinical Practice). The handheld Doppler has a narrow beam and is unlikely to pick up the maternal sound. It gives a swishing noise when tracked to a blood vessel compared with the electronic heartbeat sounds of the US transducer of a CTG machine; hence the handheld Doppler device is preferred.

ONGOING INTERMITTENT AUSCULTATION

Documentation:
The initial risk assessment should be documented in the maternal notes on admission in labour.
The FH should be documented in the notes as a single number counted as beats over one minute.
Maternal pulse should be documented every hour as a single number in the first stage of labour and every 15 minutes in the second stage of labour in order to differentiate between the maternal pulse and the fetal heart rate.
An hourly assessment should be carried out using DRCBRAVADO and documented in the maternal notes. None of the literature suggests that an assessment of variability can be determined by IA. Therefore, when documenting DR C BRAVADO when using IA, by V for variability the practitioner should write “not applicable”.
When labour is confirmed a partogram must be started. This will act as a visual prompt to identify any changes from the norm. Blood pressure, pulse, temperature and urine output should also be documented on the partogram.

CONVERSION CRITERIA FOR CHANGING FROM IA TO CEFM

During the course of pregnancy or labour the clinical circumstances may change, increasing risk to mother and/or fetus. In this situation, the mother should be informed of the rationale for changing the method of auscultation and should also be clearly documented in the notes.
If CEFM has been commenced due to concerns arising during IA but the CTG is normal after a minimum of 20 minutes it is deemed suitable to return to IA if concerns arise again, CEFM would be recommended until delivery.

If conversion to CEFM is advised but declined, the risks of not continuously monitoring should be explained, and the midwife in charge and obstetric team informed. All discussions must be clearly documented in the notes.

<table>
<thead>
<tr>
<th>REASONS FOR CHANGING TO CEFM FROM IA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MATERNAL</strong></td>
</tr>
<tr>
<td>*Pulse over 120 beats/minute on 2 occasions 30 minutes apart</td>
</tr>
<tr>
<td>*Systolic blood pressure ≥ 160 mmHg or a single reading of diastolic blood pressure ≥ 110 mmHg</td>
</tr>
<tr>
<td>Fetal heart rate below 110 or above 160 beats/minute, or if it is perceived as inappropriate for gestational age</td>
</tr>
<tr>
<td>Evidence of a rising baseline on the partogram</td>
</tr>
<tr>
<td>Maternal pyrexia (defined as ≥38.0c once or ≥37.8c on two occasions 1 hour apart)</td>
</tr>
<tr>
<td>Any vaginal blood loss other than a show</td>
</tr>
<tr>
<td>Persistent pain in between contractions</td>
</tr>
<tr>
<td>Tachysystole</td>
</tr>
</tbody>
</table>

*measured between contractions

**CONTINUOUS ELECTRONIC FETAL MONITORING**

CEFM could potentially reduce mobility. However, every effort should be made to facilitate the normal physiology of labour by encouraging the woman to adopt upright positions and mobilise. This can be facilitated by the use of wireless telemetry or by the encouragement to move within the constraints of being connected to the monitor.

CEFM is a screening tool for hypoxia and does not replace the need for accurate clinical observations on which decisions should be made in conjunction with the CTG (FIGO 2017).
### REASONS FOR CEFM

