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Addendum: fetal monitoring during labour

Exceptional review of fetal monitoring recommendations in CG190

In response to stakeholder concerns and implementation feedback, NICE will review guidance on fetal monitoring provided in CG190 Intrapartum Care for Healthy Women and Babies, published December 2014. This review will be carried out as a discrete project within the ongoing project to produce a guideline on 'Intrapartum Care for High Risk Women.' The evidence on fetal monitoring will be reviewed by the obstetric committee for this project, augmented by co-opted members and advised by expert witnesses as necessary.

The purpose of this document is to set out which review questions from CG190 will be rerun as part of this review, and consequently which recommendations in CG190 may be subject to change through this work and which will not. For some areas of the current guideline, it is intended to ask a new review question or to make explicit a review question which was addressed in CG190 but not stated explicitly. Where this is case the review question is marked DRAFT.

The tables below set out the review questions and recommendations on fetal monitoring from CG190 and NICE's decisions for review taking account of stakeholder comments on proposals that were consulted upon in April 2016.

Review decisions
All recommendation numbers below refer to those in the short version of the guideline, available here.

1. Continuous cardiotocography compared with intermittent auscultation on admission

Review questions	Recommendations	Decision
What is the effectiveness of electronic fetal monitoring compared with intermittent auscultation on admission in labour?	**Section 1.4 Initial assessment** **1.4.6** Auscultate the fetal heart rate at first contact with the	**Review** N.B. recommendations

	woman in labour, and at each further assessment. [new 2014] **1.4.7** Auscultate the fetal heart rate for a minimum of 1 minute immediately after a contraction and record it as a single rate. [new 2014] **1.4.8** Palpate the maternal pulse to differentiate between maternal heart rate and fetal heart rate. [new 2014] **1.4.9** Record accelerations and decelerations if heard. [new 2014] **1.4.10** Do not perform cardiotocography on admission for low-risk women in suspected or established labour in any birth setting as part of the initial assessment. [new 2014] **1.4.11** Offer continuous cardiotocography if any of the risk factors listed in recommendation 1.4.3 are identified on initial assessment, and explain to the woman why this is necessary. (See also section 1.10 on fetal monitoring.) [new 2014] **1.4.12** Offer cardiotocography if intermittent auscultation indicates possible fetal heart rate abnormalities, and explain to the woman why this is necessary. Remove the cardiotocograph if the trace is normal after 20 minutes. (See also section 1.10 on fetal monitoring.) [new 2014] **1.4.13** If fetal death is suspected despite the presence of an apparently recorded fetal heart rate, offer real-time ultrasound assessment to check fetal viability. [new 2014]	1.4.1, 1.4.2, 1.4.3, 1.4.4, 1.4.5 will not be reviewed at this time.

2. Cardiotocography compared with intermittent auscultation during established labour

Review questions	Recommendations	Decision
What is the effectiveness of electronic fetal monitoring compared with intermittent	**Section 1.10 Monitoring during labour**	**Review**

auscultation during established labour?	***Measuring fetal heart rate*** **1.10.1** Offer intermittent auscultation of the fetal heart rate to low-risk women in established first stage of labour in all birth settings: • Use either a Pinard stethoscope or Doppler ultrasound. • Carry out intermittent auscultation immediately after a contraction for at least 1 minute, at least every 15 minutes, and record it as a single rate. • Record accelerations and decelerations if heard. • Palpate the maternal pulse if a fetal heart rate abnormality is suspected, to differentiate between the two heart rates. [new 2014] **1.10.2** Do not perform cardiotocography for low-risk women in established labour. [new 2014] **1.10.3** Advise continuous cardiotocography if any of the following risk factors are present or arise during labour: • suspected chorioamnionitis or sepsis, or a temperature of 38°C or above • severe hypertension (160/110 mmHg or above [see the NICE guideline on hypertension in pregnancy]). • oxytocin use • the presence of significant meconium (see recommendation 1.5.2) • fresh vaginal bleeding that develops in labour. [new 2014] **1.10.4** If any one of the following risk factors is present or arises during labour, perform a full assessment of all factors listed in recommendation 1.5.1:	N.B. recommendations 1.5.1, 1.5.2, 1.12.13, 1.13.24 and 1.13.25 and section 1.11, which are cross-referred to in section 10.1, will not be reviewed at this time.

