Intrapartum fetal surveillance

Clinical Guideline Presentation

45 minutes

Towards CPD Hours

Clinical Excellence Queensland

Queensland Government

References:

Queensland Clinical Guideline: Intrapartum fetal surveillance is the primary reference for this package.

Recommended citation:

Queensland Clinical Guidelines. Intrapartum fetal surveillance clinical guideline education presentation E25.15-1-V4-R30. Queensland Health. 2025.

Disclaimer:

This presentation is an implementation tool and should be used in conjunction with the published guideline. This information does not supersede or replace the guideline. Consult the guideline for further information and references.

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Abbreviations

≤	Less than or equal to
≥	Greater than or equal to
BMI	Body mass index
CS	Caesarean section
CTG	Cardiotocography
FBS	Fetal blood sampling
FHR	Fetal heart rate
FSE	Fetal spiral electrode
FSS	Fetal scalp sampling
IA	Intermittent auscultation
IFS	Intrapartum fetal surveillance
MHR	Maternal heart rate

Objectives

- Identify discussion points to support information sharing and informed decision making with the woman
- Outline modes of intrapartum fetal heart rate (FHR) monitoring
- Identify risk factors associated with increased fetal compromise
- Identify key considerations of intrapartum fetal surveillance (IFS) for preterm labour and multiple pregnancies
- Outline a standardised approach to the assessment of a cardiotocograph (CTG)
- Define features of a normal and abnormal CTG
- Outline adjunct testing methods for IFS– fetal scalp stimulation (FSS), fetal blood sampling (FBS), paired cord gases
- Examine reversible causes and management of abnormal CTGs

Intrapartum fetal surveillance

- A screening tool to provide guidance on fetal condition, and not a stand-alone diagnostic tool
- Consider the overall clinical circumstances together with the IFS findings, when recommending care options

Information sharing

Discussion points to support informed decision making:

- Modes of IFS
  - Intermittent auscultation (IA), CTG, adjunct testing
- Reasons for IFS
- Equipment used
- Timeframes of monitoring
- Risk assessment is a continual process
  - The method of FHR monitoring recommendation may change during labour
- Evidence related to IFS including adjunct testing methods
- Advantages and disadvantages of IFS for the individual
- Recommended management arising from IFS findings

Modes of FHR monitoring

Intermittent auscultation (IA)

- Doppler ultrasound
- Pinards (fetoscope)

IF low risk of complications, recommend IA in established labour

Cardiotocography (CTG)

- External CTG (wired)
- Telemetry (wireless)
- Internal CTG (FSE)

IF risk factors identified, recommend CTG in established labour

Intermittent auscultation (IA)

- Conduct abdominal palpation to confirm fetal position
- Palpate maternal heart rate (MHR) simultaneously to differentiate between MHR and FHR
- Perform IA:
  - Towards end of contraction for at least 30–60 seconds after contraction finished
  - In active first stage: every 15–30 minutes
  - In active second stage: towards end of and after each contraction or at least every 5 minutes

External cardiotocography

- Conduct abdominal palpation to confirm fetal position
- Attach transducers to maternal abdomen with elasticised straps
- Wired and wireless (telemetry) options
- Wireless telemetry may be used in water
- Monitor maternal pulse simultaneously to differentiate between MHR and FHR