<table>
<thead>
<tr>
<th>MATERNAL</th>
<th>FETAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestation ≤37 or ≥42 weeks</td>
<td>Abnormal Doppler</td>
</tr>
<tr>
<td>Induced labour</td>
<td>Known or suspected IUGR / macrosomia</td>
</tr>
<tr>
<td>Administration of oxytocin</td>
<td>Oligohydramnios or polyhydramnios</td>
</tr>
<tr>
<td>Ante/Intrapartum haemorrhage</td>
<td>Malpresentation / free floating head in a primiparous women</td>
</tr>
<tr>
<td>Maternal illness (e.g. diabetes, cardiac, renal, hyperthyroidism), monitoring as per consultant plan</td>
<td>Meconium stained liquor</td>
</tr>
<tr>
<td>Pre-eclampsia</td>
<td>Multiple pregnancy (all babies to be monitored)</td>
</tr>
<tr>
<td>Previous uterine scar (caesarean section of myomectomy)</td>
<td>2 or more episodes of reduced fetal movements in the third trimester</td>
</tr>
<tr>
<td>Contractions ≥5:10 or lasting for more than 90 seconds</td>
<td>Reduced fetal movements in the last 24 hours reported by the woman</td>
</tr>
<tr>
<td>Epidural. If there are any concerns about the fetal heart rate then continuous fetal heart rate monitoring should be commenced prior to insertion of an epidural block.</td>
<td>Recurrent accelerations (immediately following a contraction i.e. overshoot). A rise in baseline, repeated decelerations or slow to recover decelerations.</td>
</tr>
<tr>
<td>Continuous electronic fetal monitoring (if not already in use for maternal or fetal risk factors) must be commenced after insertion of the epidural and prior to administration of the test dose for at least 30 minutes and also after each bolus dose of 10ml or more</td>
<td></td>
</tr>
<tr>
<td>Prolonged rupture of membranes ≥ 24 hours unless delivery is imminent.</td>
<td>Fetal structural abnormalities diagnosed during the antenatal period and planned for CEFM</td>
</tr>
<tr>
<td>Signs of chorioamnionitis or sepsis</td>
<td></td>
</tr>
<tr>
<td>Maternal request</td>
<td></td>
</tr>
</tbody>
</table>

The table above is not exhaustive; any condition which is thought to increase the risk of fetal hypoxia mandates CEFM.

### INTERPRETING THE CTG

Intrapartum Care and Fetal Heart Rate Monitoring in Labour UHL Obstetric Guideline  
Author: Guideline Working Party, Updated by Working Party  
Contact: Julia Austin Consultant Midwife  
Approved by: Maternity Service Governance Group  
Guideline Register No: C60/2019  
Please note that this may not be the most recent version of the document; a definitive version is in the Policy and Guidelines Library.
Step 1 – The clinical setting:

What is the current gestation, have there been any antenatal events e.g. IUGR, PET, medications given or any comorbidites such as Diabetes as these might increase the risk of fetal hypoxia. The previous CTG traces should be checked alongside the clinical scenario to assess whether they can be used as a baseline for the current monitoring.

Step 2 - current clinical situation and indication for CTG:

What is happening in labour and why has the woman been placed on CEFM? Is there meconium, is the woman pyrexial?

Step 3: Set the limits acceptable as normal for THIS trace BEFORE starting the assessment:

What is the fetal heart rate baseline for this gestation etc.?

Step 4: Assess the trace:

Identify any risks. Look at the contractions – is the inter-contraction interval more than 90 seconds?

Baseline Heart rate:

Baseline HR is the most important feature on a CTG trace. Consider whether the baseline is appropriate for gestational age and compare the rate on previous CTG’s if appropriate. A change in baseline by 10% or more signifies a need for review by a senior obstetrician. In the presence of chronic hypoxia, more subtle changes to the baseline should also be considered significant.

Variability and Cycling:

Cycling is a sign of fetal well-being. It signifies normal fetal physiology.

In the presence of decelerations and increase in baseline rate, episodes of reduced variability must be managed promptly, and not assumed to be cycling. Reduced variability in this situation is caused by CNS inhibition secondary to hypoxia.

Accelerations:

The presence of accelerations is generally considered to be a reassuring feature. An acceleration starts from, and returns to the baseline. It is important to differentiate accelerations from overshoots (rebound increase in heart rate caused by brief accumulation of CO2 during hypoxic episodes) and shouldering (increase in heart rate preceding and/or following decelerations commonly with cord compressions.)

If accelerations are coinciding with contractions, especially in the second stage of labour, exclude maternal heart rate.
Decelerations:

It is important to realise that although the presence of decelerations does not in itself reflect that the fetus is unwell, it may signal the need to try and alter fetal conditions. Such as:

Repeated chemoreceptor decelerations (late, prolonged, or reduced variability within deceleration) signify that the placental stores are being depleted. Frequently, this can be corrected by changing maternal position, or increasing circulating volume by hydration, reducing the stress by reducing/stopping oxytocin. If this does not correct the situation it is important to monitor closely for any rise in baseline rate or reduction of variability.