	• prolonged period since rupture of membranes (24 hours or more) (see also section 1.11) • moderate hypertension (150/100 to 159/109 mmHg [see the NICE guideline on hypertension in pregnancy]) • confirmed delay in the first or second stage of labour (see recommendations 1.12.13, 1.13.24 and 1.13.25) • the presence of non‑significant meconium. Advise continuous cardiotocography if 2 or more of the above risk factors are present, or any other risk factor in recommendation 1.5.1 is present with 1 of these. [new 2014] **1.10.5** Do not regard amniotomy alone for suspected delay in the established first stage of labour as an indication to start continuous cardiotocography. [2007, amended 2014] **1.10.6** Address any concerns that the woman has about continuous cardiotocography, and give her the following information: • Explain that continuous cardiotocography is used to monitor the baby's heartbeat and the labour contractions. • Give details of the types of findings that may occur. Explain that a normal trace is reassuring and indicates that the baby is coping well with labour, but if the trace is not normal there is less certainty about the condition of the baby and further continuous monitoring will be advised. • Explain that decisions about whether to take any further action will be based on an assessment of several factors, including the findings from cardiotocography. [new 2014] **1.10.7** If continuous cardiotocography has been used because of concerns arising from intermittent auscultation but there	

	are no non‑reassuring or abnormal features (see table 10) on the cardiotocograph trace after 20 minutes, remove the cardiotocograph and return to intermittent auscultation. [new 2014]	

3. Fetal heart rate monitoring for meconium-stained liquor

Review questions	Recommendations	Decision
What is the effectiveness of continuous electronic fetal monitoring compared with intermittent auscultation when there is meconium-stained liquor?	Not applicable, this review question informed recommendations elsewhere that it is proposed to review	**Review**

4. Interpretation of an electronic fetal heart rate trace

Review questions	Recommendations	Decision
What are the appropriate definitions and interpretation of the features of an electronic fetal heart rate trace? DRAFT: How should care in labour be modified as a result of cardiotocograph findings?	**Section 1.10 Monitoring during labour** ***Interpretation of cardiotocograph traces*** **1.10.9** Use tables 10 and 11 to define and interpret cardiotocograph traces and to guide the management of labour for women who are having continuous cardiotocography. These tables include and summarise individual recommendations about fetal monitoring (1.10.10 to 1.10.34), fetal scalp stimulation (1.10.39 and 1.10.40), fetal blood sampling (1.10.41 to 1.10.54) and intrauterine resuscitation (1.10.35 to 1.10.38) in this guideline. [new 2014]	**Review** N.B. recommendations 1.13.34 to 1.13.37, which are cross-referred to in section 1.10 will not be reviewed at this time. N.B. references to management with paracetamol in

	[TABLES 10 AND 11 ARE PRESENTED IN AN APPENDIX FOR REASONS OF SPACE] ***Overall care*** **1.10.10** If continuous cardiotocography is needed: • explain to the woman that it will restrict her mobility, particularly if conventional monitoring is used • encourage and help the woman to be as mobile as possible and to change position as often as she wishes • remain with the woman in order to continue providing one-to-one support • monitor the condition of the woman and the baby, and take prompt action if required • ensure that the focus of care remains on the woman rather than the cardiotocograph trace • ensure that the cardiotocograph trace is of high quality, and think about other options if this is not the case • bear in mind that it is not possible to categorise or interpret every cardiotocograph trace; senior obstetric input is important in these cases. [new 2014] **1.10.11** Do not make any decision about a woman's care in labour on the basis of cardiotocography findings alone. [new 2014] **1.10.12** Any decision about changes to a woman's care in labour when she is on a cardiotocograph monitor should also take into account the following:	recommendations 1.10.17, 1.10.20 and 1.10.35 will be stood down and addressed through the scope of the guideline on intrapartum care for high risk women (use of anti-pyretics for women with pyrexia).

