Continuous Intrapartum Electronic Fetal Monitoring Guideline

Guideline information

Guideline number: 813
Classification: Clinical
Supersedes: Version 2
Local Safety Standard for Invasive Procedures (LOCSSIP) reference: N/A
National Safety Standards for Invasive Procedures (NatSSIPs) standards: N/A
Version number: Version 3
Date of Equality Impact Assessment: 05/08/2026

Approval information

Approved by: Obstetric Guideline, Audit and Research Group
Date of approval: 24/09/2026
Date made active: 09/10/2026
Review date: 24/09/2029

Summary of document:
To provide safe care and management of high risk women and birthing people who require continuous electronic fetal monitoring of their babies during labour

Scope:
The guideline is applicable to all areas within Hywel Dda University Health Board which provide obstetric led intrapartum care to high risk women who are confirmed to be in active labour under the care of obstetricians and midwives.
This policy uses the term “women” to reflect that maternity and reproductive care are sex-based health needs. It applies equally to all people who are pregnant or have recently given birth, including trans men and non-binary people. Care must be delivered in an inclusive, respectful and responsive way.

Owning group:
Obstetric Guideline and Audit Group

Executive Director job title: Andew Carruthers Chief Operating Officer

Reviews and updates:
1.0 – New Guideline – 12.03.2019
2.0 – Reviewed and Updated – 24.08.2023
3.0 Current

Keywords
Intrapartum, Electronic, Fetal, Monitoring, High Risk

Glossary of terms
CTG – Cardiotocograph
EFM – Electronic fetal monitoring
FHR – Fetal heart rate
FSE – Fetal scalp electrode
TENS – Transcutaneous electrical nerve stimulation

Table of Content

Guideline information 1
Approval information 1
Scope 5
Aim 5
Objectives 5
Introduction 5
Monitoring of fetal heart in the Midwifery Led Units 5
Management 5
Contraindications of FSE application 6
Indications for continuous fetal monitoring 6
Induction of labour 8
Telemetry 8
Multiple pregnancy 8
Uterine Activity 8
CTG 9
Interpretation of the CTG Recording in Labour 9
Baseline Heart rate: 9
Variability and Cycling: 9
Accelerations: 9
Decelerations: 10
Sinusoidal pattern 10
“Poole shark-teeth” or “atypical sinusoidal pattern” 10
Pseudo-sinusoidal pattern 10
Fresh Eyes/ Fetal Monitoring Review 10
Senior Clinician Reviews 11
Quality of Monitoring 11
Actions in situation of suspected fetal hypoxia 11
Excessive uterine activity (most frequent cause) 11
Acute Hypoxia and 3-minute rule 12
Preterm Gestation 12

Cord Gases 13
Communication: ‘Safety Huddles’ 13
Communication: General Principles 13
Education and Training 14
Auditable Standards 14
References 14
Appendix 1 – Features of Hypoxia Classification Chart 15
Appendix 2 – Troubleshooting for Intrapartum Continuous Fetal Heart Recording 16

Scope

The guideline is applicable to all areas within Hywel Dda University Health Board which provide obstetric led intrapartum care to high risk women who are confirmed to be in active labour under the care of obstetricians and midwives.

Aim

The aim of this document is to:

- The purpose of this guideline is to provide guidance and standardise the documentation, interpretation and management of continuous electronic intrapartum fetal monitoring.

Objectives

The aim of this document will be achieved by the following objectives:

The objective of continuous electronic fetal monitoring in labour is to reduce fetal mortality/morbidity by ensuring that any fetal hypoxic insult is identified in time to allow either:

- Removal/ reduction of the hypoxic insult
- Expedited birth of the baby before irreversible asphyxial damage occurs

Introduction

The aim of monitoring the fetal heart rate in labour is to detect those babies who may be compromised or potentially compromised by a shortage of oxygen (fetal hypoxia). If the shortage of oxygen is either prolonged or severe, babies are at risk of being born with a disability or of dying either during labour or shortly after.

When there are maternal or fetal conditions that increase the risk of intrapartum hypoxia continuous Electronic Fetal Monitoring (EFM) is recommended, to provide the clinician with a period of continuous tracing of the fetal heart.

Monitoring of fetal heart in the Midwifery Led Units

Under no circumstances is CTG monitoring to be undertaken, initiated, interpreted, or considered as part of care provided within the MLU. Any clinical situation requiring CTG monitoring requires transfer to the appropriate obstetric-led setting.