Prolonged decelerations (>3 minutes) need to be managed according to the 3-minute rule (page 47).
CTG CLASSIFICATION PROCESS

Initial assessment

- Assess and document using DRCBRAVADO
- Rule out chronic hypoxia by using the Initial CTG Assessment Tool (Table 1)
- Document classification using table 1 as normal, chronic hypoxia or other

Ongoing and hourly assessment

- Assess and document using DRCBRAVADO
- Document classification using the FIGO CTG Classification table (Table 2)
  - The classification should be documented as normal, suspicious or pathological
- Assess for hypoxia using the CTG Interpretation table and document (Table 3)
- Document using the sticker (Table 4)

TABLE ONE

Initial CTG Assessment to exclude chronic hypoxia and pre-existing fetal injury (Pereira and Chandracharan, 2017)

<table>
<thead>
<tr>
<th></th>
<th>Baseline fetal heart rate appropriate for gestational age</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>Normal variability and cycling</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Presence of accelerations (not in labour or latent phase of labour)</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Shallow/late decelerations</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>Consider the wider clinical picture: meconium, temperature, fetal growth, reduced fetal movements</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Overall impression: Normal/Chronic Hypoxia/Other:

Management Plan:
### TABLE TWO

<table>
<thead>
<tr>
<th></th>
<th>Normal</th>
<th>Suspicious</th>
<th>Pathological</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline (bpm)</strong></td>
<td>110 – 160</td>
<td>Lacking at least one feature of normality but with no pathological features</td>
<td>Above 180bpm or below 100bpm</td>
</tr>
<tr>
<td><strong>Baseline variability (bpm)</strong></td>
<td>5-25</td>
<td></td>
<td>Less than 5 (reduced) &gt;50 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>More than 25 (saltatory) &gt;30 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Or sinusoidal for &gt;30 minutes</td>
</tr>
<tr>
<td><strong>Decelerations</strong></td>
<td>No repetitive Decelerations</td>
<td>Repetitive decelerations are those occurring with more than 50% of contractions</td>
<td>Repetitive, late or prolonged decelerations with any concerning characteristics &gt;30 minutes or &gt;20 minutes if there is reduced variability also</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Reduced variability within the deceleration</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Gradual or failure to return to baseline after contraction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Biphasic (W) shape</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• No shouldering</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Or A single prolonged deceleration (below 100 bpm) lasting 3 minutes or more</td>
</tr>
<tr>
<td><strong>Accelerations</strong></td>
<td>The presence of fetal heart rate accelerations, even with reduced baseline variability, is generally a sign the baby is healthy. The loss of accelerations alone (in labour) is unlikely to be associated with fetal acidosis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Management and Actions</strong></td>
<td>No hypoxia. No intervention necessary to improve fetal oxygenation.</td>
<td>Actions to reverse possible causes if identified. Close, continued observation and escalation as required. Consider adjunctive monitoring methods.</td>
<td>High probability of hypoxia / acidosis Involvement of the senior MDT. Immediate actions to reverse possible causes if possible or if this is not possible, expedite delivery.</td>
</tr>
</tbody>
</table>

*AH MOTHERS* acronym – APH, Hypertension, Meconium, Oxytocin, Temperature/Tachysystole, Heart Rate abnormal pattern, Epidural analgesia, Rate of progress in labour, Scar

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**TABLE THREE ON NEXT PAGE**

Intrapartum Care and Fetal Heart Rate Monitoring in Labour UHL Obstetric Guideline

Author: Guideline Working Party, Updated by Working Party

Contact: Julia Austin Consultant Midwife

Approved by: Maternity Service Governance Group

Guideline Register No: C60/2019

Page 58 of 65

Written: December 2003

Last Review: December 2019

Next Review: December 2022

Please note that this may not be the most recent version of the document; a definitive version is in the Policy and Guidelines Library.
### Intrapartum Care and Fetal Heart Rate Monitoring in Labour