	• the woman's report of how she is feeling • the woman's report of the baby's movements • assessment of the woman's wellbeing and behaviour • the woman's temperature, pulse and blood pressure • whether there is meconium or blood in the amniotic fluid • any signs of vaginal bleeding • any medication the woman is taking • the frequency of contractions • the stage and progress of labour • the woman's parity • the results of fetal blood sampling if undertaken (see recommendations 1.10.41 to 1.10.54) • the fetal response to scalp stimulation if performed (see recommendations 1.10.39 and 1.10.40). [new 2014] **1.10.13** When reviewing the cardiotocograph trace, assess and document all 4 features (baseline fetal heart rate, baseline variability, presence or absence of decelerations, and presence of accelerations). [new 2014] **1.10.14** Supplement ongoing care with a documented systematic assessment of the condition of the woman and unborn baby (including any cardiotocography findings) every hour. If there are concerns about cardiotocography findings, undertake this assessment more frequently. [new 2014] **1.10.15** Be aware that if the cardiotocography parameters of baseline fetal heart rate and baseline variability are normal, the risk of fetal acidosis is low. [new 2014] **1.10.16** Take the following into account when assessing	

	baseline fetal heart rate: • this will usually be between 110 and 160 beats/minute • a baseline fetal heart rate between 100 and 109 beats/minute (having confirmed that this is not the maternal heart rate) with normal baseline variability and no variable or late decelerations is normal and should not prompt further action • a stable baseline fetal heart rate between 90 and 99 beats/minute with normal baseline variability (having confirmed that this is not the maternal heart rate) may be a normal variation; obtain a senior obstetric opinion if uncertain. [new 2014] **1.10.17** If the baseline fetal heart rate is between 161 and 180 beats/minute with no other non‑reassuring or abnormal features on the cardiotocograph: • think about possible underlying causes (such as infection) and appropriate investigation • check the woman's temperature and pulse; if either are raised, offer fluids and paracetamol • start one or more conservative measures (see recommendation 1.10.35). [new 2014] **1.10.18** If the baseline fetal heart rate is between 161 and 180 beats/minute with no other non‑reassuring or abnormal features on the cardiotocograph and the woman's temperature and pulse are normal, continue cardiotocography and normal care, since the risk of fetal acidosis is low. [new 2014] **1.10.19** If the baseline fetal heart rate is between 100 and 109 beats/minute or above 160 beats/minute and there is 1 other	

	non‑reassuring feature on the cardiotocograph, start conservative measures (see recommendation 1.10.35) to improve fetal wellbeing. [new 2014] **1.10.20** If the baseline fetal heart rate is above 180 beats/minute with no other non‑reassuring or abnormal features on the cardiotocograph: • think about possible underlying causes (such as infection) and appropriate investigation • check the woman's temperature and pulse; if either are raised, offer fluids and paracetamol • start one or more conservative measures (see recommendation 1.10.35) • offer fetal blood sampling to measure lactate or pH (see recommendations 1.10.41 to 1.10.54) if the rate stays above 180 beats/minute despite conservative measures. [new 2014] **1.10.21** If there is a bradycardia or a single prolonged deceleration with the fetal heart rate below 100 beats/minute for 3 minutes or more: • start conservative measures (see recommendation 1.10.35) • urgently seek obstetric help • make preparations for urgent birth • expedite the birth (see recommendations 1.13.34 to 1.13.37) if the bradycardia persists for 9 minutes. If the fetal heart rate recovers at any time up to 9 minutes, reassess any decision to expedite the birth, in discussion with the woman. [new 2014] ***Baseline variability***	

