CLINICAL PRACTICE GUIDELINE

Fetal heart rate monitoring

This document should be read in conjunction with the Disclaimer

This guideline must be read in conjunction with the Department of Health WA Mandatory Policy: MP 0076/18: Cardiotocography Monitoring Policy. The following Clinical Guideline complies with the Cardiotocography Monitoring Standard.

Contents

General requirements

Indications for performing a cardiotocograph (CTG)

There is no evidence to support the use of routine antenatal or intrapartum CTG in women with uncomplicated pregnancies.

Indications for antenatal CTG

CTG may be performed for the following reasons in the antenatal period, depending on the clinical picture:

- Abnormal Doppler umbilical artery velocimetry
- Abnormalities of maternal serum screening associated with an increased risk of poor perinatal outcome
- Abnormality, fetal (Known fetal abnormality which requires monitoring)
- Abnormal placental cord insertion
- Antepartum haemorrhage
- Breech presentation- prior to and after attempted/successful external cephalic version
- Diabetes where medication is indicated or poorly controlled, or with fetal macrosomia
- Fetal movements (FM) altered- unless there has been demonstrated wellbeing and return to normal FMs
- Hypertension (Essential hypertension or pre-eclampsia)
- IUGR (Suspected or confirmed)
- Maternal age ≥40
- Morbid obesity (BMI ≥40)
- Multiple pregnancy
- Oligohydramnios
- Polyhydramnios
- Prolonged pregnancy ≥41 weeks
- Prolonged rupture of membranes > 24 hours
- Uterine scar
- Other current or previous obstetric or medical conditions which constitute a significant risk of fetal compromise (e.g. cholestasis, isoimmunisation, substance abuse)

Indications for intrapartum CTG[1]

Antenatal risk factors	Intrapartum (IP) risk factors
• Abnormal antenatal CTG • Abnormal Doppler umbilical artery velocimetry • Suspected or confirmed IUGR • Oligohydramnios (MVP < 2cm or AFI < 5) • Polyhydramnios (MVP > 8cm or AFI > 20) • Prolonged pregnancy ≥41 weeks[#] • Multiple pregnancy • Breech presentation • Antepartum haemorrhage • Prolonged rupture of membranes ≥ 24 hours • Known fetal abnormality which requires monitoring • Uterine scar • Hypertension, including essential hypertension or pre-eclampsia • Diabetes where medication is indicated or poorly controlled, or with fetal macrosomia • Other current or previous obstetric or medical conditions which constitute a significant risk of fetal compromise (e.g. cholestasis, isoimmunisation, substance abuse) • Fetal movements (FM) altered unless there has been demonstrated wellbeing and return to normal FMs • Morbid obesity (BMI ≥40) • Maternal age ≥42 • Abnormalities of maternal serum screening associated with an increased risk of poor perinatal outcome • Abnormal placental cord insertion • Abnormal cerebroplacental ratio	• Induction of labour with prostaglandin / oxytocin • Abnormal auscultation or CTG • Oxytocin augmentation • Regional analgesia (e.g. epidural * or spinal) • Abnormal vaginal bleeding in labour • Maternal pyrexia ≥38°C • Meconium or blood stained liquor • Absent liquor following amniotomy • Active first stage of labour >12hours (i.e. regular uterine activity, cervix 4cm dilated) • Active second stage of labour (i.e. pushing) > one hour where birth is not imminent • Pre-term labour less than 37 completed weeks • Tachysystole (more than 5 active labour contractions in 10 minutes, without FHR abnormalities) • Uterine hypertonus (contractions lasting more than 2 minutes in duration or contractions occurring within 60 seconds of each other, without FHR abnormalities) • Uterine hyperstimulation (either tachysystole or uterine hypertonus with FHR abnormalities)

* Following a decision to insert an epidural block, a CTG should be commenced to establish baseline features prior to the block's insertion.