<table>
<thead>
<tr>
<th>Hypoxia</th>
<th>Features</th>
<th>Management</th>
</tr>
</thead>
</table>
| No Hypoxia | • Baseline appropriate for G.A.  
• Normal variability and cycling  
• No repetitive decelerations | • Consider whether the CTG needs to continue  
• If continuing the CTG perform routine hourly review. (see CTG Assessment Tool below) |

### Evidence of Hypoxia

<table>
<thead>
<tr>
<th>Chronic Hypoxia</th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| • Higher baseline than expected for G.A.  
• Reduced variability and/or absence of cycling  
• Absence of accelerations  
• Shallow decelerations  
• Consider the clinical indicators: reduced fetal movements, thick meconium, bleeding, evidence of chorioamnionitis, postmaturity, IUGR | • Avoid further stress  
• Expedite delivery, if delivery is not imminent |

<table>
<thead>
<tr>
<th>Gradually Evolving Hypoxia</th>
<th>Compensated</th>
<th></th>
</tr>
</thead>
</table>
| Rise in the baseline (with normal variability and stable baseline) preceded by decelerations and loss of accelerations | • Likely to respond to conservative interventions (see below)  
• Regular review every 30-60 minutes to assess for signs of further hypoxic change, and that the intervention resulted in improvement.  
• Other causes such as reduced placental reserve MUST be considered and addressed accordingly. |

| Decompensated | | |
|---------------|------------------|
| • Reduced or increased variability  
• Unstable/progressive decline in the baseline (step ladder pattern to death) | • Needs urgent intervention to reverse the hypoxic insult (remove prostaglandin pessary, stop oxytocin infusion, tocolysis)  
• Delivery should be expedited, if no signs of improvement are seen |

<table>
<thead>
<tr>
<th>Subacute Hypoxia</th>
<th>First Stage</th>
<th>Second Stage</th>
</tr>
</thead>
</table>
| • More time spent during decelerations than at the baseline  
• May be associated with saltatory pattern (increased variability) | • Remove prostaglandin/stop oxytocin infusion  
• If no improvement, needs urgent tocolysis  
• If still no evidence of improvement within 10-15 minutes, review situation and expedite delivery | • Stop maternal active pushing during contractions until improvement is noted.  
• If no improvement in noted, consider tocolysis if delivery is not imminent or expedite delivery by operative vaginal delivery |

| Acute Hypoxia | Preceded by reduced variability and lack of cycling or reduced variability within the first 3 minutes  
Preceded by normal variability and cycling and normal variability during the first 3 minutes of the deceleration (see 3-minute rule above) | |
|--------------|---------------------------------|------------------|
| Prolonged Deceleration (> 3 minutes) | • Exclude the 3 accidents (i.e. cord prolapse, placental abruption, uterine rupture - if an accident is suspected prepare for immediate delivery)  
• Correct reversible causes  
• If no improvement by 9 minutes or any of the accidents diagnosed, immediate delivery by the safest and quickest route | |

| Unable to Ascertain fetal wellbeing | | |
|-----------------------------------|------------------|
| (Poor signal quality, uncertain baseline, possible recording of the maternal heart rate) | • Escalate to senior team  
• Consider Adjunctive Techniques, if appropriate  
• Consider the application of FSE to improve signal quality |
### TABLE FOUR

<table>
<thead>
<tr>
<th>CTG Assessment Tool</th>
<th>Baseline</th>
<th>Variability</th>
<th>Accelerations</th>
<th>Decelerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rise in Baseline (≥10%)</td>
<td>Yes</td>
<td></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Inter-contraction interval &gt; 90 sec</td>
<td>Yes</td>
<td></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Maintained Cycling</td>
<td>Yes</td>
<td></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Abnormal Variability (&lt;5 or &gt;25)</td>
<td>Yes</td>
<td></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Features of Hypoxia</td>
<td>Yes</td>
<td></td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Baseline</th>
<th>Variability</th>
<th>Accelerations</th>
<th>Decelerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Organs well oxygenated</td>
<td>Yes</td>
<td></td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other risk factors notes</th>
<th>Baseline</th>
<th>Variability</th>
<th>Accelerations</th>
<th>Decelerations</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Recommended Management</th>
<th>Baseline</th>
<th>Variability</th>
<th>Accelerations</th>
<th>Decelerations</th>
</tr>
</thead>
</table>

If the trace is classified as suspicious or pathological while no evidence of hypoxia is noted, this has to be clearly documented in the notes justifying the management plan.

