# NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

# Guideline

# Fetal monitoring in labour

## Draft for consultation, July 2022

**This guideline covers** the different methods which can be used to monitor the wellbeing of the baby during labour. It also covers the use of risk assessment to determine the most appropriate level of fetal monitoring, the use of overall clinical assessment in addition to the fetal monitoring results, the interpretation of the fetal monitoring findings, and any actions which may be needed as a result. In this guideline we use the terms 'woman' or 'mother' throughout. These should be taken to include people who do not identify as women but are pregnant or have given birth.

This guideline will partially update NICE guideline CG190 (published December 2014, updated February 2017).

### Who is it for?

- Healthcare professionals
- Commissioners and providers of maternity services
- Women who are pregnant, before and during labour, and their families and carers

### What does it include?

- the recommendations
- recommendations for research
- rationale and impact sections that explain why the committee made the 2022 recommendations and how they might affect practice.
- the guideline context.

Information about how the guideline was developed is on the guideline's webpage. This includes the evidence reviews, the scope, details of the committee and any declarations of interest.

### New and updated recommendations

We have reviewed the evidence on fetal blood sampling. You are invited to comment on the new and updated recommendations. These are marked as **[2022]**

You are also invited to comment on recommendations that we propose to delete from the 2014 guideline.

We have not reviewed the evidence for the recommendations shaded in grey, and cannot accept comments on them. In some cases, we have made minor wording changes for clarification.

See update information for a full explanation of what is being updated.

Full details of the evidence and the commitee's discussion on the 2022 recommendations are in the evidence reviews. Evidence for the 2014 recommendations is in the full version of the 2014 guideline.

# Contents

# Recommendations

People have the right to be involved in discussions and make informed decisions about their care, as described in NICE's information on making decisions about your care.

Making decisions using NICE guidelines explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

# Recommendations

## 1.1 Information and shared decision-making

1.1.1 Discuss fetal monitoring options with a woman as part of her antenatal care, and document the discussions and decisions in her personalised care plan. **[2022]**

1.1.2 Throughout labour, provide women with information on the fetal monitoring option being advised, the reasons for this advice, and the implications of other fetal monitoring methods. **[2022]**

1.1.3 Take the woman's preferences into account, and support shared decision-making about which fetal monitoring method to use. Include birthing companions in these discussions if appropriate and if that is what the woman wants. **[2022]**

For a short explanation of why the committee made these recommendations see the rationale and impact section on information and shared decision-making.

## 1.2 Fetal monitoring and assessment during labour

### General principles

1.2.1 Perform and document a systematic assessment of the condition of the woman and unborn baby every hour, or more frequently if there are concerns. **[2017]**

1.2.2 Discuss the results of each hourly assessment with the woman and base recommendations about care in labour on:

- her preferences
- any antenatal and intrapartum risk factors for fetal compromise
- the current wellbeing of the woman and unborn baby
- how labour is progressing.

Include birthing companion(s) in these discussions if appropriate and if that is what the woman wants. **[2017, amended 2022]**

1.2.3 Remember that:

- fetal heart rate monitoring is a tool to provide guidance on fetal condition, and not a standalone diagnostic tool
- the findings from monitoring need to be looked at together with the developing clinical picture for both mother and baby. **[2022]**

### Initial assessment

1.2.4 Perform an initial assessment of antenatal risk factors for fetal compromise at the onset of labour to determine whether intermittent auscultation or cardiotocography (CTG) is offered as the initial method of fetal heart rate monitoring. Take into account the recommendations for fetal monitoring for women who are considered to be at higher risk because of existing medical conditions or obstetric complications (see the NICE guideline on intrapartum care for women with existing medical conditions or obstetric complications and their babies). **[2022]**

1.2.5 Discuss with the woman whether continuous CTG monitoring has already been advised as part of a personalised care plan. **[2022]**

1.2.6 Explain to the woman that risk assessment is a continual process, and the advised method of fetal heart rate monitoring may change throughout the course of labour. **[2022]**

1.2.7 Explain that if there are no identified risk factors for fetal compromise:

- there is a risk of increased interventions with continuous CTG monitoring compared with intermittent auscultation which may outweigh the benefits **and**
- it is important to take into account the whole clinical picture when agreeing on the method of fetal heart rate monitoring. **[2017, amended 2022]**

## Intermittent auscultation

1.2.8 Offer women with a low risk of complications fetal heart rate monitoring with intermittent auscultation when in established first stage of labour. Do this as follows:

- 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 on a partogram
- record accelerations and decelerations, if heard
- palpate and record on the partogram the maternal pulse hourly, or more often if there are any concerns, to ensure differentiation between the maternal and fetal heartbeats
- if no fetal heartbeat is detected, offer urgent real-time ultrasound assessment to check fetal viability. **[2017, amended 2022]**

1.2.9 Once the woman has signs of, or is in confirmed second stage of labour:

- perform intermittent auscultation immediately after a contraction for at least 1 minute, at least every 5 minutes

- palpate the woman's pulse simultaneously to differentiate between the maternal and fetal heart rates
- if there are concerns about differentiating between the 2 heart rates, seek help and consider changing the method of fetal heart rate monitoring. **[2007, amended 2022]**

1.2.10 If, on intermittent auscultation, there is a rise in baseline fetal heart rate of 20 beats a minute or more from the start of labour, or a deceleration is heard:

- carry out intermittent auscultation more frequently (for example, after 3 consecutive contractions)
- carry out a full review, taking into account the whole clinical picture including antenatal and intrapartum risk factors, new intrapartum risk factors, maternal observations, contraction frequency and the progress of labour. **[2017, amended 2022]**

1.2.11 If fetal heart rate concerns are confirmed:

- summon help
- advise continuous CTG monitoring, and explain to the woman and her birth companion(s) why it is recommended
- transfer the woman from midwifery-led to obstetric-led care, providing that it is safe and appropriate to do so (follow the general principles for transfer of care in the NICE guideline on intrapartum care for healthy women and babies). **[2017, amended 2022]**

1.2.12 Return to intermittent auscultation if continuous CTG monitoring has been started because of concerns arising from intermittent auscultation but the CTG trace is normal after 20 minutes, unless the woman decides to remain on continuous CTG monitoring. **[2017,amended 2022]**

1.2.13 Advise continuous CTG monitoring if:

- fetal heart rate concerns arise with intermittent auscultation, **or**

- intrapartum maternal or fetal risk factors develop (see the recommendations on assessing risk). **[2017, amended 2022]**

### Continuous cardiotocography

1.2.14 Do not use the recommendations in this guideline to categorise antenatal CTG traces. **[2022]**

1.2.15 Use the recommendations in this guideline to interpret and categorise intrapartum CTG traces, but when interpreting how the baby is coping with labour take into account maternal, fetal and labour factors as well as CTG changes. **[2022]**

1.2.16 Consider a lower threshold for intervention when there are any antenatal or intrapartum risk factors that could lead to fetal compromise. **[2022]**

1.2.17 Ensure one-to-one support is maintained by having a midwife remain with the woman throughout labour. If the midwife needs to change, ensure the woman knows this is happening. **[2017, amended 2022]**

1.2.18 Encourage and help the woman to be as mobile as possible and to change position as often as she wishes. **[2017]**

1.2.19 Offer continuous CTG monitoring as part of fetal assessment if any antenatal or intrapartum risk factors for fetal compromise are present. See the recommendations on assessing risk and indications for continuous CTG monitoring. **[2022]**

1.2.20 Discuss with the woman and her birth companion(s) the reasons for offering continuous CTG monitoring and explain that:

- a combination of antenatal risk factors, intrapartum risk factors and continuous CTG monitoring are used to evaluate the baby's condition in labour
- continuous CTG monitoring is used to monitor the baby's heart rate and the labour contractions
- it may restrict her mobility

- a normal CTG trace indicates that the baby is coping well with labour
- changes to the baby's heart rate pattern during labour are common and do not necessarily cause concern, however they may represent developing fetal compromise so maintaining continuous CTG monitoring is recommended if these occur
- if the CTG trace is not normal there will be less certainty about the condition of the baby and so maintaining continuous CTG monitoring is advised
- a change in the CTG trace may indicate a change in the condition of the baby, and so a full assessment will be carried out including checks for developing intrapartum risk factors such as the presence of meconium, sepsis and slow progress in labour
- recommendations about her care during labour and birth will be based on an assessment of several factors, including her preferences, her condition and the condition of her baby, as well as the findings from the CTG. **[2017, amended 2022]**

### Telemetry

1.2.21 Ensure wireless transducers are kept charged and maintained so that they are ready to use for any woman who needs continuous CTG during labour. **[2022]**

1.2.22 Switch from wireless to wired transducers as soon as possible if there is signal loss. **[2022]**

For a short explanation of why the committee made these recommendations see the rationale and impact section on fetal monitoring and assessment during labour.

## 1.3 Assessing risk and indications for continuous cardiotocography monitoring

### Antenatal risk factors

1.3.1 Offer continuous CTG monitoring to women when it has been recommended as part of their personalised care plan. **[2022]**

1.3.2 Offer continuous CTG monitoring for women who have any of the following antenatal maternal risk factors:

- previous caesarean birth or full thickness uterine scar
- any hypertensive disorder requiring medication
- prolonged ruptured membranes (be aware women who are already in established labour more than 24 hours after their membranes ruptured do not need CTG unless there are other concerns)
- any vaginal blood loss other than a show
- suspected chorioamnionitis or maternal sepsis
- pre-existing diabetes (type 1 or type 2) and gestational diabetes requiring medication. **[2014, amended 2022]**

1.3.3 Offer continuous CTG monitoring for women who have any of the following antenatal fetal risk factors:

- non-cephalic presentation (including breech, transverse, oblique and cord), including while a decision is made about mode of birth
- fetal growth restriction (estimated fetal weight below 3rd centile)
- small for gestational age (estimated fetal weight below 10th centile) with other high-risk features such as abnormal doppler scan results, reduced liquor or reduced growth velocity
- advanced gestational age (more than 42+0 weeks at the onset of established labour)
- presence of significant meconium
- anhydramnios or polyhydramnios
- reduced fetal movements in the last 24 hours. **[2014, amended 2022]**

1.3.4 Consider continuous CTG monitoring if, based on clinical assessment and multidisciplinary review, there are concerns about other antenatal factors not listed above that may lead to fetal compromise. **[2022]**

### Ongoing risk assessment

1.3.5 Carry out a full assessment of the woman and her baby every hour. At each assessment include:

- maternal antenatal risk factors for fetal compromise
- fetal antenatal risk factors for fetal compromise
- new or developing intrapartum risk factors
- progress in labour including characteristics of contractions
- fetal heart rate monitoring, including changes to the fetal heart rate pattern.

Discuss with the woman any changes identified since the last review, and the implications of these changes. Include birthing companion(s) in these discussions if appropriate and if that is what the woman wants. **[2017, amended 2022]**

### Intrapartum risk factors

1.3.6 Be aware that intrapartum risk factors increase the risk of fetal compromise and that new intrapartum risk factors are particularly concerning. **[2022]**

1.3.7 Offer continuous CTG monitoring for women who develop any of the following new intrapartum risk factors:

- contractions that last longer than 2 minutes, or 5 or more contractions in 10 minutes
- the presence of new or significant meconium
- maternal pyrexia (a temperature of 38°C or above on a single reading or 37.5°C or above on 2 consecutive occasions 1 hour apart) (see the NICE guideline on neonatal infection: antibiotics for prevention and treatment)
- suspected chorioamnionitis or sepsis (see the NICE guideline on neonatal infection: antibiotics for prevention and treatment)
- pain reported by the woman that appears, based on her description or her previous experience, to differ from the pain normally associated with contractions
- fresh vaginal bleeding or blood-stained liquor that develops in labour
- maternal pulse over 120 beats a minute on 2 occasions 30 minutes apart

- severe hypertension (a single reading of either systolic blood pressure of 160 mmHg or more or diastolic blood pressure of 110 mmHg or more, measured between contractions)
- hypertension (either systolic blood pressure of 140 mmHg or more or diastolic blood pressure of 90 mmHg or more on 2 consecutive readings taken 30 minutes apart, measured between contractions)
- a reading of 2+ of protein on urinalysis and a single reading of either raised systolic blood pressure (140 mmHg or more) or raised diastolic blood pressure (90 mmHg or more)
- confirmed delay in the first or second stage of labour (see the NICE guideline on intrapartum care for healthy women and babies)
- insertion of regional analgesia (for example, an epidural)
- use of oxytocin. **[2017, amended 2022]**

1.3.8 Consider continuous CTG monitoring if, based on clinical assessment and multidisciplinary review, there are concerns about other intrapartum factors not listed above that may lead to fetal compromise. **[2022]**

For a short explanation of why the committee made these recommendation see the rationale and impact section on assessing risk and indications for continuous CTG monitoring.