[#] KEMH practice- CTG if ≥41 weeks

Conditions where IP CTG is not indicated when the condition occurs in isolation, but if multiple conditions are present, IP CTG should be considered.	
• Gestational hypertension • Gestational diabetes mellitus without complicating factors • Obesity (BMI 30-40) • Maternal age ≥40 and < 42 years • AFI 5-8cm (or MVP 2-3cm)	• Maternal pyrexia ≥37.8^{o}C and < 38^{o}C

Note- This list is not exhaustive and an intrapartum CTG may be commenced at clinician or maternal request.

Review, interpretation and signing of traces

Antenatal traces

- All **antenatal CTG** recordings must be reviewed by two level 2 or 3 FSEP practitioners
- During the transition to FSEP midwives and medical practitioners who have not yet attended FSEP but have successfully completed Advanced Fetal Assessment within the last 5 years will also be able to review antenatal CTG's

Intrapartum traces

- All **intrapartum CTG** traces must be reviewed by two practitioners (neither of whom are students)

Education and Fetal Surveillance Education Program (FSEP) practitioner levels

Medical and midwifery staff must meet the requirements determined by King Edward Memorial Hospital, Department of Nursing and Midwifery Education and Research (DNAMER) procedure: Cardiotocography (CTG) Monitoring: Mandatory Education Requirements for Midwives and Medical Practitioners. This document also describes the FSEP practitioner levels.

Storage

If the CTG electronic storage process should fail at any time, revert to the paper CTG process.

All paper CTG's should be stored in a paper envelope in the woman's clinical notes.

Antenatal fetal heart rate (FHR) monitoring

Key points

1. Antenatal CTG is commonly used in conjunction with ultrasound assessment of fetal and placental Doppler in high risk pregnancy.[2]
2. Antenatal CTG from 24+0 weeks gestation should be commenced if:
    - Risk factors develop throughout the pregnancy
    - There is a change in the maternal condition
    - There is any suspicion of in utero fetal compromise
3. CTG may be considered at gestations below 24+0 weeks following a multidisciplinary discussion with the woman regarding birth and neonatal management.
4. The following have NOT been shown to reduce the incidence of an abnormal CTG[3, 4]: manual fetal manipulation, maternal glucose administration, or icy drinks. Best practice is that all CTG's are assessed at point of care.

Procedure

1. Confirm patient identity (name and details), explain the procedure to the woman, gain verbal consent, and ensure privacy
2. Encourage the woman to empty her bladder
3. Perform abdominal palpation to identify fetal position unless contra-indicated e.g. TPL, APH, abruption
4. Ensure the woman is well supported in an upright or left lateral position
5. Place belts around the abdomen securing the transducers
6. Position the 'pressure transducer' on the maternal abdomen over the fundus and set the uterine resting tone baseline
7. Apply gel to the ultrasound (cardiac) transducer and place on the maternal abdomen over the location of the fetal heart
8. Screen / paper speed of 1cm per minute and validate date and time settings

Documentation

1. Each CTG recording is labelled with the woman's name and UMRN
2. Record:
    - Maternal pulse and blood pressure
    - Gestation, gravity and parity
    - Indication for CTG
3. Record on the trace any events that may influence the FHR or UA:

- maternal medications
- maternal movement / changes in position / discomfort
- FMs (recorded by the mother)
- administration of drugs, including social use of nicotine

4. The interpretation of the CTG may be recorded electronically and then documented on the MR 225 Maternal Assessment form or MR 250 Progress Notes

Monitoring and additional information

1. The duration of the recording need only be 10 minutes if the features for a normal CTG have been met
2. If after monitoring for 10 minutes the fetus is not active, an attempt to stimulate the fetus may be made by changing the maternal position
3. If the maternal condition is stable and there has been one acceleration, continue to monitor for another 20 minutes after this acceleration
4. If a fetal bradycardia occurs the maternal pulse should be simultaneously recorded on the CTG trace
5. In the event of the maternal pulse being more than 100bpm, additional means should be used to confirm that the heart rate trace is fetal and not maternal

Escalation of care- antenatal

	Baseline	Variability	Accelerations	Decelerations	Action plan
Normal	110 - 160	6-25bpm	≥15bpm above baseline and last ≥15 seconds at the baseline[5]. Two within 20 minutes	Absent	Medical obstetric team determines the frequency or necessity of performing a repeat CTG according to maternal and fetal condition.
Abnormal (Any of these features)	<110bpm >160bpm	3-5bpm for >45 mins <3bpm	Absent	Present	See “abnormal CTG” below.