	1.10.22 Take the following into account when assessing fetal heart rate baseline variability: • baseline variability will usually be 5 beats/minute or more • intermittent periods of reduced baseline variability are normal, especially during periods of quiescence ('sleep') • mild or minor pseudo-sinusoidal patterns (oscillations of amplitude 5–15 beats/minute) are of no significance. [new 2014] **1.10.23** If there is reduced baseline variability of less than 5 beats/minute with a normal baseline fetal heart rate and no variable or late decelerations: • start conservative measures (see recommendation 1.10.35) if this persists for over 30 minutes • offer fetal blood sampling to measure lactate or pH (see recommendations 1.10.41 to 1.10.54) if it persists for over 90 minutes. [new 2014] **1.10.24** If there is reduced baseline variability of less than 5 beats/minute for over 30 minutes together with 1 or more of tachycardia (baseline fetal heart rate above 160 beats/minute), a baseline fetal heart rate below 100 beats/minute or variable or late decelerations: • start conservative measures (see recommendation 1.10.35) and • offer fetal blood sampling to measure lactate or pH (see recommendations 1.10.41 to 1.10.54). [new 2014] ***Decelerations*** **1.10.25** When describing decelerations in fetal heart rate,	

	specify: • the depth and duration of the individual decelerations • their timing in relation to the peaks of the contractions • whether or not the fetal heart rate returns to baseline • how long they have been present for • whether they occur with over 50% of contractions. [new 2014] **1.10.26** Describe decelerations as 'early', 'variable' or 'late'. Do not use the terms 'typical' and 'atypical' because they can cause confusion. [new 2014] **1.10.27** Take the following into account when assessing decelerations in fetal heart rate: • early decelerations are uncommon, benign and usually associated with head compression • early decelerations with no non‑reassuring or abnormal features on the cardiotocograph trace should not prompt further action. [new 2014] **1.10.28** If variable decelerations are observed that begin with the onset of a contraction: • be aware that these are very common, can be a normal feature in an otherwise uncomplicated labour and birth, and are usually a result of cord compression • think about asking the woman to change position or mobilise. [new 2014] **1.10.29** Start conservative measures (see recommendation 1.10.35) if variable decelerations are observed with a normal baseline fetal heart rate and normal baseline variability that are:	

	• dropping from baseline by 60 beats/minute or less and taking 60 seconds or less to recover • present for over 90 minutes • occurring with over 50% of contractions. [new 2014] **1.10.30** Start conservative measures (see recommendation 1.10.35) if variable decelerations are observed with a normal baseline fetal heart rate and normal baseline variability that are: • dropping from baseline by more than 60 beats/minute or taking over 60 seconds to recover • present for up to 30 minutes • occurring with over 50% of contractions. [new 2014] **1.10.31** Offer fetal blood sampling to measure lactate or pH (see recommendations 1.10.41 to 1.10.54) if non‑reassuring variable decelerations (see recommendations 1.10.29 and 1.10.30) are: • still observed 30 minutes after starting conservative measures or • accompanied by tachycardia (baseline fetal heart rate above 160 beats/minute) and/or reduced baseline variability (less than 5 beats/minute). [new 2014] **1.10.32** If late decelerations (decelerations that start after a contraction and often have a slow return to baseline) are observed: • start conservative measures (see recommendation 1.10.35) if the late decelerations occur with over 50% of contractions • offer fetal blood sampling to measure lactate or pH (see recommendations 1.10.41 to 1.10.54) and/or expedite the birth	