## 1.4 Monitoring the fetal heart rate

1.4.1 Review the previous fetal heart rate monitoring results as part of the hourly risk assessment and in conjunction with other antenatal or intrapartum risk factors (see the recommendations on assessing risk) and determine if there are any changes in baseline fetal heart rate, variability or decelerations. **[2017, amended 2022]**

1.4.2 If there are changes in the fetal heart rate pattern over time (which indicate a change in the baby's condition), review antenatal or intrapartum risk factors for hypoxia and check for signs of maternal infection (see the NICE guideline on neonatal infection: antibiotics for prevention and treatment). **[2022]**

1.4.3 When reviewing a CTG trace, assess and document:

- contractions
- baseline fetal heart rate
- variability
- presence or absence of decelerations (and characteristics of decelerations if present)
- presence of accelerations. **[2017, amended 2022]**

1.4.4 If there is a stable baseline fetal heart rate between 110 and 160 beats a minute and normal variability, continue usual care as the risk of fetal acidosis is low. **[2017]**

1.4.5 Differentiate between the maternal and fetal heartbeats hourly, or more often if there are any concerns. **[2017]**

1.4.6 If there are concerns about whether the maternal heart rate is being heard rather than the fetal heart rate, carry out 1 or more of the following:

- auscultating fetal heart rate with a Pinard stethoscope
- clarification with bedside ultrasound scanning
- continuous maternal heart rate monitoring
- a fetal scalp electrode (but be aware this may detect maternal heart rate if there is no fetal heartbeat).

Discuss with the woman what her preference is, and take this into account when deciding on which method to use. Be aware that it is particularly important to confirm the fetal heart rate in the second stage of labour, when it is easier to mistakenly auscultate maternal rather than fetal heart rate. **[2022]**

1.4.7 Ensure that the CTG trace is of high quality and, if not, take action to improve the trace (for example, by repositioning the tocodynamometer or by using a fetal scalp electrode). **[2017, amended 2022]**

1.4.8 If it is difficult to categorise a CTG trace, obtain a review by a senior midwife or a senior obstetrician. **[2017]**

1.4.9 Evaluate changes on CTG traces over time to ascertain changes in the baby's condition. Consider the possible reasons for any changes, and take into account the whole clinical picture when planning ongoing care. **[2022]**

1.4.10 Document any change in the CTG trace from the previous review and review the changes alongside any new intrapartum risk factors. **[2022]**

1.4.11 If there are concerning changes in the CTG trace, and new intrapartum risk factors such as slow progress, meconium or sepsis, ask for urgent obstetric review as expedited birth may be indicated. **[2022]**

## Features of cardiotocography

### Contractions

1.4.12 Use a tocodynamometer to record contraction frequency and length on the CTG trace, or a marker if they are manually palpated. **[2022]**

1.4.13 Use the following to work out the categorisation for contractions (see recommendation 1.4.37 to work out the overall categorisation for the CTG):

- white
  - less than 5 contractions in 10 minutes
- amber
  - 5 or more contractions in 10 minutes. **[2022]**

1.4.14 If decelerations are present, evaluate their timing related to contractions. **[2017]**

1.4.15 If 5 or more contractions per 10 minutes are present, perform a full risk assessment and consider taking action to reduce contraction frequency as described in the section on underlying causes and conservative measures. **[2022]**

### Baseline fetal heart rate

1.4.16 Determine baseline fetal heart rate by looking at the mean fetal heart rate, excluding accelerations and decelerations, over a period of 10 minutes when the fetal heart rate is stable. When deciding if there is any change in baseline fetal heart rate, it is important to compare with earlier CTG traces or recordings of fetal heart rate. **[2022]**

1.4.17 Use the following to work out the categorisation for baseline fetal heart rate (see recommendation 1.4.37 to work out the overall categorisation for the CTG):

- white
  - stable baseline of 110 to 160 beats a minute
- amber
  - increase in baseline fetal heart rate of 20 beats a minute or more from the start of labour or since the last review an hour ago, **or**
  - 100 to 109 beats a minute (but see recommendation 1.4.18), **or**
  - 161 to 180 beats a minute
- red
  - below 100 beats a minute, **or**
  - above 180 beats a minute. **[2017, amended 2022]**

1.4.18 When assessing baseline fetal heart rate, differentiate between fetal and maternal heartbeats and take the following into account:

- baseline fetal heart rate will usually be between 110 and 160 beats a minute
- lower baseline fetal heart rates are expected with post-term pregnancies, with higher baseline rates in preterm pregnancies
- a rise in baseline fetal heart rate may represent either developing infection or hypoxia (see the NICE guideline on neonatal infection: antibiotics for prevention and treatment)
- although a baseline fetal heart rate between 100 and 109 beats a minute is an amber feature, continue usual care if this has been stable

throughout labour and there is normal baseline variability and no variable or late decelerations. **[2017, amended 2022]**

**Variability**

1.4.19 Determine variability by looking at the minor oscillations in the fetal heart rate, which usually occur at 3 to 5 cycles a minute. Measure it by estimating the difference in beats per minute between the highest peak and the lowest trough in a 1-minute segment of the trace between contractions. **[2022]**

1.4.20 Carry out a review of the complete clinical picture with a low threshold for expedited birth if there is an absence of variability, as this is a very concerning feature. **[2022]**

1.4.21 Use the following to work out the categorisation for fetal heart rate variability (see recommendation 1.4.37 to work out the overall categorisation for the CTG):

- white
  - 5 to 25 beats a minute
- amber
  - less than 5 beats a minute for between 30 and 50 minutes, **or**
  - more than 25 beats a minute for up to 10 minutes
- red
  - less than 5 beats a minute for more than 50 minutes, **or**
  - more than 25 beats a minute for more than 10 minutes, **or**
  - sinusoidal. **[2017, amended 2022]**

1.4.22 Take the following into account when assessing fetal heart rate variability:

- variability will usually be between 5 and 25 beats a minute
- intermittent periods of reduced variability are normal, especially during periods of quiescence (‘sleep’)
- certain medicines, such as opioids, may lead to a reduction in variability, but all other intrapartum risk factors should be carefully

reviewed as a potential cause (for example, look for other features on the CTG such a rise in the baseline fetal heart rate that would suggest another reason such as sepsis)

- increased variability refers to oscillations around the baseline fetal heart rate of more than 25 beats a minute, and shorter episodes lasting a few minutes may represent worsening fetal condition. **[2017, amended 2022]**

1.4.23 Obtain an urgent review by a senior obstetrician or senior midwife and consider expediting birth if:

- there is an isolated reduction in variability of more than 30 minutes when combined with antenatal or intrapartum risk factors, as this is associated with an increased risk of adverse neonatal outcomes, or
- there is a reduction in variability combined with other CTG changes, particularly a rise in the baseline fetal heart rate, as this is a strong indicator for fetal compromise. **[2022]**

**Decelerations**

1.4.24 Classify decelerations as transient episodes when the fetal heart rate slows to below the baseline level by more than 15 beats a minute, with each episode lasting 15 seconds or more. An exception to this is that in a trace with reduced variability, decelerations may be 'shallow'. **[2022]**

1.4.25 When assessing the significance of decelerations in fetal heart rate, consider:

- their timing (early, variable or late) in relation to the peaks and duration of the contractions
- the duration of the individual decelerations
- whether or not the fetal heart rate returns to the baseline heart rate
- how long they have been present for (30 minutes or more is defined as persistent)
- whether they occur with over 50% of contractions (defined as repetitive)
- the presence or absence of shouldering

- the presence or absence of reduced variability within the deceleration. **[2017, amended 2022]**

1.4.26 Describe decelerations as 'early', 'variable' or 'late'. Do not use the terms 'typical' and 'atypical', as they can cause confusion. **[2017]**

1.4.27 Regard the following as concerning characteristics of variable decelerations:

- lasting more than 60 seconds
- reduced baseline variability within the deceleration
- failure or slow return to baseline fetal heart rate
- loss of previously present shouldering. [**2017, amended 2022]**

1.4.28 Use the following to work out the categorisation for decelerations in fetal heart rate (see recommendation 1.4.37 to work out the overall categorisation for the CTG):

- white
  - no decelerations, **or**
  - early decelerations, **or**
  - variable decelerations that are not evolving to have concerning characteristics
- amber
  - without antenatal or developing intrapartum risk factors for fetal compromise:
    - ◊ either repetitive or persistent variable decelerations with any concerning characteristics, **or**
    - ◊ repetitive late decelerations for less than 30 minutes
- red
  - without antenatal or developing intrapartum risk factors for fetal compromise
    - ◊ both repetitive and persistent variable decelerations with any concerning characteristics, **or**
    - ◊ both repetitive and persistent late decelerations

- with antenatal or developing intrapartum risk factors for fetal compromise
  - ◊ repetitive variable decelerations with any concerning characteristics for less than 30 minutes, **or**
  - ◊ persistent variable decelerations with any concerning characteristics, **or**
  - ◊ repetitive late decelerations for less than 30 minutes
- acute bradycardia, or a single prolonged deceleration lasting 3 minutes or more. **[2017, amended 2022]**

1.4.29 Take into account that the longer and later the individual decelerations, the higher the risk of fetal compromise (particularly if the decelerations are accompanied by a rise in the baseline, a tachycardia or reduced variability). **[2017]**

1.4.30 Start an urgent obstetric review if there are persistent decelerations in the presence of either a rise in the baseline heart rate or reducing variability. Take into account intrapartum risk factors, such as suspected sepsis, the presence of meconium, slow progress of labour or the use of oxytocin, to determine whether there is a need for urgent birth. **[2022]**

1.4.31 If variable decelerations with no concerning characteristics and no other CTG changes, including no rise in the baseline fetal heart rate, are observed:

- 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
- support the woman to change position or mobilise. **[2017, amended 2022]**

1.4.32 Be aware that if variable decelerations persist and other CTG changes are present, there is a risk of fetal compromise and acidosis. **[2022]**

1.4.33 Take the following into account when categorising early decelerations:

- they are uncommon, benign and usually associated with head compression
- they are not accompanied by any other CTG changes, such as reduced variability or a rise in the baseline fetal heart rate. **[2017, amended 2022]**

**Accelerations**

1.4.34 Define accelerations as transient increases in fetal heart rate of 15 beats a minute or more, lasting 15 seconds or more. **[2022]**

1.4.35 Take the following into account when assessing accelerations in fetal heart rate:

- the presence of fetal heart rate accelerations, even with reduced variability, is generally a sign that the baby is healthy
- the absence of accelerations on an otherwise normal CTG trace does not indicate fetal acidosis. **[2017]**

**Categorisation of cardiotocography traces (all stages of labour)**

1.4.36 Include CTG categorisation as part of the full assessment of the condition of the woman and baby. Categorisation is a tool which quickly communicates the current state of the CTG and should only be used alongside antenatal and intrapartum risk factors to consider changes over time. **[2022]**

1.4.37 Categorise CTG traces as follows, based on whether each of the 4 features (contractions, baseline, variability, decelerations) have been scored as white, amber or red:

- normal
  - no amber or red features (all 4 features are white)
- suspicious
  - any 1 feature is amber
- pathological
  - any feature is red, **or**

- 2 or more features are amber. **[2017, amended 2022]**

1.4.38 Consider any change in the categorisation of the CTG alongside other antenatal and intrapartum risk factors for hypoxia. Discuss the change and its implications with the woman, and take into account her preferences when deciding how to proceed. **[2022]**

**Special considerations for cardiotocography traces in the second stage of labour**

1.4.39 Take into account that interpretation of CTG traces in the second stage of labour is more challenging than in the first stage of labour. Have a lower threshold for seeking a second opinion or assistance. **[2022]**

1.4.40 Ensure the fetal heart rate is differentiated from the maternal heart rate every 5 minutes or less. Consider monitoring the baby with a fetal scalp electrode if there is concern about confusing the heart rates. **[2022]**

1.4.41 Monitor and record the maternal heart rate on the CTG trace if the facility is available on the machine being used. **[2022]**

1.4.42 If there are decelerations, look for other signs of hypoxia (for example, a rise in the baseline fetal heart rate or a reduction in variability). **[2022]**

1.4.43 Take into account that onset of hypoxia is both more common and more rapid in the active second stage of labour. Take a rise in the baseline fetal heart rate as a red feature in active second stage labour. **[2022]**

1.4.44 If CTG concerns arise in the active second stage of labour, consider stopping pushing and pausing or stopping any oxytocin infusion to allow the baby to recover, unless birth is imminent. **[2022]**

For a short explanation of why the committee made these recommendations see the rationale and impact section on monitoring the fetal heart rate.