Abnormal CTG- antenatal

- Notify doctor and Triage Midwife/Midwife Coordinator.
- Review clinical picture.
- Treat reversible causes.
- Repeat CTG within 4 hours if clinical picture allows.

If woman has ≥ 2 abnormal CTGs ultrasound assessment of fetal wellbeing should be considered including:

- biophysical profile

- amniotic fluid index
- umbilical artery and Doppler studies

A Kleihauer should be performed if a credentialed health professional, performing an ultrasound, has any concerns regarding the level of fetal activity.

All abnormal antenatal CTG traces are to be reviewed as follows:

During the day:

- The LBS traces are to be reviewed by the LBS Obstetric Consultant/ Senior Registrar as appropriate
- The MFAU traces are to be reviewed by the Team Obstetric Consultant/Senior Registrar or the LBS Obstetric Consultant/ Senior Registrar as appropriate
- Ward traces are to be reviewed by the Team Obstetric Consultant/ Senior Registrar

After-hours (regardless of the department) are to be reviewed by the most senior obstetric doctor (Consultant, Senior Registrar or Registrar) present in the hospital.

Intrapartum FHR monitoring

Key points

1. Intermittent auscultation (IA) is an appropriate method of intrapartum fetal monitoring in women with no indications for performing a continuous CTG:
    - Each auscultation episode should commence toward the end of contraction and be continued for at least 30-60 seconds after the contractions has finished.
    - Auscultation should be undertaken and documented:
        - Every 15-30 minutes in the active phase of the first stage of labour[1]
        - With each contraction or at least every 5 minutes in the active second stage of labour
2. If an intrapartum CTG has been started because of concerns arising from IA but the trace is normal after 20 minutes, the woman may, after consultation with medical team, return to IA unless the woman asks to stay on continuous CTG.
3. Offer telemetry, when available, to women who need continuous CTG in labour.

Procedure

1. Explain the procedure to the woman, gain verbal consent.
2. Place two belts around the abdomen securing the transducers.
3. Position the 'pressure transducer' firmly on the maternal abdomen over the fundus.
4. Set the pressure transducer at a uterine resting tone baseline level of 10 to 20 mm of mercury.
5. Apply gel to the ultrasound (cardiac) transducer and place on the maternal abdomen over the location of the fetal heart.
6. Paper speed of 1cm per minute.
7. Validate date and time settings.

Documentation

8. Each CTG recording is labelled with the woman's name and UMRN.
9. Record:
    - Maternal pulse and blood pressure
    - Gestation, gravity and parity
    - Indication for CTG
10. Record any events that may influence the FHR or UA e.g. maternal medications, maternal movement / changes in position, epidural insertion.
11. 30 minutely - CTG interpretation should be documented by the primary clinician, this may be more frequent if clinically indicated.
12. 2 hourly – CTG interpretation by two clinicians ("Fresh Eyes").

Additional information

- In the event of the maternal pulse being more than 100bpm, additional means should be used to confirm that the heart rate trace is fetal and not maternal.
- If a fetal bradycardia occurs, maternal pulse should be simultaneously recorded on the CTG trace.
- Where continuous CTG is required, and if the electronic fetal monitoring to date is considered normal, monitoring may be interrupted for short periods of up to 15 minutes to allow for personal care. Such interruptions should be infrequent and not occur immediately after any intervention that might be expected to alter FHR.