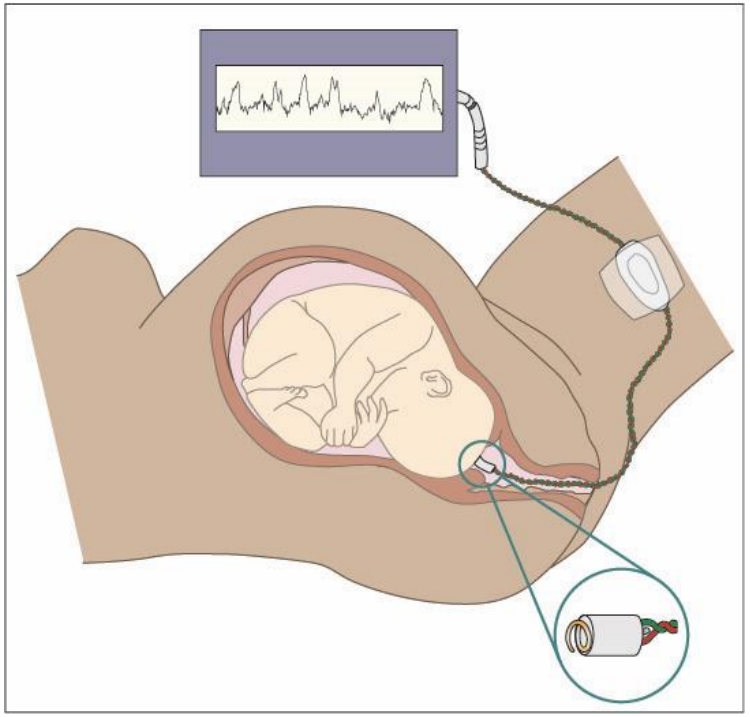
Internal cardiotocography

May be recommended when:

- Unable to use external CTG
- Difficulty obtaining continual FHR tracing via external CTG
- Concerns with baseline variability
- Presenting twin is cephalic and membranes ruptured

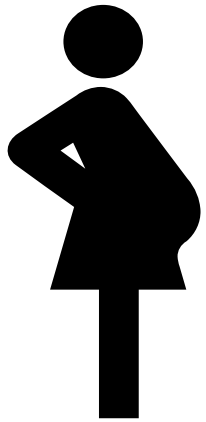
Requires:

- Ruptured membranes
- Adequate cervical dilation
- Cephalic/breech presentation
- Relative certainty of presenting part position to avoid placement in fontanelles, eyes, sutures, genitals or other structures



Antenatal risk factors for CTG

Maternal

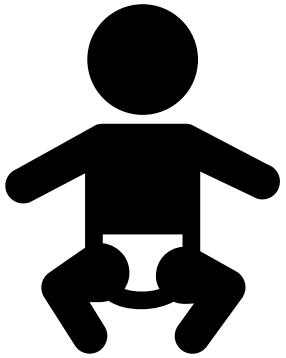


- Maternal age ≥ 42 years
- Obese class III (BMI > 40 kg/m^2)
- Rupture of membranes ≥ 24 hours
- Gestation ≥ 42 weeks
- Uterine scar (e.g. previous CS or uterine surgery)
- Medical or obstetric conditions that pose a risk to intrapartum fetal wellbeing (e.g. cholestasis)
- Any hypertensive disorder requiring medication
- Diabetes where medication (insulin or metformin) is indicated; or poorly controlled; or with fetal macrosomia

Antenatal risk factors for CTG

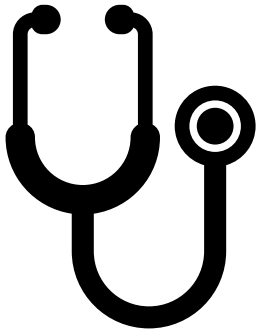
Fetal

- Fetal growth restriction/small for gestational age
- Multiple pregnancy
- Non-cephalic presentation
- Known fetal abnormality requiring monitoring
- Fetal movements altered unless there has been a return to normal movements and demonstrated well-being (CTG with or without ultrasound)



Antenatal risk factors for CTG

Abnormal findings in pregnancy

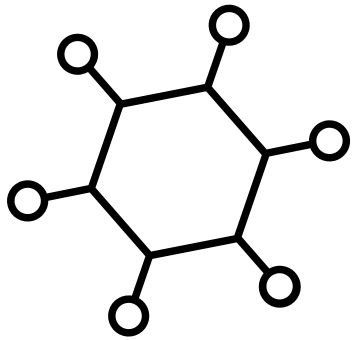


- Oligohydramnios or polyhydramnios
- Suspected chorioamnionitis or sepsis
- Antepartum haemorrhage
- Abnormal antenatal CTG
- Abnormal doppler umbilical artery velocimetry
- Placental cord insertion likely to impact fetal compromise in labour (e.g. velamentous insertion)
- Abnormal cerebroplacental ratio