## 1.5 Making care decisions based on the cardiotocography trace

1.5.1 Assess fetal wellbeing every hour, taking into account antenatal and intrapartum risk factors, in conjunction with interpretation of the CTG trace. **[2017]**

1.5.2 Take the whole clinical picture into account when making decisions on how to manage the labour, including maternal observations, contraction frequency and labour progress. **[2017]**

1.5.3 Discuss with the woman and her birth companion(s) what is happening, taking into account her individual circumstances and preferences, and support her decisions**. [2017]**

1.5.4 If the CTG trace is categorised as normal:

- continue CTG (unless it was started because of concerns arising from intermittent auscultation and there are no ongoing antenatal or intrapartum risk factors) and usual care
- continue to perform and document a full risk assessment at least hourly. **[2017, amended 2022]**

1.5.5 If the CTG trace is categorised as suspicious:

- perform and document a full risk assessment, including a full set of maternal observations, taking into account the whole clinical picture
- note that if accelerations are present then fetal acidosis is unlikely
- if the CTG trace was previously normal, consider possible underlying reasons for the change and undertake conservative measures as indicated (see the section on underlying causes and conservative measures)
- if a CTG trace is classed as suspicious because of a reduction in variability and there are additional intrapartum risk factors such as slow progress, sepsis or meconium, then a lower threshold for action should be considered

- inform an obstetrician or senior midwife. **[2017, amended 2022]**

1.5.6 If the CTG trace is categorised as pathological:

- obtain an urgent review by an obstetrician and a senior midwife
- exclude acute events (for example, cord prolapse, suspected placental abruption or suspected uterine rupture) that need immediate intervention
- perform and document a full risk assessment, including a full set of maternal observations, taking into account the whole clinical picture
- consider possible underlying causes and undertake conservative measures as indicated (see the section on underlying causes and conservative measures). **[2017, amended 2022]**

1.5.7 If the CTG trace is still pathological after implementing conservative measures:

- obtain a further urgent review by an obstetrician and a senior midwife
- evaluate the whole clinical picture when considering options:
  - if there are intrapartum risk factors for fetal compromise there should be a very low threshold for expediting birth
  - if there are no intrapartum risk factors for fetal compromise consider:
    - fetal scalp stimulation (see the section on fetal scalp stimulation)
    - expediting the birth. **[2017, amended 2022]**

1.5.8 If there is an acute bradycardia, or a single prolonged deceleration for 3 minutes or more:

- urgently seek obstetric help
- if there has been an acute event (for example, cord prolapse, suspected placental abruption or suspected uterine rupture), expedite the birth
- consider possible underlying causes and undertake conservative measures as indicated (see the section on underlying causes and conservative measures)

- make preparations for an urgent birth
- expedite the birth if the acute bradycardia persists for 9 minutes, or less if there are significant antenatal or intrapartum risk factors for fetal compromise.

If the fetal heart rate recovers at any time up to 9 minutes, reassess any decision to expedite the birth, but take into account other antenatal and intrapartum risk factors and discuss this with the woman. **[2017, amended 2022]**

### Underlying causes and conservative measures

1.5.9 If there are any concerns about the baby's wellbeing, be aware of the possible underlying causes and start 1 or more of the following conservative measures based on an assessment of the most likely cause(s):

- maternal position (as this can affect uterine blood flow and cord compression) – encourage the woman to mobilise, or adopt an alternative position, and to avoid being supine
- hypotension:
  - if the woman is hypotensive secondary to an epidural top-up, start intravenous fluids, move her to a left lateral position and call the anaesthetist to review
  - do not offer intravenous fluids to treat fetal heart rate abnormalities unless the woman is hypotensive or has signs of sepsis
- excessive contraction frequency:
  - reduce contraction frequency by reducing or stopping oxytocin if it is being used
  - offer a tocolytic drug (a suggested regimen is subcutaneous terbutaline 0.25 mg). **[2017, amended 2022]**

1.5.10 Do not offer maternal facial oxygen therapy as part of conservative measures because it may harm the baby. However, it can be used if it is administered for maternal indications such as hypoxia, or as part of preoxygenation before a potential anaesthetic. **[2017, amended 2022]**

1.5.11 Do not offer amnioinfusion for intrauterine fetal resuscitation. **[2014]**

## 1.6 Fetal scalp stimulation

1.6.1 If the CTG trace is pathological without other antenatal or intrapartum risk factors for fetal compromise, then offer digital fetal scalp stimulation. If this leads to an acceleration in fetal heart rate and a sustained improvement in the CTG trace, then it is reasonable to continue to monitor the fetal heart rate and clinical picture. **[2017, amended 2022]**

1.6.2 Be aware that an absence of an acceleration in response to fetal scalp stimulation is a worrying sign that fetal compromise may be present, and that expedited birth may be necessary. **[2017, amended 2022]**

## 1.7 Fetal blood sampling

1.7.1 Do not offer fetal blood sampling in labour to assess fetal wellbeing. **[2022]**

For a short explanation of why the committee made this recommendation see the rationale and impact section on fetal blood sampling.

Full details of the evidence and the committee's discussion are in evidence review A: fetal blood sampling.

## 1.8 Record keeping for cardiotocography

1.8.1 To ensure accurate record keeping for CTG:

- make sure that date and time clocks on the cardiotocograph monitor are set correctly
- ensure the recording or paper speed is set at 1 cm a minute
- label traces with the woman's name, date of birth, hospital number or NHS number and pulse at the start of monitoring, and the date of the CTG. **[2014, amended 2022]**

1.8.2 Individual units should develop a system for recording relevant intrapartum events (for example, vaginal examination and siting of an

epidural) in standard notes and/or on the cardiotocograph trace. **[2014, amended 2022]**

1.8.3 Keep cardiotocograph traces for 25 years and, if possible, store them electronically. **[2007, amended 2014]**

1.8.4 In cases where there is concern that the baby may experience developmental delay, photocopy cardiotocograph traces (if they are not available electronically) and store them indefinitely in case of possible adverse outcomes. **[2007, amended 2022]**

1.8.5 Ensure that tracer systems are available for all cardiotocograph traces if stored separately from the woman's records. **[2007, amended 2014]**

1.8.6 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]**

## Terms used in this guideline

This section defines terms that have been used in a particular way for this guideline. For other definitions see the NICE glossary and the Think Local, Act Personal Care and Support Jargon Buster.

### Early decelerations

Uniform, repetitive and periodic slowing of the fetal heart rate with onset early in the contraction and return to baseline at the end of the contraction. These are rare.

### Late decelerations

Repetitive and periodic slowing of the fetal heart rate with onset mid to end of the contraction and the lowest point more than 20 seconds after the peak of the contraction, and ending after the contraction.

### Variable decelerations

Variable, intermittent and periodic slowing of the fetal heart rate.

# Rationale and impact

These sections briefly explain why the committee made the recommendations and how they might affect practice.

## Information and shared decision-making

Recommendations 1.1.1 to 1.1.3

### Why the committee made the recommendations

The committee agreed, based on their knowledge and expertise, that discussions about fetal monitoring should occur as part of antenatal care and be documented in the personalised care plan. Although healthcare professionals currently always provide advice to women in labour on options for fetal monitoring, they should also make a shared decision with the woman about which method to use.

### How the recommendations might affect practice

The recommendations will reinforce current practice.

Return to recommendations

## Fetal monitoring and assessment during labour

Recommendations 1.2.3. to 1.2.6 and 1.2.14 to 1.2.16, 1.2.19 to 1.2.22

### Why the committee made the recommendations

Based on their knowledge and expertise, the committee emphasised that fetal heart rate monitoring is only a tool that provides information. It should be used as part of assessing the whole clinical picture including antenatal and intrapartum risk factors, not as a standalone diagnostic tool, and that multiple risk factors may lower the threshold for intervention.

The committee discussed the initial assessment that should be carried out at the start of labour and agreed that a decision on the method of monitoring should be based on antenatal risk factors. These risk factors should have been identified and discussed with the woman during antenatal care and should already be recorded in her personalised care plan. However, the committee agreed it was important to advise women that the recommended method of fetal monitoring may change during

labour, but that for women at low risk, the use of cardiotocography (CTG) may lead to more interventions without evidence of benefit.

The committee were aware that there was the possibility of confusion between the interpretation of antenatal and intrapartum CTG and so made a recommendation to clarify this.

The committee were aware of incidences where telemetry was not available because transducers had not been plugged in to charge, or where CTG was not used effectively because of problems with signal loss, so they made recommendations to reduce such events based on their knowledge and experience.

### How the recommendations might affect practice

The recommendations will reinforce current best practice and help ensure the full clinical picture is looked at.

Return to recommendations

## Assessing risk and indications for continuous cardiotocography monitoring

Recommendations 1.3.1, 1.3.4, 1.3.6 and 1.3.8

### Why the committee made the recommendations

The committee agreed that a decision to use CTG monitoring may already have been discussed and recorded in a woman's personalised care plan, but that antenatal risk factors identified during pregnancy or labour, or new intrapartum risk factors would mean that CTG was needed to assess if there was developing fetal compromise. The committee were aware that the lists of antenatal and intrapartum risk factors covered all commonly recognised risk factors but clinical judgement would be needed to determine if there were other risk factors not listed which also might lead to consideration of CTG.

### How the recommendations might affect practice

The recommendations will reinforce current practice.

Return to recommendations

# Monitoring the fetal heart rate

Recommendations 1.4.2, 1.4.6, 1.4.9 to 1.4.13, 1.4.15, 1.4.16, 1.4.19, 1.4.20, 1.4.23, 1.4.24, 1.4.30, 1.4.32, 1.4.34, 1.4.36, 1.4.38 to 1.4.44

## Why the committee made the recommendations

Recommendations 1.4.2, 1.4.9 to 1.4.11: The committee used their knowledge and expertise and agreed that any changes in the CTG, including the fetal heart rate pattern, over time indicated that the baby may be suffering from hypoxia. They agreed this should be investigated, alongside a review of the clinical picture and antenatal or intrapartum risk factors, so that causes could be sought and action could be taken, if necessary.

Recommendation 1.4.6: The committee agreed, based on their knowledge and expertise, to add more detail to the recommendations about the actions to take when it is difficult to distinguish between the maternal and fetal heart rate, as incorrect monitoring can lead to significant harm to the baby.

Recommendations 1.4.12, 1.4.13 and 1.4.15: The committee agreed, based on their knowledge and expertise, that as well as monitoring the fetal heart rate pattern, it was important to monitor and record contractions to determine if they were normal and, if not, to take action.