Notes about interruptions to FHR monitoring

- Personal care- Women's wellbeing is considered and their wishes are respected in relation to monitoring. Disturbances to the woman are also

minimised e.g. monitoring volume low, upright positions/mobility, and use of water for pain relief.[1]

- Transfers- The FHR should be monitored intermittently when there are unavoidable interruptions and/or periods of potential fetal vulnerability, with continuous CTG to be re-commenced when feasible. Interruptions to fetal monitoring should be minimised during transfer to the operating theatre and prior to the birth of the fetus.[1]

Escalation of care – intrapartum

	Baseline	Variability	Decelerations	Action plan
Normal	110 - 160	6-25bpm	Absent	Nil
Abnormal These features are unlikely to be associated with fetal compromise when occurring in isolation	100-109		Early Uncomplicated variables	Notify doctor and midwife co-ordinator • Continue CTG • Review clinical picture • Treat reversible causes • +/- scalp stimulation or FBS • Review in 30 minutes • Consider IV fluid rehydration
Abnormal These features may be associated with significant fetal compromise	>160 Rising baseline	3-5bpm OR >25bpm for 30 minutes	Complicated variables Late Prolonged	Notify doctor and midwife co-ordinator • Continue CTG • Review clinical picture • Treat reversible causes • Scalp stimulation +/- FBS • VE to assess progress • Review management – birth may be indicated
Abnormal These features are very likely to be associated with significant fetal compromise	Bradycardia (<100bpm for > 5 minutes)	<3bpm Sinusoidal		Immediate notification to doctor and midwife co-ordinator • As above • Consider tocolysis • Early assisted birth • Reduce second stage or Category 1 (urgent) CS

Fetal scalp electrode (FSE) application

Key points

1. Application of the FSE should be used when clearly identified 'risk factors' are present, and signal quality from external monitoring is poor
2. Repeated application of the FSE should be avoided

Contraindications

- Fetus less than 34 weeks gestation
- Placenta praevia
- Maternal carrier of haemophilia with affected fetus or with unknown status
- Maternal clotting disorders or thrombocytopenia
- Known or suspected fetal bleeding disorders
- If the fetal presenting part is unable to be identified or anything other than vertex presentation
- Face presentation
- In the presence of:
  - active herpes lesions
  - Hepatitis C
  - Hepatitis B
  - HIV
  - COVID 19 (known or suspected)- until further information available. Refer to current guidance as per Management of COVID-19 Infection in Pregnant Women Department of Health WA state-wide guideline.

Note: In event of any maternal infections, the FSE should not be applied without Consultant approval. This may include discussion with the Microbiology Consultant

Equipment

- Sterile FSE
- Sterile gloves
- Sterile water based lubricant
- Cardiotocograph monitor
- Fetal scalp electrode monitor lead and leg adaptor for selected FSE

Procedure

Prior to procedure

1. Obtain verbal consent from the woman
2. Ensure the woman's bladder is empty prior to examination
3. Establish the membranes are ruptured prior to application of the FSE
    - Membranes should be ruptured and ideally cervix dilated 2-3cm prior to application
4. Establish there are no risk factors prior to application

Procedure

1. Perform a vaginal examination (VE)
    - confirm membranes are ruptured
    - identify presenting part
    - do not place FSE over the fontanelles, on the face, or genitalia
2. Choose FSE and refer to manufacturer's instructions for application

Following procedure

1. Document commencement of FSE
2. Inform the paediatric staff of any abnormalities of the insertion site e.g. lacerations or infections

References

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3. Tan KH, Sabapathy A, Wei X. Fetal manipulation for facilitating tests of fetal wellbeing. **Cochrane Database of Systematic Reviews**. 2013 (12). Available from: https://doi.org//10.1002/14651858.CD003396.pub2
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5. Baker L, Beaves M, Wallace E. **Assessing fetal wellbeing: A practical guide**. 2nd ed. Melbourne, VIC: RANZCOG and Monash Health; 2016.

Related policies

Department of Health WA

- Mandatory Policy: MP 0076/18: Cardiotocography Monitoring Policy
- Cardiotocography Monitoring Standard

Related WNHS policies, procedures and guidelines

KEMH: DNAMER: CTG Monitoring: Mandatory Education Requirements for Staff [procedure]

WNHS Policy: Patient Identification

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