Multiple risk factors for CTG

May have a cumulative and/or synergistic effect

- Where two or more of the following are present in labour, recommend CTG:
  - Gestational hypertension
  - Gestational diabetes mellitus (GDM) without complicating factors
  - Obese class I and II (body mass index 30–39.9 kg/m^2)
  - Maternal age between 40–42 years
  - Maternal pyrexia (temperature 37.8 °C or 37.9 °C)
  - 41 to 41+6 weeks gestation



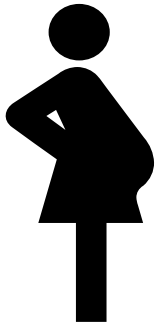
Intrapartum risk factors for CTG

Maternal

- Maternal pyrexia (≥ 38ºC)
- Maternal hypertension *(between contractions)*
  - sBP ≥ 160 mmHg or
  - dBP ≥ 110 mmHg

Or two consecutive readings 30 minutes apart

  - sBP ≥ 140 mmHg or
  - dBP ≥ 90 mmHg



Uterine

- Tachysystole
- Hypertonus
- Hyperstimulation

Interventions

- IOL with prostaglandins or oxytocin
- Augmentation with oxytocin
- Regional analgesia
- Patient controlled analgesia infusion

Intrapartum risk factors for CTG

Abnormal findings in labour

- Suspected chorioamnionitis or sepsis
- Abnormal vaginal bleeding
- Meconium liquor or blood-stained liquor
- Absent liquor following confirmed amniotomy
- Abnormal FHR detected by IA
- Prolonged1st or active 2nd stage of labour

Fetal

- Preterm labour < 37 weeks

Preterm fetus

Physiology of FHR

- Physiological control of FHR differs from term baby
- Lower reserves
- Reduced ability to withstand persistent intrapartum insults
- Requires early identification and management of hypoxia

Interpretation of CTG

- Poor positive predictive value
- Baseline often higher
- Variability may be reduced due to immature autonomic nervous system
- Variable decelerations can occur more frequently
- Requires expert clinician input
- Not recommended < 24 weeks gestation
- Limited evidence on interpretation between 24 weeks–28 weeks

Multiple pregnancy

- Assess and document each fetal position
- Identify and confirm each FHR and monitor simultaneously
- Where possible, consider separating the FHRs by 20 bpm to differentiate between them
- Monitor MHR and display it simultaneously with each FHR

Assessment of CTG

- Use a systematic approach to review CTG
  - Contractions, baseline, baseline variability, accelerations, decelerations
- Review in context of overall clinical picture including:
  - Antenatal and intrapartum risk factors
  - Clinical history, observations, progress of labour, parity
  - Medications
  - Individual values and preferences
- Discuss findings with woman and escalate as required

Safety considerations during CTG monitoring

- Short, infrequent interruptions for personal care if previous CTG normal and no recent interventions
- 1:1 intrapartum midwifery care
- Minimise disturbances
- Differentiate between MHR and FHR
- Minimise interruptions to CTG monitoring (if transferring to theatre – use IA if unable to use CTG)
- If fetal death suspected, confirm fetal viability with USS
- Commence CTG prior to epidural block to establish baseline features
- Review and interpret CTG trace every 15–30 minutes