Recommendation 1.4.16: The committee defined how baseline heart rate should be measured and, based on their expertise, described how changes should be assessed.

Recommendation 1.4.19, 1.4.20:The committee defined how variability should be measured. The committee were aware, based on their knowledge and expertise, that an absence of variability was concerning and so made a recommendation to address this.

Recommendation 1.4.23: The committee were aware, based on their knowledge and expertise, that a reduction in variability is not specific for fetal hypoxia. However, it does indicate an increased risk of adverse neonatal outcome and therefore requires obstetric review when combined with antenatal or intrapartum risk factors for fetal compromise. If a reduction in variability is combined with other amber or red features

on the CTG, it will be classified as pathological, and the committee have emphasised the need for urgent review in these circumstances.

Recommendation 1.4.24: The committee stated how decelerations should be defined.

Recommendation 1.4.30: The committee wanted to emphasise, based on their knowledge and expertise, that persistent decelerations combined with other CTG abnormalities should trigger an urgent obstetric review as this combination is particularly concerning for fetal compromise.

Recommendation 1.4.32: The committee acknowledged, based on their knowledge and expertise, that variable decelerations without concerning characteristics can be a baby's normal response to labour. However, ongoing variable decelerations can indicate an increased risk of fetal compromise, although this would be demonstrated by other CTG changes too.

Recommendation 1.4.34: The committee stated how accelerations should be defined.

Recommendations 1.4.36 and 1.4.38: The committee were aware, based on their knowledge and expertise, that too much reliance may be placed on the categorisation of CTG trace as a substitute for reviewing and communicating about the wider clinical picture. They stated that CTG categorisation was a tool that should be used alongside review of other antenatal and intrapartum risk factors and the wider clinical picture.

Recommendations 1.4.39 to 1.4.44: The committee were aware, based on their knowledge and expertise, that in the second stage of labour it may be more difficult to differentiate the maternal and fetal heart rates, and that hypoxia may develop more rapidly, and so made new recommendations about this.

### How the recommendations might affect practice

The recommendations will reinforce current practice.

Return to recommendations

# Fetal blood sampling

Recommendation 1.7.1

## Why the committee made the recommendation

There was recent but very limited evidence that fetal blood sampling does not improve outcomes for women and babies compared to CTG alone, or compared to CTG in combination with fetal scalp stimulation. The comparison to CTG alone showed that fetal blood sampling may increase the proportion of babies with an Apgar score less than 7 at 5 minutes, possibly because of a delay in expediting birth to allow the fetal blood sampling to be carried out. This harm was not seen in the comparison with CTG in combination with fetal scalp stimulation, although in this comparison the number of caesarean births was increased. The committee agreed that it was difficult to define whether this outcome was harm or a benefit as it may indicate that a birth had been expedited appropriately.

The committee were aware, based on their knowledge and experience, that the time taken to carry out fetal blood sampling can delay appropriate expedition of birth, and that it can be an unpleasant procedure for the mother, especially in the absence of an effective epidural. The committee therefore agreed that the risks of fetal blood sampling were not balanced by the benefits. The committee were aware of an ongoing research study comparing fetal scalp stimulation with fetal blood sampling on maternal and fetal outcomes, so although the evidence was very limited they did not make a research recommendation. The committee noted that this study is not due to be completed until the end of 2024 and that on its completion the advice on use of fetal blood sampling may need to be reviewed again.

## How the recommendations might affect practice

The recommendations may reduce resource use – both of staff time and equipment needed to carry out the sampling process.

Return to recommendations

# Context

This guideline covers the care of healthy women who go into labour at term. Of the 625,000 live births in England and Wales in 2021, approximately 90% were single babies born at term (37+0 weeks onwards), and so the recommendations in this guideline will affect over half a million women every year.

Wherever birth happens (at home, in a midwifery-led unit, or in an obstetric unit) monitoring the wellbeing of the woman and baby during labour is an important part of intrapartum care. The recommendations in this guideline cover fetal assessment and monitoring, including intermittent auscultation and cardiotocography. Risk assessment to determine the most appropriate method of monitoring is covered, as well as the interpretation of cardiotocograph traces, and escalation when fetal hypoxia is suspected.

This guideline and replaces the fetal monitoring section in the NICE intrapartum care guidance. Editorial changes have been made to highlight the need for continual risk assessment of the mother and the baby in labour and to simplify the interpretation and categorisation of the cardiotocography (CTG) trace. The new guidance highlights that a change in the categorisation of the CTG is an intrapartum risk factor but equally important are the development of other intrapartum risk factors such as sepsis, slow progress, the presence of meconium and uterine tachysystole, all of which are associated with a poor outcome for the baby. There is a recognition that contraction frequency needs to be carefully monitored and the presence of 5 or more contractions in 10 minutes needs action. The updated guidance also reminds healthcare professionals that intravenous fluids should not be used as part of the management of an abnormal CTG unless the mother is hypotensive, and that the guideline is only applicable to the categorisation of intrapartum CTGs.The evidence on fetal blood sampling has been reviewed for this update and the recommendations updated based on recent evidence.

# Finding more information and committee details

To find NICE guidance on related topics, including guidance in development, see the NICE webpage on intrapartum care.

For details of the guideline committee see the committee member list.

**[After consultation the editor will expand this section to include additional links]**

# Update information

## December 2022

This is a new guideline that updates and replaces the section on monitoring in labour in the NICE guideline on intrapartum care for healthy women and babies (CG190; published in 2014).

We have reviewed the evidence on fetal blood sampling during labour. All other changes have been made as editorial edits to the recommendations previously contained in CG190. These recommendations have not had an evidence review.

Recommendations are marked **[2022]** if the evidence has been reviewed, or are new consensus recommendations based on the committee's knowledge or expertise.

## Recommendations that have been deleted, or changed without an evidence review

We propose to delete some recommendations from the 2014 guideline. Table 1 sets out these recommendations and includes details of replacement recommendations. If there is no replacement recommendation, an explanation for the proposed deletion is given.

For recommendations shaded in grey and ending **[2014 or 2017, amended 2022]** we have made changes that could affect the intent without reviewing the evidence. Yellow shading is used to highlight these changes, and reasons for the changes are given in table 2.

For recommendations shaded in grey and ending **[2014 or 2017]** we have not reviewed the evidence. In some cases minor changes have been made – for example, to update links, or bring the language and style up to date – without changing the intent of the recommendation. Minor changes are listed in table 3.

1 See also the previous NICE guideline and supporting documents.

2 **Table 1 Recommendations that have been deleted**

| Recommendation in 2014 guideline | Comment |
|---|---|
| 1.10.5 Do not offer continuous cardiotocography to women who have non-significant meconium if there are no other risk factors. | This recommendation has been deleted as it is not necessary to specify individual low-risk situations when CTG should not be used, as the other recommendations specify risks which indicate when CTG should be used, including 'significant meconium'. |
| 1.10.6 Do not regard amniotomy alone for suspected delay in the established first stage of labour as an indication to start continuous cardiotocography. | This recommendation has been deleted as amniotomy is a midwife-led intervention which does not require transfer or CTG. It is not necessary to list all midwife-led interventions which are low risk and do not require CTG, as the emphasis of the guideline has changed to assessing risk and deciding which women do require CTG. |
| 1.10.9 Offer telemetry to any woman who needs continuous cardiotocography during labour. | Replaced with:<br>1.2.21 Maintain and ensure wireless transducers are kept charged so that they are ready to use for any women who needs continuous CTG during labour. [2022]<br>1.2.22 Switch from wireless to wired transducers as soon as possible if there are difficulties with signal loss. [2022] |
| 1.10.10<br>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 (1.10.11 to 1.10.35), fetal scalp stimulation (1.10.38 and 1.10.39), fetal blood sampling (1.10.40 to 1.10.55) and intrauterine resuscitation (1.10.36 and 1.10.37) in this guideline. | This recommendation has been deleted as the tables are no longer present, so it is not necessary to have a recommendation referring to them. |
| 1.10.13 Do not make any decision about a woman's care in labour on the basis of cardiotocography findings alone, but also take into account:<br>• her preferences<br>• her report of how she is feeling<br>• her report of the baby's movements | Replaced by:<br>1.2.15 Use the recommendations in this guideline to interpret and categorise intrapartum CTG traces, but when interpreting how the baby is coping with labour take into account maternal, fetal and labour factors as well as CTG changes. [2022] |

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| • assessment of her wellbeing and behaviour<br>• maternal observations, including temperature, blood pressure and pulse<br>• whether there is meconium or blood in the amniotic fluid<br>• any signs of vaginal bleeding<br>• any medication she is taking<br>• the frequency of contractions<br>• the stage and progress of labour<br>• her parity<br>• the fetal response to digital scalp stimulation if performed (see recommendations 1.10.38 and 1.10.39)<br>• the results of fetal blood sampling if undertaken (see recommendation 1.10.48). [2017] | 1.2.16 Consider a lower threshold for intervention when there are 1 or more antenatal or intrapartum risk factors that could lead to fetal compromise. [2022]<br><br>The detail on risk factors is now contained in separate recommendations. |
| 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. [2017] | Replaced by:<br>1.4.1 Review the previous fetal heart rate monitoring results as part of the hourly risk assessment (in conjunction with other antenatal or intrapartum risk factors, see the recommendations on assessing risk) and determine if there are any changes in baseline rate, variability or decelerations. [2017, amended 2022]<br>1.4.2 If there are changes in the fetal heart rate pattern over time (which can indicate a change in the condition of the baby), review other antenatal or intrapartum risk factors for hypoxia and check for signs of maternal infection. [2022]<br>(Existing recommendation 1.2.1 already advises the frequency of review should be increased if there are concerns so this has not been repeated). |
| 1.10.35 Inform a senior midwife or an obstetrician whenever conservative measures are implemented. [2017] | This recommendation has been deleted as the committee agreed it was a local operational issue, and would depend on staff availability, and so did not need to be specified in a recommendation. |
| 1.10.40 Do not carry out fetal blood sampling if:<br>• there is an acute event (for example, cord prolapse, suspected placental abruption or suspected uterine rupture) or<br>• the whole clinical picture indicates that the birth should be expedited or | Replaced by:<br>1.7.1 Do not offer fetal blood sampling in labour to assess fetal wellbeing. [2022] |

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| • contraindications are present, including risk of maternal-to-fetal transmission of infection or risk of fetal bleeding disorders.<br><br>1.10.41 Be aware that for women with sepsis or significant meconium (see recommendation 1.5.2), fetal blood sample results may be falsely reassuring, and always discuss with a consultant obstetrician:<br>• whether fetal blood sampling is appropriate<br>• any results from the procedure if carried out.<br><br>1.10.42 Before carrying out or repeating fetal blood sampling, start conservative measures and offer digital fetal scalp stimulation (see recommendations 1.10.34 and 1.10.38). Only continue with fetal blood sampling if the cardiotocograph trace remains pathological (see recommendation 1.10.27).<br><br>1.10.43 When considering fetal blood sampling, take into account the woman's preferences and the whole clinical picture.<br><br>1.10.44 When considering fetal blood sampling, explain the following to the woman and her birth companion(s):<br>• Why the test is being considered and other options available, including the risks, benefits and limitations of each.<br>• The blood sample will be used to measure the level of acid in the baby's blood, which may help to show how well the baby is coping with labour.<br>• The procedure will require her to have a vaginal examination using a device similar to a speculum.<br>• 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.<br>• What the different outcomes of the test may be (normal, borderline and abnormal) and the actions that will follow each result. | |