Management

Technique for performing continuous electronic fetal monitoring

- Ensure the EFM monitor is clean, fully equipped, adequately charged and correct EFM tracing paper is used.
- EFM monitor must be checked to ensure the date and time clocks are correctly set.
- Settings on CTG machines should be standardised so that paper speed is set to 1 centimetre per minute
- Sensitivity displays are set to 20 beats per minute (bpm/cm)

- FHR range displays of 50-210 bpm are used
- Ensure the tocograph pressure is correctly set to 10 to 20
- Perform abdominal palpation and auscultation of fetal heart using a Pinard stethoscope or handheld Doppler before continuous monitoring is commenced.
- The tocograph transducer should be placed where the fetal heart was heard.
- The maternal pulse oximeter should be used continuously to ensure differentiation between maternal and fetal heart rate. Where this is not possible the maternal pulse should be palpated at least every 15 minutes and the rate recorded

Fetal Scalp Electrode

- Application of a fetal scalp electrode (FSE), with the mother's consent, should be considered where cardiotocograph tracing is of inadequate quality using an abdominal transducer.

Contraindications of FSE application

FSE application is contraindicated if:
• Known HIV, Hepatitis B and Hepatitis C infection (review viral load and use of antiviral therapy) • Bleeding disorders • Preterm gestation below 34 weeks • Non-cephalic

When application of FSE is contraindicated the risks and benefits of an FSE vs expediting birth should be considered on an individualised basis for mothers where abdominal monitoring cannot be used to adequately assess fetal wellbeing.

Indications for continuous fetal monitoring

Advise the woman that continuous EFM is recommended if any of the following risk factors is/are identified are identified:

Maternal indication
• Previous caesarean birth /uterine surgery • Pre-eclampsia • Essential or pregnancy-induced hypertension requiring antihypertensive treatment Post-term pregnancy (> 42 weeks) • Prolonged rupture of membranes (>/=24 hours) before the onset of established labour • Antepartum haemorrhage • Diabetes on medication • Severe Intrahepatic Cholestasis of Pregnancy

- Other significant maternal medical disease (severe asthma, cardiac disease, poorly controlled epilepsy, rheumatological disease, renal disease)
- Woman's request

Fetal indications
• Gestation less than 37 or more than 42 weeks • Non-cephalic, including cord presentation • Transverse or oblique lie • Multiple pregnancy (all babies to be monitored) • Suspected fetal growth restriction • Oligohydramnios /Anhydramnios or polyhydramnios • Abnormal umbilical artery doppler velocimetry • Haemolytic disease of the fetus • Recurrent episodes of reduced fetal movements (i.e.2 episodes in previous 21 days) OR altered fetal movements in the last 24 hours. Note: If the fetal movements normalise AND there are no other concerns AND the admission CTG is normal, then consider change to intermittent auscultation

Other indications noted at admission or at any time during labour (including the second stage):
• Fetal baseline heart rate: Less than 110 or above 160 bpm on intermittent auscultation. • Decelerations in fetal heart rate heard on intermittent auscultation • A rise in fetal baseline, in line with physiological teaching (Intrapartum Fetal Surveillance training HDdUHB).

Maternal observations:
• Pulse over 120 bpm on two occasions 15 minutes apart • A single reading of either raised diastolic blood pressure of 110mmHg 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 two consecutive readings taken 30 minutes apart +/- proteinuria • Temperature ≥38oC on a single reading, or ≥ 37.5oC on two consecutive readings 1 hour apart • Suspected chorioamnionitis or maternal sepsis

Other indications
• Any vaginal bleeding other than a show • The presence of meconium-stained liquor • Pain reported by the woman that differs from the pain that can be normally associated with contractions • Delay in the first stage of labour (following amniotomy) • Administration of oxytocin for induction or augmentation of labour • Prolonged active second stage of labour; more than 2 hours in a primiparous woman, more than 1 hour in a multiparous woman. • During and following epidural insertion • Contraction frequency >5 in 10 minutes

Induction of labour

When uterine contractions begin after administering dinoprostone (e.g. Prostin E2 ®) or misoprostol, assess fetal wellbeing and uterine contractions with intrapartum cardiotocography interpretation and if the cardiotocogram is confirmed as normal, review the individual circumstances and use intermittent auscultation unless there are clear indications for further cardiotocography (see list above).

The above list is not exhaustive, any condition which is thought to increase the chance of fetal hypoxia mandates continuous EFM.

Telemetry

- This should be offered, when available, to women to encourage mobility.

Multiple pregnancy

- An ultrasound examination should be performed prior to commencing a CTG in a multiple pregnancy to confirm the presence and location of the individual fetal heart beats.
- Consider use of trace separation.