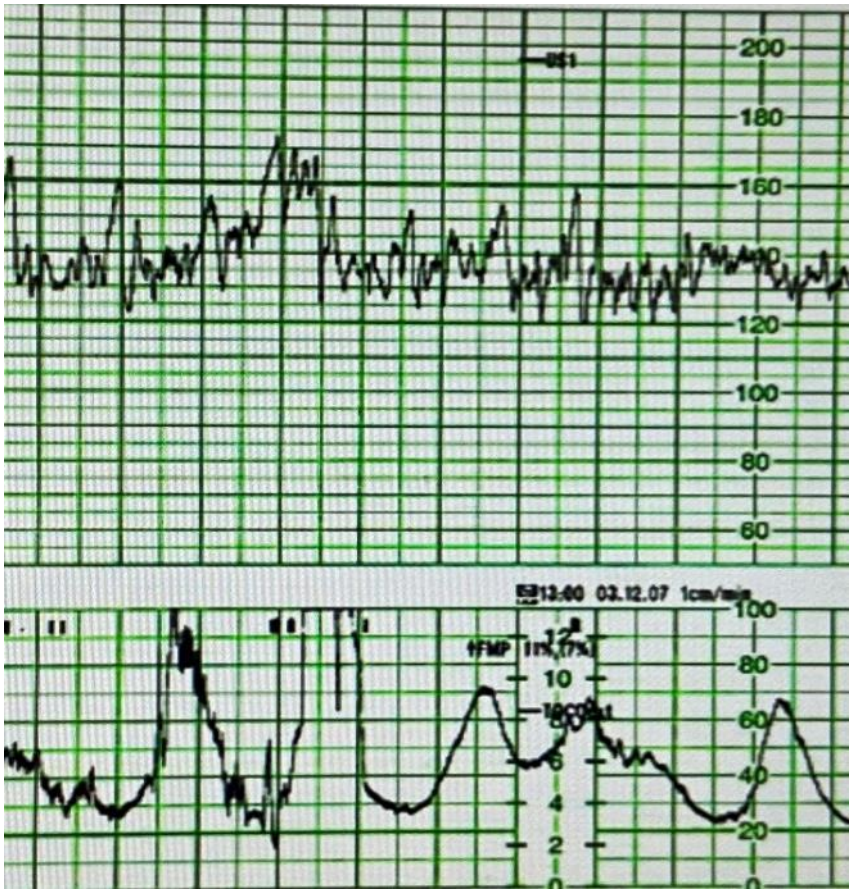
Normal CTG–features are green

Classification			Baseline	Variability	Decelerations	Accelerations	Actions
Normal	***Low probability***	**GREEN**	• **110–160 bpm**	• **6–25 bpm**	• **Nil**	• **Present**	• **Nil**
Abnormal	***Unlikely significant*** ***when occuring in isolation***	BLUE	• 100–109 bpm	• Reduced (3–5 bpm)	• Early or • Variable	• Absent	• Continue CTG • Obstetric/midwifery review • Correct reversible causes
	May be significant ***requiring further action***	YELLOW	• > 160 bpm or • Rising		• Complicated variable or • Late or • Prolonged		• Continue CTG • Obstetric/midwifery review • Correct reversible causes • FSS/FBS/Review birth timing
	Likely ***Significant fetal compromise***	RED	≥ 2 YELLOW features = RED				Persistent YELLOW = RED
			• Bradycardia • > 5 minutes	• Absent (< 3 bpm) • Sinusoidal	• Complicated variable (with reduced or absent variability) • Late (with reduced or absent variability)		• Continue CTG • Urgent obstetric/midwifery review • Expedite birth

Normal intrapartum CTG

Systematic interpretation

- Contractions
- Baseline FHR 110–160 bpm
- Variability 6–25 bpm
- Accelerations present
- Significance of no accelerations on an otherwise normal CTG unclear
- Decelerations – nil
- Classification of trace



Abnormal CTG – features may be blue, yellow and/or red

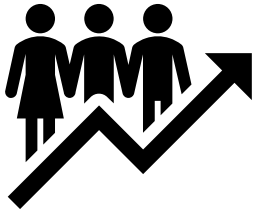
All CTGs that are not normal are by definition abnormal and further evaluation is recommended

Classification			Baseline	Variability	Decelerations	Accelerations	Actions
Normal	***Low probability***	GREEN	• 110–160 bpm	• 6–25 bpm	• Nil	• Present	• Nil
Abnormal[2]	***Unlikely significant*** *when occuring in isolation*	**BLUE**	• **100–109 bpm**	• **Reduced (3–5 bpm)**	• **Early or** • **Variable**	• **Absent**[1]	• **Continue CTG** • **Obstetric/midwifery review** • **Correct reversible causes**
	May be significant *requiring further action*	**YELLOW**	• **> 160 bpm or** • **Rising**		• **Complicated variable or** • **Late or** • **Prolonged**		• **Continue CTG** • **Obstetric/midwifery review** • **Correct reversible causes** • **FSS/FBS/Review birth timing**
	Likely *Significant fetal compromise*	**RED**	**≥ 2 YELLOW features = RED**				**Persistent YELLOW = RED**
			• **Bradycardia** • **> 5 minutes**	• **Absent (< 3 bpm)** • **Sinusoidal**	• **Complicated variable** (with reduced or absent variability) • **Late** (with reduced or absent variability)		• **Continue CTG** • **Urgent obstetric/midwifery review** • **Expedite birth**