### MANAGEMENT OF SUSPECTED FETAL HYPOXIA

Identify reversible causes as alleviating them can lead to subsequent recovery of adequate fetal oxygenation and the return to a normal trace.

When CTG changes develop, it is important to address underlying causes before hypoxia occurs. The midwife caring for the woman should escalate to a senior midwife/obstetric team for review without delay whilst simultaneously starting conservative measures.

**Excessive uterine activity:**

Excessive uterine activity can be detected by palpating the uterine fundus, assessing the frequency, strength and duration of contractions and the tone in between.

It can usually be reversed by

- Reducing or stopping oxytocin infusion
- Removing administered prostaglandins
- Starting acute tocolysis with beta-adrenergic agonists (terbutaline) or nitro-glycerine
- During the second stage of labour, maternal pushing efforts utilising valsala manoeuvre can also contribute to fetal hypoxia/acidosis and the mother can be asked to stop pushing and a further assessment made to see if the situation improves. (FIGO 2015). If this does not improve the trace, delivery should be expedited.
Aorto-caval compression:

Aorto-caval compression can occur in supine position. Turning the mother to lateral or upright positions may relieve compression.

Transient cord compression:

Transient cord compression (Variable decelerations) can sometimes be relieved by changing maternal position.

Sudden maternal hypotension:

Sudden maternal hypotension most frequently occurs after spinal or epidural administration. This is reversible by rapid fluid administration + I.V ephedrine bolus (by the anaesthetic team).

Actions with no supporting evidence:

Oxygen administration to a well oxygenated mother does not alleviate fetal hypoxia and may actually be more harmful.

I.V. fluids in normotensive well hydrated women - although some may consider IV fluids to improve the placental flow, administration of IV fluids in chronic hypoxia and chorioamnionitis may provide a false sense of reassurance without improving perinatal outcomes.

Good clinical judgment is required to diagnose the underlying cause of the changes on the CTG, to judge the reversibility of the conditions with which it is associated, and to determine the timing of delivery. The objective is to avoid prolonged fetal hypoxia/acidosis, as well as unnecessary obstetric interventions. Additional methods such as fetal scalp stimulation may be used to evaluate fetal oxygenation.

DOCUMENTATION, QUALITY AND STORAGE

It is the responsibility of every clinician using the CTG machine to perform the following initial checks prior to commencing the trace:

- Correct Date and Time
- Correct speed – 1cm per minute
- Paper specific for the machine in use, with correct orientation

Every trace should start by clearly documenting:

- Due to the longer half-life of prostaglandins, hyperstimulation usually requires the removal of the pessary and administration of tocolytics at the same time, especially when dealing with acute hypoxia.
Intrapartum Care and Fetal Heart Rate Monitoring in Labour UHL Obstetric Guideline

The name, DOB, and hospital number of the woman
Indication for CEFM
Maternal observations
On-going documentation of maternal heart rate every hour in the first stage of labour and every 15 minutes in the second stage of labour

Simultaneous maternal heart rate monitoring should be considered in:
- Fetal heart block
- Fetal heart rate similar to maternal heart rate
- Maternal tachycardia
- During 2nd stage of labour trace shows accelerations coinciding with contractions/expulsive efforts

Maternal observations:
- Maternal BP and temperature is to be measured every 4 hours unless more frequent observations are indicated clinically

Relevant intrapartum events should be documented on the CTG for example:
- Vaginal examination
- Siting of an epidural
- Review of CTG
- Maternal hypotensive episodes

Hourly assessment should be performed using the CTG assessment tool (page 58-check) and documented in the maternal notes

**FRESH EYES:**

In addition to the continuous hourly assessment of the CTG undertaken by the midwife caring for the woman, at least once every 2 hours the midwife must seek the assistance of a colleague (Dr or midwife) to perform a systematic, independant assessment of the CTG trace. The reviewer should document their findings and categorisation of the CTG in the maternal notes.