	(see recommendations 1.13.34 to 1.13.37) if the late decelerations persist for over 30 minutes and occur with over 50% of contractions • take action sooner if the late decelerations are accompanied by an abnormal baseline fetal heart rate and/or reduced baseline variability. [new 2014] **1.10.33** Take into account that the longer, the later and the deeper the individual decelerations, the more likely the presence of fetal acidosis (particularly if the decelerations are accompanied by tachycardia and/or reduced baseline variability), and take action sooner than 30 minutes if there is concern about fetal wellbeing. [new 2014] ***Accelerations*** **1.10.34** Take the following into account when assessing accelerations in fetal heart rate: • the presence of fetal heart rate accelerations is generally a sign that the baby is healthy • the absence of accelerations in an otherwise normal cardiotocograph trace does not indicate acidosis. [new 2014] ***Conservative measures*** **1.10.35** If there are any concerns about the baby's wellbeing, think about the possible underlying causes and start one or more of the following conservative measures based on an assessment of the most likely cause(s): • encourage the woman to mobilise or adopt a left‑lateral	

	position, and in particular to avoid being supine
	• offer oral or intravenous fluids
	• offer paracetamol if the woman has a raised temperature
	• reduce contraction frequency by:
	  ○ stopping oxytocin if it is being used (the consultant obstetrician should decide whether and when to restart oxytocin) and/or
	  ○ offering a tocolytic drug (a suggested regimen is subcutaneous terbutaline 0.25 mg). [new 2014]
	1.10.36 Inform the coordinating midwife and an obstetrician whenever conservative measures are implemented. [new 2014]
	1.10.37 Do not use maternal facial oxygen therapy for intrauterine fetal resuscitation, because it may harm the baby (but it can be used where it is administered for maternal indications such as hypoxia or as part of preoxygenation before a potential anaesthetic). [new 2014]	

5. Predictive value of fetal scalp stimulation

Review questions	Recommendations	Decision
Does the use of fetal stimulation as an adjunct to electronic fetal monitoring improve the predictive value of monitoring and clinical outcomes when compared with: • electronic fetal monitoring alone • electronic fetal monitoring plus electrocardiogram?	**Section 1.10 Monitoring during labour** ***Response to fetal scalp stimulation*** **1.10.39** If fetal scalp stimulation leads to an acceleration in fetal heart rate, regard this as a reassuring feature. Take this into account when reviewing the whole clinical picture (see	**Review**

	recommendation 1.10.12). [new 2014] **1.10.40** 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. [new 2014]	

6. Fetal blood sampling

Review questions	Recommendations	Decision
Does the use of fetal blood sampling as an adjunct to electronic fetal monitoring improve outcomes, when compared to: • electronic fetal monitoring alone • electronic fetal monitoring plus electrocardiogram? What is the optimum time from the decision to perform a fetal blood sample to having the blood result? What is the predictive value of the following measures, for maternal and neonatal outcomes: • fetal blood pH analysis • fetal blood lactate analysis • fetal acid-base status • fetal base deficit?	**Section 1.10 Monitoring during labour** ***Fetal blood sampling*** **1.10.41** When offering fetal blood sampling, explain the following to the woman: • Why the test is being advised. • The blood sample will be used to measure the level of acid in the baby's blood, to see how well the baby is coping with labour. • The procedure will require her to have a vaginal examination using a small device similar to a speculum. • A sample of blood will be taken from the baby's head by making a small scratch on the baby's scalp. This will heal quickly after birth, but there is a small risk of infection. • The procedure can help to reduce the need for further, more serious interventions. • What the different outcomes of the test may be (normal, borderline and abnormal) and the actions that will follow each result.	**Review** N.B. recommendations 1.13.34 to 1.13.37, which are cross-referred to in section 10.1 will not be reviewed at this time.