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| • If a fetal blood sample cannot be obtained but there are fetal heart rate accelerations in response to the procedure, this is encouraging and in these circumstances expediting the birth may not be necessary.<br>• If a fetal blood sample cannot be obtained and the cardiotocograph trace has not improved, expediting the birth will be advised.<br>• A caesarean section or instrumental birth (forceps or ventouse) may be advised, depending on the results of the procedure.<br><br>1.10.45 Do not take a fetal blood sample during or immediately after a prolonged deceleration.<br><br>1.10.46 Take fetal blood samples with the woman in the left lateral position.<br><br>1.10.47 Use either pH or lactate when interpreting fetal blood sample results.<br><br>1.10.48 Use the following classifications for fetal blood sample results:<br>• pH:<br>  ○ normal: 7.25 or above<br>  ○ borderline: 7.21 to 7.24<br>  ○ abnormal: 7.20 or below or<br>• lactate:<br>  ○ normal: 4.1 mmol/l or below<br>  ○ borderline: 4.2 to 4.8 mmol/l<br>  ○ abnormal: 4.9 mmol/l or above.<br><br>1.10.49 Interpret fetal blood sample results taking into account:<br>• any previous pH or lactate measurement and<br>• the clinical features of the woman and baby, such as rate of progress in labour.<br><br>1.10.50 If the fetal blood sample result is abnormal:<br>• inform a senior obstetrician and the neonatal team and<br>• talk to the woman and her birth companion(s) about what is happening and take her preferences into account and | |

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| • expedite the birth (see recommendations 1.13.34 to 1.13.37).<br><br>1.10.51 If the fetal blood sample result is borderline and there are no accelerations in response to fetal scalp stimulation, consider taking a second fetal blood sample no more than 30 minutes later if this is still indicated by the cardiotocograph trace.<br><br>1.10.52 If the fetal blood sample result is normal and there are no accelerations in response to fetal scalp stimulation, consider taking a second fetal blood sample no more than 1 hour later if this is still indicated by the cardiotocograph trace.<br><br>1.10.53 Discuss with a consultant obstetrician if a third fetal blood sample is thought to be needed.<br><br>1.10.54 If fetal blood sampling is attempted and a sample cannot be obtained, but the associated fetal scalp stimulation results in a fetal heart rate acceleration, decide whether to continue the labour or expedite the birth in light of the clinical circumstances and in discussion with the woman and a senior obstetrician.<br><br>1.10.55 If fetal blood sampling is attempted but a sample cannot be obtained and there has been no improvement in the cardiotocograph trace, expedite the birth (see recommendations 1.13.34 to 1.13.37). | |

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2 **Table 2 Amended recommendation wording (change to intent) without an**

3 **evidence review**

| Recommendation in 2014 updated 2017 guideline (this table is ordered in the order of recommendations in this version of the guideline) | Recommendation in current guideline | Reason for change |
|---|---|---|
| 1.4.3 Transfer the woman to obstetric-led care, | 1.3.2 Offer continuous CTG monitoring for women who have | To make the risk assessment of women in |

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| following the general principles for transfer of care described in section 1.6, if any of the following are observed on initial assessment:<br><br>• Observations of the woman:<br>  ○ pulse over 120 beats/minute on 2 occasions 30 minutes apart<br>  ○ a single reading of either raised diastolic blood pressure of 110 mmHg or more or raised systolic blood pressure of 160 mmHg or more<br>  ○ either raised diastolic blood pressure of 90 mmHg or more or raised systolic blood pressure of 140 mmHg or more on 2 consecutive readings taken 30 minutes apart<br>  ○ a reading of 2+ of protein on urinalysis and a single reading of either raised diastolic blood pressure (90 mmHg or more) or raised systolic blood pressure (140 mmHg or more)<br>  ○ temperature of 38°C or above on a single reading, or 37.5°C or above on 2 consecutive readings 1 hour apart | any of the following antenatal maternal risk factors:<br>• previous caesarean birth or full thickness uterine scar<br>• any hypertensive disorder requiring medication<br>• prolonged ruptured membranes (woman who are in established labour more than 24 hours after their membranes ruptured do not need CTG unless there are other concerns)<br>• any vaginal blood loss other than a show<br>• suspected chorioamnionitis or maternal sepsis<br>• pre-existing diabetes (type 1 or type 2) and gestational diabetes requiring medication [2014, amended 2022]<br>1.3.3 Offer continuous CTG monitoring for women who have any of the following antenatal fetal risk factors:<br>• non-cephalic presentation (including breech, transverse, oblique and cord), while a decision is made about mode of birth<br>• fetal growth restriction (estimated fetal weight below 3rd centile)<br>• small for gestational age (estimated fetal weight below 10th centile) with other high-risk features such as abnormal doppler scan results, reduced liquor or reduced growth velocity<br>• advanced gestational age (more than 42+0 weeks at the onset of established labour)<br>• presence of significant meconium<br>• anhydramnios or polyhydramnios | labour easier to follow, these risk factors have been adapted to create a lists of maternal and then fetal antenatal risk factors that may determine that CTG is needed. The definitions of fetal growth restriction or small for gestational weight have been taken from Saving Babies Lives version 2 care bundle. |

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| ○ any vaginal blood loss other than a show<br>○ rupture of membranes more than 24 hours before the onset of established labour (see recommendation 1.15.25)<br>○ the presence of significant meconium (see recommendation 1.5.2)<br>○ pain reported by the woman that differs from the pain normally associated with contractions<br>○ any risk factors recorded in the woman's notes that indicate the need for obstetric-led care.<br>• Observations of the unborn baby:<br>○ any abnormal presentation, including cord presentation<br>○ transverse or oblique lie<br>○ high (4/5–5/5 palpable) or free-floating head in a nulliparous woman<br>○ suspected fetal growth restriction or macrosomia<br>○ suspected anhydramnios or polyhydramnios<br>○ fetal heart rate below 110 or above 160 beats/minute | • reduced fetal movements in the last 24 hours. [2014, amended 2022] | |

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| ○ a deceleration in fetal heart rate heard on intermittent auscultation<br>○ reduced fetal movements in the last 24 hours reported by the woman. | | |
| 1.4.7 Be aware that for women at low risk of complications there is insufficient evidence about whether cardiotocography as part of the initial assessment either improves outcomes or results in harm for women and their babies, compared with intermittent auscultation alone. [2017] | 1.2.7 Explain that if there are no identified risk factors for fetal compromise:<br>• there is a possible risk of increased interventions with continuous CTG monitoring compared with intermittent auscultation which may outweigh the benefits, and<br>• it is important to take into account the whole clinical picture when agreeing on the method of fetal heart rate monitoring. [2017, amended 2022] | This recommendation has been updated to clarify that the harm is related to increased interventions and to add that the whole clinical picture must therefore be taken into account when deciding on the monitoring method to use, as this was not emphasised in the previous guideline. |
| 1.10.1 Do not offer cardiotocography to women at low risk of complications in established labour. | 1.2.7 Explain that if there are no identified risk factors for fetal compromise:<br>• there is a risk of increased interventions with continuous CTG monitoring compared with intermittent auscultation which may outweigh the benefits and<br>• it is therefore important to take into account the whole clinical picture when agreeing on the method of fetal heart rate monitoring. [2017, amended 2022] | More detail has been added about the reasons for not using CTG in low-risk women, as well adding that it is the whole clinical picture that needs to be taken into account when deciding on the method of monitoring. The recommendation is no longer a 'do not' recommendation as the use of CTG (or not) even in low-risk women should be based on a discussion with the woman and consideration of her preferences,<br>(see also 1.4.7) |
| 1.10.2 Offer intermittent auscultation of the fetal heart rate to women at low risk of complications in established first stage of labour:<br>• Use either a Pinard stethoscope or doppler ultrasound. | 1.2.8 Offer women with a low risk of complications fetal heart rate monitoring with intermittent auscultation when in established first stage of labour. Do this as follows:<br>• use either a Pinard stethoscope or doppler ultrasound | The use of a partogram has been added to the recommendation to clarify where the heart rate should be recorded as this was not clear in the previous version of the guideline; an additional bullet has been added |

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| • 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.<br>• Record accelerations and decelerations if heard.<br>• Palpate the maternal pulse hourly, or more often if there are any concerns, to differentiate between the maternal and fetal heartbeats. [2017] | • 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 on a partogram<br>• record accelerations and decelerations if heard<br>• palpate and record on the partogram the maternal pulse hourly, or more often if there are any concerns, to ensure differentiation between the maternal and fetal heartbeats<br>• if no fetal heartbeat is detected offer urgent real-time ultrasound assessment to check fetal viability [2017, amended 2022] | (based on recommendation 1.4.11 in CG190) about the action to be taken if no fetal heart is detected, as this was missing in the previous version of the guideline. |
| 1.10.3 If there is a rising baseline fetal heart rate or decelerations are suspected on intermittent auscultation, actions should include:<br>• carrying out intermittent auscultation more frequently, for example after 3 consecutive contractions initially<br>• thinking about the whole clinical picture, including the woman's position and hydration, the strength and frequency of contractions and maternal observations.<br>If a rising baseline or decelerations are confirmed, further actions should include:<br>• summoning help<br>• advising continuous cardiotocography, and explaining to the woman and her birth companion(s) why it is needed<br>• transferring the woman to obstetric-led care, provided that it is safe and appropriate to do | 1.2.10 If, on intermittent auscultation, there is a rise in baseline fetal heart rate of 20 beats a minute or more from the start of labour, or a deceleration is heard:<br>• carry out intermittent auscultation more frequently (for example, after 3 consecutive contractions)<br>• carry out a full review, taking into account the whole clinical picture including antenatal and intrapartum risk factors, new intrapartum risk factors, maternal observations, contraction frequency and progress of labour. [2017, amended 2022]<br>1.2.11 If fetal heart rate concerns are confirmed:<br>• summon help<br>• advise continuous CTG monitoring, and explain to the woman and her birth companion(s) why it is recommended<br>• transfer the woman from midwifery-led to obstetric-led care, providing that it is safe and appropriate to do so (follow the general principles | The recommendation has been split into 2 for improved readability. The increase in the fetal heart rate has been quantified as 20 beats per minute as this was not specified in the previous version of the guideline; the full clinical review has been expanded to include a wider range of factors to emphasise how important full clinical review is. |

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| so (follow the general principles for transfer of care described in section 1.6). [2017] | for transfer of care in the NICE guideline on intrapartum care for healthy women and babies). [2017, amended 2022] | |
| 1.10.4 Advise continuous cardiotocography if any of the following risk factors are present at initial assessment (see section 1.4) or arise during labour:<br>• maternal pulse over 120 beats/minute on 2 occasions 30 minutes apart<br>• temperature of 38°C or above on a single reading, or 37.5°C or above on 2 consecutive occasions 1 hour apart<br>• suspected chorioamnionitis or sepsis<br>• pain reported by the woman that differs from the pain normally associated with contractions<br>• the presence of significant meconium (as defined in recommendation 1.5.2)<br>• fresh vaginal bleeding that develops in labour<br>• severe hypertension: a single reading of either systolic blood pressure of 160 mmHg or more or diastolic blood pressure of 110 mmHg or more, measured between contractions<br>• hypertension: either systolic blood pressure of 140 mmHg or more or diastolic blood pressure of 90 mmHg or more on 2 consecutive readings taken 30 minutes apart, measured between contractions<br>• a reading of 2+ of protein on urinalysis | 1.2.13 Advise continuous CTG monitoring if:<br>• fetal heart rate concerns arise with intermittent auscultation, or<br>• intrapartum maternal or fetal risk factors develop (see the recommendations on assessing risk). [2017, amended 2022]<br>1.3.7 Offer continuous CTG monitoring for women who develop any of the following new intrapartum risk factors:<br>• contractions that last longer than 2 minutes, or 5 or more contractions in 10 minutes<br>• the presence of new or significant meconium<br>• maternal pyrexia (a temperature of 38°C or above on a single reading or 37.5°C or above on 2 consecutive occasions 1 hour apart) (see the NICE guideline on Neonatal infection: antibiotics for prevention and treatment)<br>• suspected chorioamnionitis or sepsis (see the NICE guideline on Neonatal infection: antibiotics for prevention and treatment)<br>• pain reported by the woman that appears, based on her description or her previous experience, to differ from the pain normally associated with contractions<br>• fresh vaginal bleeding or blood-stained liquor that develops in labour<br>• maternal pulse over 120 beats a minute on 2 occasions 30 minutes apart | The first bullet point in this revised recommendation was taken from recommendation 1.10.3 above. The detail of the intrapartum risks (which may indicate a move to CTG monitoring is necessary) have been split out into separate recommendations and cross-linked to improve the clarity of the recommendations. The details of longer contractions and more frequent contractions have been amended to reflect the recommendations agreed for induction of labour guideline, and the occurrence of new meconium or blood-stained liquor have been added as additional risk factors as these were missing from the previous version of the guideline.<br>The definition of significant meconium has been removed, as the committee agreed that meconium that does not meet these precise criteria may also be a risk factor and that would be a clinical judgement. |