**QUALITY:**

External FHR monitoring is the recommended initial method, provided that a recording of acceptable quality is obtained i.e. that the basic CTG features can be identified. If the trace is of poor quality, early recourse to FSE is advised if no contraindications exist. Such instances include increased maternal BMI and poor recording during second stage (thus avoiding monitoring maternal heart rate).

**MONITORING OF TWINS:**

CEFM should preferably be performed with dual channel monitors.
Clearly identify which trace is allocated to which twin on the CTG and in the notes.

Consider offsetting twin 2 by 20 beats in order to clearly identify each twin separately.

External monitoring of both twins is acceptable for as long as distinct traces of good quality are obtained.

There should be a low threshold for internal monitoring of the presenting twin in the absence of contraindications as it is often superior in quality especially in the second stage.

**STORAGE:**

CTG must be stored for 25 years. Given that thermal paper deteriorates and is only legible for about 10 years, storage should ideally be in electronic form.

**ADJUNCTIVE TECHNIQUES TO ASSESS FETAL WELLBEING**

Be aware that if the CTG parameters of baseline fetal heart rate and baseline variability are stable, the risk of fetal acidosis is low. (NICE 2017, FIGO 2015).

It is important to attempt to understand the physiological events behind changes in fetal heart rate pattern. This can provide reassurance of fetal status without the need to perform further testing. However, in situations where changes cannot be explained, it is important to seek senior advice and plan further testing accordingly.

**FETAL SCALP STIMULATION:**

**Supporting Evidence:**
There are many observational studies supporting the use of fetal scalp stimulation (FSS) compared to fetal blood sampling. However, the evidence grading for the trials behind the use of FSS is predominantly moderate to low.

**Limitation:**
There is no consensus on the clinical situation for FSS to be used (FIGO 2015).

**Method:**
FSS involves stimulating the fetal scalp by rubbing it with the examiner’s fingers. Other techniques involve using forceps to clasp the fetal skin, or alternatively using vibroacoustic stimulation applied to the mother’s abdomen. However, these are not locally available. Digital scalp stimulation is the most widely used as it is the easiest to perform, least invasive, and appears to have a similar predictive value for fetal hypoxia/acidosis to the other alternatives (FIGO 2015).

**Interpretation:**
If an acceleration is noted during FSS the likelihood of fetal hypoxia is <2.5%, while in the absence of an acceleration the likelihood of fetal hypoxia is >38%. The risk of hypoxia is increased if the lack of acceleration is associated with reduced variability. This information should be considered in the context of the entire clinical picture (FIGO 2015; NICE 2017).
FETAL SCALP BLOOD SAMPLING:

The Cochrane systematic review in 2013 has demonstrated that there is no available evidence of a correlation between fetal scalp pH and improvements in long term outcomes. In addition, the review has also demonstrated that contrary to the erroneous belief in the past, current evidence suggests that FBS may increase the number of caesarean sections and operative vaginal births. Further review of evidence has shown rare, but, potentially serious fetal complications.

FBS can be considered in the presence of an abnormal FHR trace, after correcting reversible causes, unless either FBS is not possible or there is clear evidence of acute compromise or there are contraindications (i.e. BBI and bleeding disorders); in which cases, delivery should be expedited.

If offering fetal blood sampling the woman should be given a full explanation of the procedure and the benefits and risks.

Fetal blood samples should be taken with the woman in the left-lateral position.

The classification of FBS results shown below is recommended.

<table>
<thead>
<tr>
<th>FBS result (pH)</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 7.25</td>
<td>Normal FBS result</td>
</tr>
<tr>
<td>7.21–7.24</td>
<td>Borderline FBS result</td>
</tr>
<tr>
<td>≤ 7.20</td>
<td>Abnormal FBS result</td>
</tr>
</tbody>
</table>

These results should be interpreted taking into account any previous pH measurement, the rate of progress in labour and the clinical risk features of the woman and baby.