	• There is a small chance that it will not be possible to obtain a blood sample (especially if the cervix is less than 4 cm dilated). If a sample cannot be obtained, a caesarean section or instrumental birth (forceps or ventouse) may be needed because otherwise it is not possible to find out how well the baby is coping. [new 2014] **1.10.42** Do not carry out fetal blood sampling if any contraindications are present, including risk of maternal-to-fetal transmission of infection or risk of fetal bleeding disorders. [new 2014] **1.10.43** Take fetal blood samples with the woman in the left-lateral position. [2014] **1.10.44** Measure either lactate or pH when performing fetal blood sampling. Measure lactate if the necessary equipment and suitably trained staff are available; otherwise measure pH. [new 2014] **1.10.45** Use the classification of fetal blood sample results shown in table 12. [new 2014] [TABLE 12 IS PRESENTED IN AN APPENDIX FOR REASONS OF SPACE] **1.10.46** Interpret fetal blood sample results taking into account any previous lactate or pH measurement, the rate of progress in labour and the clinical features of the woman and baby. [new 2014] **1.10.47** Inform the consultant obstetrician if any fetal blood sample result is abnormal. [new 2014] **1.10.48** Discuss with the consultant obstetrician if:	

	• a fetal blood sample cannot be obtained or • a third fetal blood sample is thought to be needed. [new 2014] **1.10.49** If the fetal blood sample result is normal, offer repeat sampling no more than 1 hour later if this is still indicated by the cardiotocograph trace, or sooner if additional non‑reassuring or abnormal features are seen. [2014] **1.10.50** If the fetal blood sample result is borderline, offer repeat sampling no more than 30 minutes later if this is still indicated by the cardiotocograph trace, or sooner if additional non‑reassuring or abnormal features are seen. [2014] **1.10.51** Take into account the time needed to take a fetal blood sample when planning repeat sampling. [2014] **1.10.52** If the cardiotocograph trace remains unchanged and the fetal blood sample result is stable (that is, lactate or pH is unchanged) after a second test, further samples may be deferred unless additional non‑reassuring or abnormal features are seen. [new 2014] ***When a fetal blood sample cannot be obtained*** **1.10.53** If a fetal blood sample is indicated and the sample cannot be obtained, but the associated scalp stimulation results in fetal heart rate accelerations, decide whether to continue the labour or expedite the birth in light of the clinical circumstances and in discussion with the consultant obstetrician and the woman. [new 2014] **1.10.54** If a fetal blood sample is indicated but a sample cannot be obtained and there is no improvement in the cardiotocograph trace, advise the woman that the birth	

	should be expedited (see recommendations 1.13.34 to 1.13.37). [new 2014]	

7. Cardiotocography using telemetry compared with conventional cardiotocography

Review questions	Recommendations	Decision
What is the effectiveness of cardiotocography using telemetry compared with conventional cardiotocography?	**Section 10.1 Monitoring during labour** ***Telemetry*** **1.10.8** Offer telemetry to any woman who needs continuous cardiotocography during labour. [new 2014]	**Not review**

8. Women's views and experiences of fetal monitoring

Review questions	Recommendations	Decision
What are women's views and experiences of fetal monitoring in labour?	Not applicable, this review question informed recommendations elsewhere that it is proposed to review	**Review**

9. Cardiotocography with fetal electrocardiogram analysis compared with cardiotocography alone

Review questions	Recommendations	Decision
Does the use of fetal electrocardiogram analysis with continuous electronic fetal monitoring improve outcomes when compared with continuous electronic fetal monitoring alone?	No recommendation was made.	**Review**

10. Computerised systems versus human interpretation

Review questions	Recommendations	Decision
DRAFT: Does automated interpretation of cardiotocograph traces using computer software improve consistency of interpretation and outcomes (neonatal and maternal)?	No recommendation was made.	**Review**