Uterine Activity

- In order for the CTG to be assessed accurately, effective recording of contractions is essential therefore every effort should be made to record on the CTG the presence of contractions.
- Contractions should always be palpated and the frequency and strength recorded
- Any difficulties in monitoring the contractions should be evidenced within the maternal records including actions taken.

- Escalate to the midwifery co-ordinator if unable to monitor contractions with toco or palpation and add clinical note on BadgerNet of when contractions occur.
- Reason for continuous EFM

CTG

- All relevant information that may affect the fetal heart should also be noted contemporaneously on BadgerNet (e.g. vaginal examinations, administration of drugs, vomiting, sitting for epidural insertion).
- Any member of staff who is asked to provide an opinion on a trace complete monitoring review and note any findings on BadgerNet The same should happen at any staff change over.
-

CTG review should take place in the room with consideration of the whole clinical picture.

- Ensure that the appropriate clinical area and bed number is selected on BadgerNet.
- The CTG is automatically stored from the moment the CTG machine is turned on
- Dawes Redman analysis should not be used for women in active labour
- A simultaneous note should be made in the maternal longhand documentation

Interpretation of the CTG Recording in Labour

- The CTG should be reviewed continuously and the FHR baseline recorded in the partogram every 15 minutes. Identify risk factors before assessing the CTG
- Contractions (ensure inter-contraction interval more than 90 seconds)

Baseline Heart rate:

- Normal baseline 110bpm to 160bpm (a baseline between 100 and 110bpm may be normal for a mature fetus)
- Is baseline appropriate for gestational age (G.A.)
- Is the baseline stable compared to baseline rates on previous CTGs

Variability and Cycling:

- 5 to 25bpm with alternating periods of sleep and wakefulness not lasting longer than 60 minutes
- In the presence of decelerations and increase in baseline rate, episodes of reduced variability must be managed promptly, and not assumed to be cycling.
- Increased variability (zig-zag/saltatory pattern) may represent rapidly evolving hypoxia and autonomic instability

Accelerations:

- Transient rise from a stable baseline by at least 15bpm lasting for at least 15 seconds and returning to a normal baseline
- The presence of accelerations is generally considered to be a reassuring feature.
- It is important to differentiate accelerations from overshoots and shouldering.
- If accelerations coincide with contractions ensure there is not inadvertent monitoring of the maternal heart rate.

Decelerations:

- Transient fall from baseline by at least 15bpm lasting for a least 15 seconds
- Baroreceptor: short-lasting, nadir coincides with peak of contraction, not associated with fetal hypoxia
- Chemoreceptor decelerations: late, prolonged, or reduced variability within deceleration, signify anaerobic metabolism and depletion of placental stores
- Prolonged decelerations (>3 minutes) need to be managed according to the 3-minute rule for acute hypoxia

Sinusoidal pattern

- A regular, smooth, undulating, low-frequency pattern lasting more than 30 minutes with absent accelerations
- Occurs in association with severe fetal anaemia

Birth should be urgently expedited

"Poole shark-teeth" or "atypical sinusoidal pattern"

- Resembles the sinusoidal pattern, but with a more jagged "saw-tooth" appearance, rather than the smooth sine wave form.
- Caused by fetal hypotension, often occurring secondary to acute feto-maternal haemorrhage

Pseudo-sinusoidal pattern

- Seldom exceeds 30 minutes
- Characterized by normal variability and accelerations before and after
- May be seen after opiate analgesic administration to the mother, and during periods of fetal sucking and other mouth movements

A structured review of the CTG tracing should be performed and documented in the notes every 60 minutes using BadgerNet fetal monitoring review

- This will identify features indicating the fetal likelihood of hypoxia (See Appendix 1)

Fresh Eyes/ Fetal Monitoring Review

- Fetal monitoring review assessment by two people using the **Fresh Eyes** approach is **recommended hourly** but **must** take place **at least every two hours** using the fetal monitoring review on BadgerNet .
- At an hour, the fresh eyes review can be undertaken by Band 6 midwives however a senior clinician review is done every 2 hours
- When reviewing a CTG consideration of previous CTG tracings should be made to identify when the CTG was last normal.
- All reviews should take place in person, unless there are exceptional circumstances, to allow for a holistic review and discussion of the recommended management with the mother
- The overall clinical picture must be taken into consideration at all times when reviewing the CTG tracing

Senior Clinician Reviews

The CTG should be reviewed by the labour ward co-ordinator or obstetrician (ST3 level or above) at least every two hours to assess for any evidence of hypoxia or atypical pattern and confirmation that the current care plan remains appropriate

Quality of Monitoring

- The quality of monitoring of both uterine activity and FHR must allow for accurate interpretation of the CTG tracing. If a problem is anticipated, consider applying an FSE
- Refer to Troubleshooting for Fetal Heart Recordings Appendix 2.