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| and a single reading of either raised systolic blood pressure (140 mmHg or more) or raised diastolic blood pressure (90 mmHg or more)<br>• confirmed delay in the first or second stage of labour (see recommendations 1.12.14, 1.13.3 and 1.13.4)<br>• contractions that last longer than 60 seconds (hypertonus), or more than 5 contractions in 10 minutes (tachysystole)<br>• oxytocin use. [2017] | • severe hypertension (a single reading of either systolic blood pressure of 160 mmHg or more or diastolic blood pressure of 110 mmHg or more, measured between contractions)<br>• hypertension (either systolic blood pressure of 140 mmHg or more or diastolic blood pressure of 90 mmHg or more on 2 consecutive readings taken 30 minutes apart, measured between contractions)<br>• a reading of 2+ of protein on urinalysis and a single reading of either raised systolic blood pressure (140 mmHg or more) or raised diastolic blood pressure (90 mmHg or more)<br>• confirmed delay in the first or second stage of labour (see the NICE guideline on intrapartum care for healthy women and babies)<br>• insertion of regional analgesia (for example, an epidural)<br>• use of oxytocin. [2017, amended 2022] | |
| 1.10.7 Address any concerns that the woman has about continuous cardiotocography, and give her and her birth companion(s) the following information:<br>• Explain that continuous cardiotocography is used to monitor the baby's heartbeat and the labour contractions.<br>• Explain that it may restrict her mobility.<br>• Give details of the types of findings that may occur. Explain that a normal trace indicates that the baby is coping well with labour. | 1.2.20 Discuss with the woman and her birth companion(s) the reasons for offering continuous CTG monitoring and explain that:<br>• a combination of antenatal risk factors, intrapartum risk factors and continuous CTG monitoring are used to evaluate the baby's condition in labour<br>• continuous CTG monitoring is used to monitor the baby's heart rate and the labour contractions<br>• it may restrict her mobility<br>• a normal CTG trace indicates that the baby is coping well with labour | The stem of the recommendation has been amended to advise that a discussion is held to bring the guideline in line with current best practice around shared decision-making; the use of risk factors as well as CTG has been added to the recommendation as the emphasis of the guideline has shifted to encourage a more holistic assessment; more detail has been included on the implications of changes to the fetal heart rate as this was missing from the previous version. |

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| • Explain that changes to the baby's heart rate pattern during labour are common and do not necessarily cause concern.<br>• Explain that if the trace is not normal (see table 11), there will be less certainty about the condition of the baby and so continuous monitoring will be advised.<br>• Explain that decisions about her care during labour and birth will be based on an assessment of several factors, including her preferences, her condition and that of her baby, as well as the findings from cardiotocography. [2017] | • changes to the baby's heart rate pattern during labour are common and do not necessarily cause concern, however they may represent developing fetal compromise so maintaining continuous CTG monitoring is recommended if these occur<br>• if the CTG trace is not normal there will be less certainty about the condition of the baby and so maintaining continuous CTG monitoring is advised<br>• a change in the CTG trace may indicate a change in the condition of the baby, and so a full assessment will be carried out including checks for developing intrapartum risk factors such as the presence of meconium, sepsis and slow progress in labour<br>• recommendations about her care during labour and birth will be based on an assessment of several factors, including her preferences, her condition and the condition of her baby, as well as the findings from the CTG. [2017, amended 2022] | |
| 1.10.8 If continuous cardiotocography has been started because of concerns arising from intermittent auscultation, but the trace is normal (see table 11) after 20 minutes, return to intermittent auscultation unless the woman asks to stay on continuous cardiotocography (see recommendation 1.4.8). [2017] | 1.2.12 Return to intermittent auscultation if continuous CTG monitoring has been started because of concerns arising from intermittent auscultation but the CTG trace is normal after 20 minutes, unless the woman decides to remain on continuous CTG monitoring. [2017] | The word 'asks' has been changed to 'decides' as the choice of method of fetal monitoring should be discussed with the woman. She should not need to pro-actively ask for CTG. |
| Table 10 Bullets.<br>Overall care<br>• Make a documented systematic assessment | 1.2.1 Perform and document a systematic assessment of the condition of the woman and unborn baby every hour, or more | To improve the clarity and readability of the guideline, these bullets have all been changed |

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| of the condition of the woman and unborn baby (including cardiotocography [CTG] findings) every hour, or more frequently if there are concerns.<br>• Do not make any decision about a woman's care in labour on the basis of CTG findings alone.<br>• Take into account the woman's preferences, any antenatal and intrapartum risk factors, the current wellbeing of the woman and unborn baby and the progress of labour.<br>• Ensure that the focus of care remains on the woman rather than the CTG trace.<br>• Remain with the woman in order to continue providing one-to-one support.<br>• Talk to the woman and her birth companion(s) about what is happening and take her preferences into account.<br>Principles for intrapartum CTG trace interpretation<br>• When reviewing the CTG trace, assess and document contractions and all 4 features of fetal heart rate: baseline rate; baseline variability; presence or absence of decelerations (and concerning characteristics of variable decelerations* if present); presence of accelerations.<br>• If there is a stable baseline fetal heart rate between 110 and 160 beats/minute and | frequently if there are concerns. [2017]<br>1.2.2 Discuss the results of each hourly assessment with the woman and base recommendations about care in labour on:<br>• her preferences<br>• any antenatal and intrapartum risk factors for fetal compromise<br>• the current wellbeing of the woman and unborn baby<br>• how labour is progressing. Include birthing companion(s) in these discussions, if appropriate and that is what the woman wants. [2017,amended 2022]<br>1.2.17 Ensure one-to-one support is maintained by having a healthcare professional remain with the woman throughout labour. If the person needs to change, ensure the woman knows this is happening. [2017, amended 2022]<br>1.3.5 Carry out a full assessment of the woman and her baby every hour. At each assessment include:<br>• maternal antenatal risk factors for fetal compromise<br>• fetal antenatal risk factors for fetal compromise<br>• new or developing intrapartum risk factors<br>• progress in labour including characteristics of contractions<br>• fetal heart rate monitoring, including changes to the fetal heart rate pattern.<br>• Discuss with the woman any changes identified since the last review, and the implications of these changes. Include birthing companion(s) in these discussions, if appropriate and that is what the woman wants. [2017, amended 2022] | into individual recommendations or incorporated into different recommendations as shown. In some cases the wording has not changed but they are listed here for completeness. Some of these bullets were repeated in separate recommendations, but duplication has now been removed or minimised. The additional advice has been added that the results of the ongoing assessment should be discussed with the woman. |

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| normal variability, continue usual care as the risk of fetal acidosis is low.<br>• If it is difficult to categorise or interpret a CTG trace, obtain a review by a senior midwife or a senior obstetrician.<br>Accelerations<br>• The presence of fetal heart rate accelerations, even with reduced baseline variability, is generally a sign that the baby is healthy. | 1.4.1 Review the previous fetal heart rate monitoring results as part of the hourly risk assessment and in conjunction with other antenatal or intrapartum risk factors (see the recommendations on assessing risk) and determine if there are any changes in baseline rate, variability or decelerations. [2017, updated 2022]<br>1.4.35 Take the following into account when assessing accelerations in fetal heart rate:<br>• the presence of fetal heart rate accelerations, even with reduced variability, is generally a sign that the baby is healthy<br>• the absence of accelerations on an otherwise normal CTG trace does not indicate fetal acidosis. [2017]<br>1.5.1 Assess fetal wellbeing hourly by considering antenatal and intrapartum risk factors, in conjunction with interpretation of the CTG trace. [2017]<br>1.5.2 Take the whole clinical picture into account when making decisions on how to manage the labour, including maternal observations, contraction frequency and labour progress. [2017]<br>1.5.3 Discuss with the woman and her birth companion(s) what is happening, taking into account her individual circumstances and preferences, and support her decisions. [2017] | |
| 1.10.11 When a woman is having continuous cardiotocography:<br>• ensure that the focus of care remains on the woman rather than the cardiotocograph trace<br>• remain with the woman in order to continue providing one-to-one support | 1.2.17 Ensure one-to-one support is maintained by having a midwife remain with the woman throughout labour. If the midwife needs to change, ensure the woman knows this is happening. [2017, amended 2022]<br>1.2.18 Encourage and help the woman to be as mobile as possible and to change position as often as she wishes. [2017] | To improve the clarity and readability of the guideline, this recommendation has been split into several recommendations. The clarification has been added that women should be informed if their one-to-one support changes andmore detail has been added about what do if the CTG trace is not of |

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| • encourage and help the woman to be as mobile as possible and to change position as often as she wishes<br>• monitor the condition of the woman and the baby, and take prompt action if required<br>• differentiate between the maternal and fetal heartbeats hourly, or more often if there are any concerns<br>• ensure that the cardiotocograph trace is of high quality, and think about other options if this is not the case<br>• if it is difficult to categorise or interpret a cardiotocograph trace, obtain a review by a senior midwife or a senior obstetrician. [2017] | 1.4.5 Differentiate between the maternal and fetal heartbeats hourly, or more often if there are any concerns. [2017]<br>1.4.7 Ensure that the CTG trace is of high quality and if not, take action to improve the trace (for example, by repositioning the tocodynamometer or by using a fetal scalp electrode). [2017, amended 2022] | good quality, as these were missing from the previous version of the guideline |
| 1.10.12 When reviewing the cardiotocograph trace, assess and document contractions and all 4 features of fetal heart rate:<br>• baseline rate<br>• baseline variability<br>• presence or absence of decelerations, and concerning characteristics of variable decelerations if present (see recommendation 1.10.22)<br>• presence of accelerations. [2017] | 1.4.3 When reviewing a CTG trace, assess and document:<br>• contractions<br>• baseline fetal heart rate<br>• variability<br>• presence or absence of decelerations (and characteristics of decelerations if present)<br>• presence of accelerations. [2017, amended 2022] | Contractions have been added to the list if features to be assessed from the CTG trace as these were mentioned in the previous guideline but not included in the categorisation of the CTG trace, and so the importance of considering the contractions could be missed. Baseline variability has been amended to variability to avoid confusion with baseline heart rate. |
| 1.10.15 Use the following categorisations for baseline fetal heart rate:<br>• reassuring:<br>  ○ 110 to 160 beats/minute<br>• non-reassuring: | 1.4.17 Use the following to work out the categorisation for baseline fetal heart rate (see recommendation 1.4.37 to work out the overall categorisation for the CTG):<br>• white | The categorisation of reassuring/non-reassuring/abnormal has been changed to white/amber/red to bring the guideline in line with other documentation used for monitoring (such as |