11. Record keeping for electronic fetal monitoring

Review questions	Recommendations	Decision
How should record keeping be carried out for electronic fetal monitoring?	**Section 10.1 Monitoring during labour** ***Record keeping*** **1.10.55** To ensure accurate record keeping for cardiotocography: • make sure that date and time clocks on the cardiotocograph monitor are set correctly • label traces with the woman's name, date of birth and hospital number or NHS number, the date and the woman's pulse at the start of monitoring. [new 2014] **1.10.56** Individual units should develop a system for recording relevant intrapartum events (for example, vaginal examination, fetal blood sampling and siting of an epidural) in	**Not review**

	standard notes and/or on the cardiotocograph trace. [new 2014]	

12. Risk management in monitoring babies in labour

Review questions	Recommendations	Decision
DRAFT: For how long, how and where should cardiotocograph traces be stored?	**Section 10.1 Monitoring during labour** ***Record keeping*** **1.10.57** Keep cardiotocograph traces for 25 years and, if possible, store them electronically. [2007, amended 2014] **1.10.58** In cases where there is concern that the baby may experience developmental delay, photocopy cardiotocograph traces and store them indefinitely in case of possible adverse outcomes. [2007, amended 2014] **1.10.59** Ensure that tracer systems are available for all cardiotocograph traces if stored separately from the woman's records. [2007, amended 2014] **1.10.60** Develop tracer systems to ensure that cardiotocograph traces removed for any purpose (such as risk management or for teaching purposes) can always be located. [2007, amended 2014]	**Not review**

APPENDIX

Table 10: Description of cardiotocograph trace features

Overall care
Do not make any decision about a woman's care in labour on the basis of cardiotocography (CTG) findings alone.
Take into account any antenatal and intrapartum risk factors, the current wellbeing of the woman and unborn baby, and the progress of labour when interpreting the CTG trace.
Remain with the woman at all times in order to continue providing one-to-one support.
Ensure that the focus of care remains on the woman rather than the CTG trace.
Make a documented systematic assessment of the condition of the woman and the unborn baby (including CTG findings) hourly, or more frequently if there are concerns.

Principles for intrapartum CTG trace interpretation
When reviewing the CTG trace, assess and document all 4 features (baseline fetal heart rate, baseline variability, presence or absence of decelerations, presence of accelerations).
It is not possible to categorise or interpret every CTG trace. Senior obstetric input is important in these cases.

Accelerations
The presence of fetal heart rate accelerations is generally a sign that the unborn baby is healthy.
If a fetal blood sample is indicated and the sample cannot be obtained, but the associated scalp stimulation results in fetal heart rate accelerations, decide whether to continue the labour or expedite the birth in light of the clinical circumstances and in discussion with the woman.

Description	Feature		
	Baseline (beats/ minute)	Baseline variability (beats/ minute)	Decelerations
Normal/ reassuring	100–160	5 or more	None or early
Non-reassuring	161–180	Less than 5 for 30–90 minutes	Variable decelerations: dropping from baseline by 60 beats/minute or less and taking 60 seconds or less to recover present for over 90 minutes occurring with over 50% of contractions. OR Variable decelerations: dropping from baseline by more than 60 beats/minute or taking over 60 seconds to recover present for up to 30 minutes occurring with over 50% of contractions. OR Late decelerations: present for up to 30 minutes occurring with over 50% of contractions.
Abnormal	Above 180	Less than 5 for over	Non-reassuring variable decelerations (see row above):

Overall care **Do not make any decision about a woman's care in labour on the basis of cardiotocography (CTG) findings alone.** **Take into account any antenatal and intrapartum risk factors, the current wellbeing of the woman and unborn baby, and the progress of labour when interpreting the CTG trace.** **Remain with the woman at all times in order to continue providing one-to-one support.** **Ensure that the focus of care remains on the woman rather than the CTG trace.** **Make a documented systematic assessment of the condition of the woman and the unborn baby (including CTG findings) hourly, or more frequently if there are concerns.** **Principles for intrapartum CTG trace interpretation** **When reviewing the CTG trace, assess and document all 4 features (baseline fetal heart rate, baseline variability, presence or absence of decelerations, presence of accelerations).** **It is not possible to categorise or interpret every CTG trace. Senior obstetric input is important in these cases.** **Accelerations** **The presence of fetal heart rate accelerations is generally a sign that the unborn baby is healthy.** **If a fetal blood sample is indicated and the sample cannot be obtained, but the associated scalp stimulation results in fetal heart rate accelerations, decide whether to continue the labour or expedite the birth in light of the clinical circumstances and in discussion with the woman.**			
	or below 100	90 minutes	still observed 30 minutes after starting conservative measures occurring with over 50% of contractions. OR Late decelerations present for over 30 minutes do not improve with conservative measures occurring with over 50% of contractions. OR Bradycardia or a single prolonged deceleration lasting 3 minutes or more.
Abbreviation: CTG, cardiotocography.			