After a normal FBS result (pH ≥7.25), sampling should be repeated no more than 60 minutes later if this is still indicated by the CTG or sooner if additional non-reassuring or abnormal features are seen.

After a borderline FBS result (pH 7.21–7.24), repeat sampling should be offered no more than 30 minutes later if this is still indicated by the CTG or sooner if additional non-reassuring or abnormal features are seen.

After an abnormal FBS result (pH ≤7.21), consultant obstetric advice should be sought.
The time taken to take a fetal blood sample needs to be considered when planning repeat samples.

If the CTG trace remains unchanged and the FBS result is stable after the second test, a third/further sample may be deferred unless additional non-reassuring or abnormal features are seen.

Where a third FBS is considered necessary, consultant obstetric opinion should be sought.

Contraindications to FBS include:

- maternal infection (for example, HIV, hepatitis viruses, herpes simplex virus) and chorioamnionitis
- fetal bleeding disorders (for example, haemophilia)
- prematurity (less than 34 weeks)

When a fetal blood sample cannot be obtained:

Use the fetal heart rate response after fetal scalp stimulation during a vaginal examination to elicit information about fetal wellbeing if fetal blood sampling is unsuccessful or contraindicated. Where scalp stimulation results in fetal heart rate accelerations, a decision should be made whether to continue labour or expedite the birth in light of the clinical circumstances and in discussion with the Consultant Obstetrician and the woman.

FBS results should be documented in the maternal health record or on the relevant FBS sticker and the sticker placed in the case notes and the print out secured in an envelope in the maternal hospital notes in the current pregnancy section. If a printout is unavailable (equipment failure etc.) the reason is documented in the notes.

12. EDUCATION AND TRAINING

The Maternity Clinical Network within the East Midlands has produced a training record and competency document that needs to be completed by all clinicians who deliver care in labour, (Saving Babies Lives, 2015). The document is recognised across the region and should be retained by the clinician, included in their revalidation and annual appraisal process as a record of their CPD and suitability for providing care to women in labour. It is suitable for all Midwives, Obstetric trainees (ST4-ST7) and Obstetric Consultants. Midwives and Obstetricians who lead on Education, guidance review and the investigation of incidents/lessons learnt or the management of other clinicians involved in EFM, must also complete this competency pack regardless of their clinical contribution.

The following must be achieved annually and will be recorded and reported on.

- Record of education in Physiological CTG Interpretation (can include face to face teaching, e-learning, internal and external courses)
- Record of annual theory assessment where the pass mark is 90%
The following are recommendations only but can be used to enhance knowledge and use for CPD

- Record of participation in EFM review events (CTG meetings / feedback of lessons learnt/incident review.

- Peer review of EFM interpretation - 1 required within this 12 month period.

Once the whole competency package has been completed this will be recorded by the W&C Education Team on a locally held database.

### 13. MONITORING COMPLIANCE

<table>
<thead>
<tr>
<th>What will be measured to monitor compliance</th>
<th>How will compliance be monitored</th>
<th>Monitoring Lead</th>
<th>Frequency</th>
<th>Reporting arrangements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditable standards against the current guideline</td>
<td>Audit</td>
<td>Labour Ward Leads and matrons</td>
<td>Yearly</td>
<td>Report to Maternity Governance</td>
</tr>
</tbody>
</table>

### 14. SUPPORTING REFERENCES


2. Chandraharan E (Ed) Handbook of CTG Interpretation; From Patterns to Physiology Cambridge University Press 2017

15. KEY WORDS

Labour Fetal Heart Rate CTG Intermittent Auscultation Interpretation Classification Hypoxia

<table>
<thead>
<tr>
<th>CONTACT AND REVIEW DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guideline Lead (Name and Title): K Moores</td>
</tr>
</tbody>
</table>

Details of Changes made during review: Extensive review. Use of FIGO classification. Emphasis on pathophysiology.