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| ○ 100 to 109 beats/minute (but see recommendation 1.10.16)<br>○ 161 to 180 beats/minute<br>• abnormal:<br>○ below 100 beats/minute<br>○ above 180 beats/minute. [2017] | ○ stable baseline of 110 to 160 beats a minute<br>• amber<br>○ increase in baseline fetal heart rate of 20 beats a minute or more from the start of labour or since the last review an hour ago, or<br>○ 100 to 109 beats a minute (but see the following recommendation), or<br>○ 161 to 180 beats a minute<br>• red<br>○ below 100 beats a minute, or<br>○ above 180 beats a minute. [2017, amended 2022] | MEWS charts); amber features have been expanded to include an increase in baseline of 20 beats a minutes or more as the committee agreed this was important to emphasise. A rise in baseline was in previous versions of the guideline, and the importance of a stable baseline was emphasised in 1.10.28, but actions for a rise had been removed. |
| 1.10.16 Take the following into account when assessing baseline fetal heart rate:<br>• differentiate between fetal and maternal heartbeats<br>• baseline fetal heart rate will usually be between 110 and 160 beats/minute<br>• although a baseline fetal heart rate between 100 and 109 beats/minute is a non-reassuring feature, continue usual care if there is normal baseline variability and no variable or late decelerations. [2017] | 1.4.18 When assessing baseline fetal heart rate, differentiate between fetal and maternal heartbeats and take the following into account:<br>• baseline fetal heart rate will usually be between 110 and 160 beats a minute<br>• lower baseline fetal heart rates are expected with post-term pregnancies, with higher baseline rates in preterm pregnancies<br>• a rise in baseline fetal heart rate may represent either developing infection or hypoxia (see the NICE guideline on Neonatal infection: antibiotics for prevention and treatment)<br>• although a baseline fetal heart rate between 100 and 109 beats a minute is an amber feature, continue usual care if this has been stable throughout labour and there is normal baseline variability and no variable or late decelerations. [2017, amended 2022] | Additional possible reasons for a rise in baseline heart rate have been added, as well as the impact of gestational age, as the committee agreed this detail may aid implementation of the guideline recommendations in clinical practice. |

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| 1.10.17 Use the following categorisations for fetal heart rate baseline variability:<br>• reassuring:<br>  ○ 5 to 25 beats/minute<br>• non-reassuring:<br>  ○ less than 5 beats/minute for 30 to 50 minutes<br>  ○ more than 25 beats/minute for 15 to 25 minutes<br>• abnormal:<br>  ○ less than 5 beats/minute for more than 50 minutes<br>  ○ more than 25 beats/minute for more than 25 minutes<br>  ○ sinusoidal. [2017] | 1.4.21 Use the following to work out the categorisation for fetal heart rate variability (see recommendation 1.4.37 to work out the overall categorisation for the CTG):<br>• white<br>  ○ 5 to 25 beats a minute<br>• amber<br>  ○ less than 5 beats a minute for between 30 and 50 minutes, or<br>  ○ more than 25 beats a minute for up to 10 minutes<br>• red<br>  ○ less than 5 beats a minute for more than 50 minutes, or<br>  ○ more than 25 beats a minute for more than 10 minutes, or<br>  ○ sinusoidal. [2017, amended 2022] | The categorisation of reassuring/non-reassuring/abnormal has been changed to white/amber/red to bring the guideline in line with other documentation used for monitoring (such as MEWS charts); amber features have changed to more than 25 beats/minute for up to 10 minutes instead of 15 to 25 minutes; and red to more than 25 beats a minute for more than 10 minutes instead of more than 25 minutes, as the committee agreed the longer periods in the previous guideline risked allowing the fetus to be at risk for too long before action was taken.<br>Previous evidence reviews were consulted regarding increased variability, and the rationale relating to timings in the 2017 update related to committee consensus only. The current committee acknowledge that a true increase in variability for more than 25 minutes is rare, but the previous evidence review showed a significant increased likelihood of term neonatal respiratory morbidity in those born vaginally with much shorter periods of increased variability. |
| 1.10.18 Take the following into account when assessing fetal heart rate baseline variability:<br>• baseline variability will usually be between 5 and 25 beats/minute | 1.4.22 Take the following into account when assessing fetal heart rate variability:<br>• variability will usually be between 5 and 25 beats a minute<br>• intermittent periods of reduced variability are | Other considerations regarding interpretation of variability have been added, including possible reasons and indicators of fetal distress, as the committee agreed this detail may aid implementation of the |

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| • intermittent periods of reduced baseline variability are normal, especially during periods of quiescence ('sleep'). [2017] | normal, especially during periods of quiescence (‘sleep’)<br>• certain medicines, such as opioids, may lead to a reduction in variability, but all other intrapartum risk factors should be carefully reviewed as a potential cause (for example, look for other features on the CTG such a rise in the baseline fetal heart rate that would suggest another reason such as sepsis).<br>• increased variability refers to oscillations around the baseline fetal heart rate of more than 25 beats a minute, and shorter episodes lasting a few minutes may represent worsening fetal condition. [2017, amended 2022] | guideline recommendations in clinical practice. |
| 1.10.19 When describing decelerations in fetal heart rate, specify:<br>• their timing in relation to the peaks of the contractions<br>• the duration of the individual decelerations<br>• whether or not the fetal heart rate returns to baseline<br>• how long they have been present for<br>• whether they occur with over 50% of contractions<br>• the presence or absence of a biphasic (W) shape<br>• the presence or absence of shouldering<br>• the presence or absence of reduced variability within the deceleration. [2017] | 1.4.25 When assessing the significance of decelerations in fetal heart rate, consider:<br>• their timing (early, variable or late) in relation to the peaks and duration of the contractions<br>• the duration of the individual decelerations<br>• whether or not the fetal heart rate returns to the baseline heart rate<br>• how long they have been present for (30 minutes or more is defined as persistent)<br>• whether they occur with over 50% of contractions (defined as repetitive)<br>• the presence or absence of shouldering<br>• the presence or absence of reduced variability within the deceleration. [2017, amended 2022] | Definitions of early, variable and late, persistent and repeated have been added to help users understand and implement this recommendation.<br>The presence or absence of a biphasic (W) shape has been removed. This was as over time the description of a biphasic deceleration has been lost from the guideline, but that also a true biphasic deceleration lasts more than 60 seconds and so the addition of this feature does not change the interpretation of the decelerations. |
| 1.10.21 Use the following categorisations for | 1.4.28 Use the following to work out the categorisation for decelerations in fetal heart rate | The categorisation of reassuring/non-reassuring/abnormal has |

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| decelerations in fetal heart rate:<br>• reassuring:<br>  ○ no decelerations<br>  ○ early decelerations<br>  ○ variable decelerations with no concerning characteristics (see recommendation 1.10.22) for less than 90 minutes<br>• non-reassuring:<br>  ○ variable decelerations with no concerning characteristics for 90 minutes or more<br>  ○ variable decelerations with any concerning characteristics in up to 50% of contractions for 30 minutes or more<br>  ○ variable decelerations with any concerning characteristics in over 50% of contractions for less than 30 minutes<br>  ○ late decelerations in over 50% of contractions for less than 30 minutes, with no maternal or fetal clinical risk factors such as vaginal bleeding | (see recommendation 1.4.37 to work out the overall categorisation for the CTG)::<br>• white<br>  ○ no decelerations, or<br>  ○ early decelerations, or<br>  ○ variable decelerations that are not evolving to have concerning characteristics<br>• amber<br>  ○ without antenatal or developing intrapartum risk factors for fetal compromise:<br>  ▪ either repetitive or persistent variable decelerations with any concerning characteristics, or<br>  ▪ repetitive late decelerations for less than 30 minutes<br>• red<br>  ○ without antenatal or developing intrapartum risk factors for fetal compromise<br>  ▪ both repetitive and persistent variable decelerations with any concerning characteristics, or<br>  ▪ both repetitive and persistent late decelerations<br>  ○ with antenatal or developing intrapartum risk | been changed to white/amber/red to bring the guideline in line with other documentation used for monitoring (such as MEWS charts); the amber and red features have been split into those present with or without antenatal or developing intrapartum risk factors, to emphasise that CTG features should be considered with other risk factors. Variable decelerations without concerning characteristics are now a white feature regardless of the length of time present. This correlates with previous recommendation 1.10.28 that states to continue usual care if there is a stable baseline and normal variability. |

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| or significant meconium<br>• abnormal:<br>○ variable decelerations with any concerning characteristics in over 50% of contractions for 30 minutes (or less if there are any maternal or fetal clinical risk factors)<br>○ late decelerations for 30 minutes (or less if there are any maternal or fetal clinical risk factors)<br>○ acute bradycardia, or a single prolonged deceleration lasting 3 minutes or more. | factors for fetal compromise<br>▪ repetitive variable decelerations with any concerning characteristics for less than 30 minutes, or<br>▪ persistent variable decelerations with any concerning characteristics, or<br>▪ repetitive late decelerations for less than 30 minutes<br>○ acute bradycardia, or a single prolonged deceleration lasting 3 minutes or more. [2017, amended 2022] | |
| 1.10.22 Regard the following as concerning characteristics of variable decelerations:<br>• lasting more than 60 seconds<br>• reduced baseline variability within the deceleration<br>• failure to return to baseline<br>• biphasic (W) shape<br>• no shouldering. | 1.4.27 Regard the following as concerning characteristics of variable decelerations:<br>• lasting more than 60 seconds<br>• reduced baseline variability within the deceleration<br>• failure or slow return to baseline fetal heart rate<br>• loss of previously present shouldering. [2017, amended 2022] | The characteristic of biphasic (W) shape has been removed, as a true biphasic deceleration lasts more than 60 seconds and so the addition of this feature does not change the interpretation of the decelerations.<br>The absence of shouldering has been amended to 'loss of previously present shouldering', as shouldering is not always present in decelerations and this is not a concerning feature if there hasn't been a change |
| 1.10.23 If variable decelerations with no concerning characteristics | 1.4.31 If variable decelerations with no concerning characteristics and no other CTG | The stem has been extended to clarify that variable decelerations are |

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| (see recommendation 1.10.22) are observed:<br>• 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<br>• ask the woman to change position or mobilise. [2017] | changes, including no rise in the baseline fetal heart rate, are observed:<br>• 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<br>• support the woman to change position or mobilise. [2017, amended 2022] | not concerning only if there are no other CTG changes or rise in baseline fetal heart rate. |
| 1.10.24 Take the following into account when assessing decelerations in fetal heart rate:<br>• early decelerations are uncommon, benign and usually associated with head compression<br>• early decelerations with no non-reassuring or abnormal features on the cardiotocograph trace should not prompt further action. [2017] | 1.4.33 Take the following into account when categorising early decelerations:<br>• they are uncommon, benign and usually associated with head compression<br>• they are not accompanied by any other CTG changes, such as reduced variability or a rise in the baseline fetal heart rate. [2017, amended 2022] | The wording has been amended to clarify that early decelerations are by definition not accompanied by other CTG changes such as reduced variability or a rise in baseline fetal heart rate. |
| 1.10.27 Categorise cardiotocography traces as follows:<br>• normal: all features are reassuring (see table 10)<br>• suspicious: 1 non-reassuring feature and 2 reassuring features (but note that if accelerations are present, fetal acidosis is unlikely)<br>• pathological:<br>  ○ 1 abnormal feature or<br>  ○ 2 non-reassuring features. [2017] | 1.4.37 Categorise CTG traces as follows:<br>• normal<br>  ○ all 4 features (contractions, baseline, variability, decelerations) are white<br>• suspicious<br>  ○ 1 amber feature and 3 white features<br>• pathological<br>  ○ 1 or more red feature, or<br>  ○ 2 or more amber features. [2017, amended 2022] | Contractions have been added to the classification so 4 features are considered, not 3, as the committee agreed that contractions were important but by not being included in the CTG categorisation in the previous version of the guideline, they may not be adequately considered. |
| 1.10.29 If there is an acute bradycardia, or a single prolonged deceleration for 3 minutes or more: | 1.5.8 If there is an acute bradycardia, or a single prolonged deceleration for 3 minutes or more:<br>• urgently seek obstetric help | The advice to expedite birth if bradycardia persists for 9 minutes or recovers in 9 minutes have been extended to |