Table 11: Management based on interpretation of cardiotocograph traces

Category	Definition	Interpretation	Management
CTG is normal/ reassuring	All 3 features are normal/ reassuring	Normal CTG, no non-reassuring or abnormal features, healthy fetus	Continue CTG and normal care. If CTG was started because of concerns arising from intermittent auscultation, remove CTG after 20 minutes if there are no non-reassuring or abnormal features and no ongoing risk factors.
CTG is non-reassuring and suggests need for conservative	1 non-reassuring feature AND 2 normal/ reassuring	Combination of features that may be associated with increased risk of fetal acidosis; if	Think about possible underlying causes. If the baseline fetal heart rate is over 160 beats/minute, check the woman's temperature and pulse. If either are raised, offer fluids and paracetamol. Start 1 or more conservative measures:

Category	Definition	Interpretation	Management
measures	features	accelerations are present, acidosis is unlikely	encourage the woman to mobilise or adopt a left-lateral position, and in particular to avoid being supine offer oral or intravenous fluids reduce contraction frequency by stopping oxytocin if being used and/or offering tocolysis. Inform coordinating midwife and obstetrician.
CTG is abnormal and indicates need for conservative measures AND further testing	1 abnormal feature OR 2 non-reassuring features	Combination of features that is more likely to be associated with fetal acidosis	Think about possible underlying causes. If the baseline fetal heart rate is over 180 beats/minute, check the woman's temperature and pulse. If either are raised, offer fluids and paracetamol. Start 1 or more conservative measures (see 'CTG is non-reassuring…' row for details). Inform coordinating midwife and obstetrician. Offer to take an FBS (for lactate or pH) after implementing conservative measures, or expedite birth if an FBS cannot be obtained and no accelerations are seen as a result of scalp stimulation. Take action sooner than 30 minutes if late decelerations are accompanied by tachycardia and/or reduced baseline variability. Inform the consultant obstetrician if any FBS result is abnormal. Discuss with the consultant obstetrician if an FBS cannot be obtained or a third FBS is thought to be needed.
CTG is abnormal and indicates need for urgent intervention	Bradycardia or a single prolonged deceleration with baseline below 100 beats/minute, persisting for 3 minutes or more*	An abnormal feature that is very likely to be associated with current fetal acidosis or imminent rapid development of fetal acidosis	Start 1 or more conservative measures (see 'CTG is non-reassuring…' row for details). Inform coordinating midwife. Urgently seek obstetric help. Make preparations for urgent birth. Expedite birth if persists for 9 minutes. If heart rate recovers before 9 minutes, reassess decision to expedite birth in discussion with the woman.
Abbreviations: CTG, cardiotocography; FBS, fetal blood sample. * A stable baseline value of 90–99 beats/minute with normal baseline variability (having confirmed that this is not the maternal heart rate) may be a normal variation; obtain a senior obstetric opinion if uncertain			

Table 22: Classification of fetal blood sample results

Lactate (mmol/l)	pH	Interpretation
≤ 4.1	≥ 7.25	Normal
4.2–4.8	7.21–7.24	Borderline
≥ 4.9	≤ 7.2	Abnormal