Abnormal CTG

Review and escalate

- Regular independent review by 2nd clinician
- Timely review and escalation to senior clinicians



Initiate

- Actions to identify and manage reversible causes
- Further fetal evaluation and review if CTG abnormality persists after correcting reversible causes
- Consider fetal scalp stimulation and/or fetal blood sampling
- Expediate birth where CTG indicates:
  - Further assessment required and FBS unavailable, contraindicated or declined
  - Likely significant fetal compromise (e.g. prolonged bradycardia less than 100 bpm for greater than 5 minutes)

Reversible causes

Cause	Actions

Maternal hypotension / reduced placental perfusion	• Position change
	• Monitor MHR and BP
	• Commence IV fluids to correct abnormalities in circulation (caution with fluid loading)
	• If secondary to epidural insertion/top-up:
	  ○ Turn off epidural
	  ○ Notify anaesthetist for urgent review
	  ○ Monitor maternal observations

Cord compression	• Position change • Exclude acute events • Consider vaginal exam (VE) to assess labour progress/exclude cord prolapse or cord presentation • If acute bradycardia or single prolonged deceleration seek urgent obstetric review

Reversible causes

Cause	Actions
Excessive uterine activity	• Cease or reduce oxytocin infusion • Remove prostaglandin • Consider tocolysis
Maternal tachycardia or pyrexia	• Undertake screening and treatment • Check maternal observations • If dehydrated: commence intravenous fluids • If tachycardia related to pain response, offer analgesia
Inadequate quality of CTG	• Check MHR • Reposition transducers • Consider FSE

Fetal scalp stimulation

Elements	Actions
Context	• Adjunct test to CTG • May reduce use of FBS by 50% • Based on the assumption that a healthy response leads to an acceleration in FHR
Mode	• Stroke fetal scalp lightly and gently for 15–30 seconds during a vaginal examination ○ Applying substantial pressure may produce a vagal response and result in deceleration

Management	• If following FSS, CTG displays:
	  ○ An acceleration and a sustained improvement in the CTG trace, continue to monitor the FHR and clinical picture
	  ○ No acceleration or acceleration occurs but there is continued reduced variability, additional testing and review is indicated

Fetal blood sampling

<table>
<tr><th>Elements</th><th>Actions</th></tr>
<tr><td>Context</td><td>• Consider in presence of abnormal CTG despite appropriate corrective actions
• Requires ruptured membranes and adequate cervical dilation</td></tr>
<tr><td>Management</td><td>• If the FHR trace remains abnormal despite a normal FBS result, repeat in 30 minutes
• If stable FBS after second test (lactate or pH remains unchanged), defer further testing unless there are additional abnormal features</td></tr>
<tr><td>Interpretation of results</td><td>
<table>
<tr><th>Interpretation</th><th>pH (units)</th><th>Lactate (mmol/L)</th></tr>
<tr><td>Normal</td><td>Greater than or equal to 7.25</td><td>Less than 4.2</td></tr>
<tr><td>Borderline: repeat in 30 mins</td><td>7.21 to 7.24</td><td>4.2 to 4.8</td></tr>
<tr><td>Abnormal: Expedite birth</td><td>7.20 to 7.14</td><td>Greater than 4.8</td></tr>
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Paired cord blood sampling

Elements	Actions
Context	• Samples from both vessels are needed to validate the arterial origin
Sampling technique	• Intact cord sampling (supports optimal cord clamping) or clamped cord sampling
Timing	• As soon as possible after birth • Analyse the sample as soon as possible after collection
Management	• Follow local processes for reporting abnormal results to neonatal team/clinician caring for baby
Reference ranges	

At term	pH	Base Excess (mmol/L)	pO_2 (mmHg)	pCO_2 (mmHg)	Lactate (mmol/L)
UA	7.10 to 7.38	-9.0 to 1.8	4.1 to 31.7	39.1 to 73	Less than 6.1
UV	7.22 to 7.44	-7.7 to 1.9	30.4 to 57.2	14.1 to 43.3	