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| • urgently seek obstetric help<br>• if there has been an acute event (for example, cord prolapse, suspected placental abruption or suspected uterine rupture), expedite the birth (see recommendations 1.13.34 to 1.13.37)<br>• correct any underlying causes, such as hypotension or uterine hyperstimulation<br>• start one or more conservative measures (see recommendation 1.10.34)<br>• make preparations for an urgent birth<br>• talk to the woman and her birth companion(s) about what is happening and take her preferences into account<br>• expedite the birth if the acute bradycardia persists for 9 minutes.<br>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. [2017] | • if there has been an acute event (for example, cord prolapse, suspected placental abruption or suspected uterine rupture), expedite the birth<br>• consider possible underlying causes and undertake conservative measures as indicated (see the section on underlying causes and conservative measures)<br>• make preparations for an urgent birth<br>• expedite the birth if the acute bradycardia persists for 9 minutes, or less if there are significant antenatal or intrapartum risk factors for fetal compromise.<br>If the fetal heart rate recovers at any time up to 9 minutes, reassess any decision to expedite the birth, but taken into account other antenatal and intrapartum risk factors and discuss this with the woman. [2017, amended 2022] | state that this should take into account if there are other risk factors, as the committee agreed that the cumulative effect of additional risk factors with bradycardia should increase the urgency of the situation |
| 1.10.30 If the cardiotocograph trace is categorised as pathological (see recommendation 1.10.27):<br>• obtain a review by an obstetrician and a senior midwife<br>• exclude acute events (for example, cord prolapse, suspected placental abruption or suspected uterine rupture) | 1.5.6 If the CTG trace is categorised as pathological:<br>• obtain an urgent review by an obstetrician and a senior midwife<br>• exclude acute events (for example, cord prolapse, suspected placental abruption or suspected uterine rupture) that need immediate intervention<br>• perform and document a full risk assessment, including a full set of maternal observations, taking into | An additional bullet to state that a full risk assessment should be carried out has been added, as the emphasis of the guideline has been changed to encourage a more holistic approach to assessing risk. |

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| • correct any underlying causes, such as hypotension or uterine hyperstimulation<br>• start one or more conservative measures (see recommendation 1.10.34)<br>• talk to the woman and her birth companion(s) about what is happening and take her preferences into account. [2017] | account the whole clinical picture<br>• consider possible underlying causes and undertake conservative measures as indicated (see the section on underlying causes and conservative measures). [2017, amended 2022] | |
| 1.10.31 If the cardiotocograph trace is still pathological after implementing conservative measures:<br>• obtain a further review by an obstetrician and a senior midwife<br>• offer digital fetal scalp stimulation (see recommendation 1.10.38) and document the outcome.<br>If the cardiotocograph trace is still pathological after fetal scalp stimulation, consider:<br>• fetal blood sampling (see recommendations 1.10.40 to 1.10.55) or<br>• expediting the birth (see recommendations 1.13.34 to 1.13.37).<br>Take the woman's preferences into account. [2017] | 1.5.7 If the CTG trace is still pathological after implementing conservative measures:<br>• obtain a further urgent review by an obstetrician and a senior midwife<br>• evaluate the whole clinical picture when considering options:<br>• if there are intrapartum risk factors for fetal compromise there should be a very low threshold for expediting birth<br>• if there are no intrapartum risk factors for fetal compromise consider:<br>o fetal scalp stimulation (see the section on fetal scalp stimulation)<br>o expediting the birth. [2017, amended 2022] | An additional bullet to state that assessment of the full clinical picture should be carried out has been added as the emphasis of the guideline has been changed to encourage a more holistic approach to assessing risk. An addition has also been made to state that the presence of risk factors should lower the threshold for expediting birth, as the committee agreed that the cumulative effect of additional risk factors with a pathological CTG trace should increase the urgency of the situation.<br>The reference to fetal blood sampling has been removed as this is no longer recommended. |
| 1.10.32 If the cardiotocograph trace is categorised as suspicious (see recommendation 1.10.27):<br>• correct any underlying causes, such as hypotension or uterine hyperstimulation<br>• perform a full set of maternal observations | 1.5.5 If the CTG trace is categorised as suspicious:<br>• perform and document a full risk assessment, including a full set of maternal observations, taking into account the whole clinical picture<br>• note that if accelerations are present then fetal acidosis is unlikely | Details have been added about the presence of accelerations as this was missing from the previous version of the guideline. dDcumentation of the risk assessment, and consideration of additional risk factors which may lower the threshold for intervention, as the emphasis of the guideline |

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| • start one or more conservative measures (see recommendation 1.10.34)<br>• inform an obstetrician or a senior midwife<br>• document a plan for reviewing the whole clinical picture and the cardiotocography findings<br>• talk to the woman and her birth companion(s) about what is happening and take her preferences into account. | • if the CTG trace was previously normal, consider possible underlying reasons for the change and undertake conservative measures as indicated (see the section on underlying causes and conservative measures)<br>• if a CTG trace is classed as suspicious because of a reduction in variability and there are additional intrapartum risk factors such as slow progress, sepsis or meconium, then a lower threshold for action should be considered<br>• inform an obstetrician or senior midwife. [2017, amended 2022] | has been changed to encourage a more holistic approach to assessing risk.. |
| 1.10.33 If the cardiotocograph trace is categorised as normal (see recommendation 1.10.27):<br>• continue cardiotocography (unless it was started because of concerns arising from intermittent auscultation and there are no ongoing risk factors; see recommendation 1.10.8) and usual care<br>• talk to the woman and her birth companion(s) about what is happening. [2017] | 1.5.4 If the CTG trace is categorised as normal:<br>• continue CTG (unless it was started because of concerns arising from intermittent auscultation and there are no ongoing antenatal or intrapartum risk factors) and usual care<br>• continue to perform and document a full risk assessment at least hourly. [2017, amended 2022] | The need to continue with hourly risk assessment has been added, as the emphasis of the guideline has been changed to encourage a more holistic approach to assessing risk. |
| 1.10.34 If there are any concerns about the baby's wellbeing, be aware of the possible underlying causes and start one or more of the following conservative measures based on an assessment of the most likely cause(s):<br>• encourage the woman to mobilise or adopt an alternative position (and to avoid being supine) | 1.5.9 If there are any concerns about the baby's wellbeing, be aware of the possible underlying causes and start 1 or more of the following conservative measures based on an assessment of the most likely cause(s):<br>• maternal position (as this can affect uterine blood flow and cord compression) - encourage the woman to mobilise, or adopt an alternative position and to avoid being supine | The rationale for asking a woman to change position has been added to aid understanding and implementation of the guideline; additional information about hypotension in women with an epidural has been added, to bring these recommendations in line with the recommendations for regional analgesia in the IPC guideline. A point has been added about not |

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| • offer intravenous fluids if the woman is hypotensive<br>• reduce contraction frequency by:<br>  ○ reducing or stopping oxytocin if it is being used and/or<br>  ○ offering a tocolytic drug (a suggested regimen is subcutaneous terbutaline 0.25 mg). [2017] | • hypotension:<br>  ○ if the woman is hypotensive secondary to an epidural top-up, start intravenous fluids, move her to a left lateral position and call the anaesthetist to review<br>  ○ do not offer intravenous fluids to treat fetal heart rate abnormalities unless the woman is hypotensive or has signs of sepsis<br>• excessive contraction frequency:<br>  ○ reduce contraction frequency by reducing or stopping oxytocin if it is being used<br>  ○ offering a tocolytic drug (a suggested regimen is subcutaneous terbutaline 0.25 mg). [2017, amended 2022] | using intravenous fluids for fetal heart rate abnormalities unless the woman is hypotensive or has signs of sepsis – this is because there have been multiple documented cases of women becoming hyponatraemic from excessive fluid administration. |
| 1.10.36 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). | 1.5.10 Do not offer maternal facial oxygen therapy as part of conservative measures because it may harm the baby. However, it can be used if it is administered for maternal indications such as hypoxia or as part of preoxygenation before a potential anaesthetic). [2017, amended 2022] | The caveat ‘as part of conservative measures’ has been added to clarify the situation when facila oxygen therapy should not be used. |
| 1.10.38 If the cardiotocograph trace is pathological (see recommendation 1.10.27), offer digital fetal scalp stimulation. If this leads to an acceleration in fetal heart rate, only continue with fetal blood sampling if the cardiotocograph trace is still pathological. | 1.6.1 If the CTG trace is pathological without other antenatal or intrapartum risk factors for fetal compromise, then offer digital fetal scalp stimulation. If this leads to an acceleration in fetal heart rate and a sustained improvement in the CTG trace then it is reasonable to continue to monitor the fetal heart rate and clinical picture. [2017, amended 2022] | The absence of other risk factors has been added; the wording has been revised to make it a positive action. |
| 1.10.39 If digital fetal scalp stimulation (during vaginal examination) leads to an acceleration in fetal heart rate, regard this as a sign | 1.6.2 Be aware that an absence of an acceleration in response to fetal scalp stimulation is a worrying sign that fetal compromise may be | The wording has been revised to emphasise that a lack of response to scalp stimulation is a worrying sign. This is in |

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| that the baby is healthy. Take this into account when reviewing the whole clinical picture. [2017] | present, and that expedited birth may be necessary. [2017, amended 2022] | response to considering the 2017 evidence review |
| 1.10.56 To ensure accurate record keeping for cardiotocography:<br>• make sure that date and time clocks on the cardiotocograph monitor are set correctly<br>• 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. | 1.8.1 To ensure accurate record keeping for CTG:<br>• make sure that date and time clocks on the cardiotocograph monitor are set correctly<br>• ensure the recording or paper speed is set at 1 cm a minute<br>• label traces with the woman's name, date of birth, hospital number or NHS number and pulse at the start of monitoring, the date of the CTG. [2014, amended 2022] | The paper speed has been added as this was missing from the previous version of the guideline and is important that all centres use the same speed to ensure CTG recordings can be interpreted correctly. |
| 1.10.57 Individual units should develop a system for recording relevant intrapartum events (for example, vaginal examination, fetal blood sampling and siting of an epidural) in standard notes and/or on the cardiotocograph trace. [2014] | 1.8.2 Individual units should develop a system for recording relevant intrapartum events (for example, vaginal examination and siting of an epidural) in standard notes and/or on the cardiotocograph trace. [2014, amended 2022] | Fetal blood sampling has been removed from this recommendation as it is no longer advised. |
| 1.10.59 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] | 1.8.4 In cases where there is concern that the baby may experience developmental delay, photocopy cardiotocograph traces (if they are not available electronically) and store them indefinitely in case of possible adverse outcomes. [2007, amended 2022] | CTG traces in some units can now be recorded electronically and so can be stored this way, meaning that photocopying isn't necessary. |
| 1.13.2 (part of)<br>Perform intermittent auscultation of the fetal heart rate immediately after a contraction for at least 1 minute, at least every 5 minutes. Palpate the woman's pulse every 15 minutes to differentiate between the 2 heartbeats. [2007, amended 2014] | 1.2.9 Once the woman has signs of, or is in confirmed second stage of labour:<br>• perform intermittent auscultation immediately after a contraction for at least 1 minute, at least every 5 minutes<br>• palpate the woman's pulse simultaneously to differentiate between the maternal and fetal heart rates | The need to palpate the woman's pulse simultaneously, and the action to be taken if the pulses cannot be differentiated have been added to the recommendation, as this information was missing from the previous guideline. |

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| | • if there are concerns about differentiating between the 2 heart rates, then seek help and consider changing the method of fetal heart rate monitoring. [2007, amended 2022] | |

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2 **Table 3 Minor changes to recommendation wording (no change to intent)**

| Recommendation numbers in current guideline | Comment |
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| All recommendations except those labelled [2022] | Recommendations have been edited into the direct style (in line with current NICE style for recommendations in guidelines) where possible. Yellow highlighting has not been applied to these changes. |

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4 **Table 4 No changes to recommendation wording**

| Recommendation numbers in current guideline | Recommendation numbers in updated guideline |
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| 1.10.20 | 1.4.26 |
| 1.10.25 | 1.4.29 |
| 1.10.26 | 1.4.35 |
| 1.10.28 | 1.4.4 |
| 1.10.37 | 1.5.11 |
| 1.10.57 to 1.10.61 | 1.8.2 to 1.8.6 |

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