Actions in situation of suspected fetal hypoxia

- Identify reversible causes of hypoxia as alleviating them can result in subsequent recovery of adequate fetal oxygenation and return to a normal CTG
- 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/obstetrician (ST3 level or above) for review without delay.
-

Excessive uterine activity (most frequent cause) ○

Palpate 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 nitroglycerine

- **During the second stage of labour**, maternal pushing efforts can also contribute to fetal hypoxia/acidosis, and the mother can be asked to stop pushing until the situation has improved.
- **Aorto-caval compression:** Can occur in supine position. Turning the mother to lateral or upright positions may relieve compression.
- **Transient cord compression**
  - can sometimes be relieved by changing maternal position
  - if persistent decelerations are present consider measures to reduce uterine activity (see above)
- **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)

Acute Hypoxia and 3-minute rule

If the CTG shows acute hypoxia follow the 3-minute rule

3 Minute rule	Actions
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 a non-reversible cause is diagnosed (cord prolapse, uterine rupture, placental abruption) the aim would be for immediate birth as soon as safely possible in the fastest route possible • If an iatrogenic cause is diagnosed immediate measures must be utilized to correct the changes (see above actions in suspected hypoxia)
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 birth MUST be started.
9 – 12 minutes	By this point in time the deceleration has either recovered, or preparation for an assisted vaginal birth / caesarean birth is in progress **aiming for birth by 12 – 15 minutes**

.

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 birth by the safest and fastest route possible

Preterm Gestation

There is paucity of evidence/ guidelines on the use of CTG in preterm gestations therefore each case should be considered on an individual basis with a senior obstetrician involved in the planning for intrapartum care with a low threshold for expediting birth.

CTG should not be used <26 weeks' gestation

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
- reduced amount of Wharton's jelly in the umbilical cord

CTG findings include:

- Higher baseline heart rate and reduced variability.

- Accelerations being less frequent and of smaller amplitude (10bpm) and for a shorter duration (10sec).
- Fetal heart rate decelerations in the absence of uterine contractions often occur in the normal preterm fetus between 20 and 30 weeks' gestation.
- A less developed cycling pattern, this is especially more evident in extreme prematurity

Cord Gases

Paired umbilical cord blood samples should be taken in the following circumstances
• All unplanned caesarean births • All assisted vaginal births • Any birth where there has been a CTG with features of hypoxia in labour • All cases of suspected chorioamnionitis (placental histopathology is also recommended) • Shoulder dystocia • All breech or malpresentation births • All preterm births • All births where significant meconium-stained liquor is present. • Any baby that is born in poor condition or requiring unexpected admission to the neonatal unit

There should be a difference of at least 0.02 between the arterial and venous pH

The arterial sample
• pH should be ≥7.05 • Base deficit should be <12 • Lactate should be <4.5

NOTE. If the baby is born in unexpectedly poor condition, consider sending the placenta for histology

Communication: 'Safety Huddles'

- A Safety Huddle is a structured briefing for the leaders of key clinical teams. This will ensure everyone understands their roles and responsibilities in an incident and shares key clinical information relevant to patient safety.
- Where intrapartum care is complex or in the event of an unexpected adverse outcome a safety huddle should be undertaken.

Communication: General Principles

- Maternal wishes and concerns should be discussed and recorded.
- The benefits, risks and limitations of continuous intrapartum fetal monitoring should be explained.
- Consent should be sought prior to any interventions.

- The woman should be included in the decision-making process regarding her care.
- Where continuous EFM is recommended but declined by the woman a senior clinician should discuss the indication and intrapartum risk factors with the woman and agree thresholds for a change to EFM or other possible interventions. This discussion should ideally occur in the antenatal period and be recorded on BadgerNet electronic record.

Education and Training

Health professionals performing, interpreting, and managing CTGs and performing intermittent auscultation of the fetal heart during labour should update their skills regularly and align with the All-Wales Fetal Surveillance Standards

Auditable Standards

- A minimum of hourly assessments on the CTG trace will be carried out during the intrapartum period by completing the **fetal monitoring review on BadgerNet.**
- Assessments will be aimed to be performed hourly
- Fresh eyes reviews will be carried within a maximum of 2 hours from previous fresh eyes assessment by a midwife or an obstetrician.
- All intrapartum events that may affect the FHR will be recorded on BadgerNet
- All second opinions provided during labour will be recorded, on BadgerNet by the person providing the second opinion.
- In all cases when the CTG trace is assessed as Suspicious or Pathological an action plan will be documented on BadgerNet

References

- Ayres-de-Campos D, Spong C, Chandraharan E ; for the FIGO Intrapartum Fetal Monitoring Expert Consensus Panel (2015) “FIGO consensus guidelines on intrapartum fetal monitoring: Cardiotocography” International Journal of Gynaecology and Obstetrics; 131(2015)13-24
- NICE (2022) Fetal Monitoring in Labour (NG229) Overview | Fetal monitoring in labour | Guidance | NICE (Opens in a new link)
- NICE (2022) Preterm Labour and Birth (NG25) Overview | Preterm labour and birth | Guidance | NICE (Opens in new link)
- Visser GH, Ayres-de-Campos D, FIGO Intrapartum Fetal Monitoring Expert Consensus Panel. FIGO consensus guidelines on intrapartum fetal monitoring: Adjunctive technologies. Int J Gynecol Obstet 2015;131:25–
- Intrapartum Fetal Monitoring Guideline Published February 2018 Physiological CTG - Guideline (physiological-ctg.com) last accessed 22/08/202

Appendix 1 – Features of Hypoxia Classification Chart

Hypoxia	Features	Management
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		
Chronic Hypoxia	• 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 birth, if birth is not imminent (consider the whole clinical picture)
Gradually Evolving Hypoxia	**Compensated** ▯ 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 an improvement. • Other causes such as reduced placental reserve MUST be considered and addressed accordingly.
	Decompensated ▯ Rise in the baseline (with abnormal variability and unstable baseline) preceded by decelerations and loss of accelerations	• Needs urgent intervention to reverse the hypoxic insult (remove prostaglandin pessary, stop oxytocin infusion, tocolysis) • Birth should be expedited, if no signs of improvement are seen
Subacute Hypoxia	• More time spent during decelerations than at the baseline • May be associated with saltatory pattern(increased variability)	**First Stage** • Remove prostaglandins/stop oxytocin infusion • If no improvement, needs urgent tocolysis • If still no evidence of improvement within 10-15 minutes, review situation and expedite birth **Second Stage** • Stop maternal active pushing during contractions until improvement is noted. • If no improvement is noted, consider tocolysis if birth is not imminent or expedite birth by birth with forceps or ventouse
Acute Hypoxia	**Prolonged Deceleration (> 3 minutes)**	**Preceded by reduced variability and lack of cycling or reduced variability within the first 3 minutes** **IMMEDIATE DELIVERY IS THE SAFEST OPTION** **Preceded by normal variability and cycling and normal variability during the first 3 minutes of the deceleration (see 3-minute rule above)** **Exclude the 3 accidents (i.e. cord prolapse, placental abruption, uterine rupture - if an accident is suspected prepare for immediate birth)** • **Correct reversible causes** • **If no improvement by 9 minutes or any of the accidents diagnosed, immediate birth 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 additional Techniques, if appropriate, for example: scalp stimulation, ultrasound scan application of FSE to improve signal quality.

Appendix 2 – Troubleshooting for Intrapartum Continuous Fetal Heart Recording

Troubleshooting for Intrapartum Continuous Fetal Heart Recording	
Problem	**Action**
No fetal heart rate before the CTG is commenced	• The Senior Obstetric Doctor and Coordinator should be informed immediately • A portable US machine should be brought to the bedside. • Visualise fetal heart beating with ultrasound. • Confirm fetal life • Reposition US transducer
Erratic recording, loss of contact with external transducer	• Perform Leopold's manoeuvres to locate fetal back • Reposition US transducer over fetal back • Readjust belt and apply enough gel over US transducer • If recording still suboptimal, locate fetal heart with ultrasound and reposition US transducer • If membranes ruptured and there are no contraindications, apply fetal scalp electrode.
Erratic or no recording with FSE	• Confirm presence of fetal heartbeat with ultrasound or auscultation using pinard or sonicaid • Check that FSE wire is attached to the leg plate • Check FSE connection to fetus and replace it if detached • Check that external monitor is discontinued • Transcutaneous Electrical Nerve Stimulation (TENS) may interfere with the acquisition of FHR signal. • Call Senior Obstetrician and Senior Midwife and give full history and labour events to this point. • Consider expediting birth if fetal wellbeing cannot be adequately confirmed