Antenatal Electronic Fetal Monitoring Guideline

Guideline information

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Summary of document:
To provide the user with evidence-based guidance on antenatal electronic FHR monitoring with the aim of recognising and prevention potential adverse outcomes to fetuses at risk of hypoxia.

Scope:
The guideline is for the use of all clinicians within Hywel Dda University Health Board when providing antenatal CTG monitoring of pregnant women with increased risk of complications.

This guidance uses the term “woman” (pronouns she or her) to describe individuals whose sex assigned at birth was female, whether they identify as female, male or nonbinary. It is important to acknowledge it is not only people who identify as women for whom it is necessary to access women’s health and reproductive services. Therefore, this should include people who do not identify themselves as women but who are pregnant or have recently given birth. Obstetric and midwifery services and delivery of care must therefore be appropriate, inclusive and sensitive to the needs of those individuals whose gender identity does not align with the sex that they were assigned at birth.

To be read in conjunction with:
813 - Continuous Intrapartum Electronic Fetal Monitoring Guideline – opens in new tab

Patient information:
Include links to Patient Information Library

Owning group:
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Reviews and updates:
1.0 – New Guideline
2.0 - Updated

Keywords
Antenatal Fetal Assessment, CTG, Dawes Redman, Analysis

Glossary of terms
BMI - Body Mass Index
cCTG - Computerised Cardiotocograph
CTG – Cardiotocograph
EFM - Electronic Fetal Monitoring
DAU - Day Assessment

Key points:
Evidence-based guidance on antenatal electronic FHR monitoring and assessment.

Contents

Scope
The guideline is for the use of all clinicians within Hywel Dda University Health Board who provide antenatal CTG when monitoring pregnancies with increased risk of complications.

Aim
The aim of this document is to:
- provide the user with evidence-based guidance on antenatal electronic FHR monitoring with the aim of recognition and prevention of potential adverse outcomes to fetuses at risk of hypoxia.

Objectives
The aim of this document will be achieved by the following objectives:
- Identifying pregnancies with increased risk of complications who require antenatal CTG monitoring
- Understand the use of cCTG and DR Criteria
- How to approach situations where the DR criteria are not met on cCTG.

Introduction
The antenatal CTG is widely used as the primary method of antenatal fetal assessment in pregnancies with increased risk of complications. It is usually used in conjunction with other ways of monitoring fetal health and wellbeing which includes observation of fetal movements, ultrasound assessments and Doppler blood flow recording.

The evidence does not support the routine use of antenatal CTG for fetal assessment in women with an uncomplicated pregnancy (NICE 2017b) and a Cochrane review found no clear evidence that antenatal CTGs improve perinatal outcomes or caesarean section rates.

The use of CTG monitoring using computerised CTG analysis has been shown to significantly reduce perinatal mortality.

Monitoring in Preterm Infants
Antenatal Electronic Fetal Monitoring (EFM) should not be performed prior to 26 weeks gestation as reliability is less certain due to the immaturity of the central nervous system.

Prior to 26 weeks gestation
The fetal heart should be auscultated with a hand-held Doppler for 60 seconds if the patient presents to Triage / Maternity DAU with a problem in her pregnancy.

Antenatal auscultation is used to confirm that the fetus is alive and provides reassurance but is of no predictive value. Therefore, routine auscultation at all antenatal appointments of the fetal heart in no longer recommended (NICE, 2021). However, auscultation of the fetal heart usually provides reassurance for the mother.

From 26+0 weeks gestation
Monitoring should be considered when risk factors are present between 26 and 28 weeks. If unsure discuss with a senior midwife or Obstetrician.

Indications for Antenatal CTG

Note: This is not an exhaustive list and other indications may apply. Please refer to BSOTS.

Women who develop complications during pregnancy

- Antepartum haemorrhage
- Hypertensive disorder of pregnancy
- Altered fetal movements.
- Pre-labour premature or prolonged rupture of membranes
- Threatened pre-term labour
- Abdominal trauma/pain
- IUGR (<3rd centile or abnormal Dopplers)
- Post-term pregnancy >42 weeks
- Ectopic beats
- Any medical/obstetric condition which constitutes a significant risk of fetal compromise

Women with recognised pre-existing risk factors

- Previous stillbirth or neonatal death (for maternal reassurance)

Limited evidence available suggests there is no specific risk associated to recommend continuous monitoring with regards to Raised BMI (singularly a risk factor) However, a low threshold and emphasis is encouraged in achieving quality of recording- so use of a CTG may be indicated if habitus inhibits auscultation.

Management

Visual Assessment

Visual Assessment, utilising the antenatal CTG, should be performed for every CTG performed irrespective of whether computerised CTG used or not.

Dawes Redman (DR) Computerised CTG (cCTG)

- Computerised CTG provides an objective CTG interpretation with communication of robust numerical data rather than opinion
- The Dawes-Redman cCTG monitor and analysis is valid for any gestation over 26 weeks but it is **not** suitable for intrapartum CTG analysis
- It should only be used for **antenatal** women with NO uterine activity and only if electronic fetal monitoring is required.
- It is NOT to be used for women who are contracting, this includes active labour and latent phase of labour.
- The criteria may be met at 10 minutes and every 2 minutes thereafter.
- Upon completion of the computerised analysis the outcome will be printed on the end of the CTG.
- It is advised to ensure the woman has the fetal movement button to press whilst a cCTG is in place.
- CTG's performed before 30 weeks should be undertaken and interpreted with caution and must be made on an individual basis by a senior obstetrician because there may be
    - Physiologically higher baseline

- Reduced frequency and amplitude of accelerations seen
- It is more common to observe an absence of high variation (not concerning at early gestations if no other clinical or CTG concerns)
- There is reduced variability
- Occurrence of sporadic decelerations may be seen
- Unlikely to be cycling due to immature central nervous system

The final clinical judgement should be based on the entire clinical assessment with cCTG forming part of this holistic approach to pregnancy management. A computerised CTG is only a clinical diagnostic tool and cannot be used as a predictive or screening test. It only indicates the current fetal state.

Induction of Labour

- cCTG Dawes Redman analysis can be used prior to induction
- **Reminder -It is not valid for use when contractions/ established labour has been confirmed.**

Multiple Pregnancy

Dawes Redman analysis can be used in multiple pregnancies.

- Consider using the 20-beat fetal heart separation when there is a need to differentiate between twin's heart rates.

Prior to Antenatal EFM

- Perform abdominal examination
- Listen to fetal heart with a Sonic aid Doppler or pinard stethoscope before commencing EFM
- Ensure the date and time on the CTG is correctly set.
- Ensure that the monitor is set to run at 1cm per minute
- Position the toco and ultrasound transducer.
- Connect the fetal event marker and show the mother how to use it.
- Ensure integral pulse oximeter is used to record the maternal pulse during EFM
- Ensure the gestation, patients name, hospital number, maternal pulse, date and time are clearly recorded.
- Turn the Dawes Redman analysis on

Note: **Dawes Redman analysis will not start unless the gestation is entered**.

Interpretation of Antenatal CTG

- The CTG must be of good technical quality to be interpreted safely.
- The four main features, baseline rate, baseline variability, accelerations and decelerations should be systematically examined to assist in the interpretation of the CTG
- The sleep phase with no fetal movement and no fetal heart accelerations does not usually exceed 40 minutes.
- The designated antenatal CTG proforma should always be used for the classification of the trace in non-labouring women
- The whole clinical picture should be considered including reason for performing the CTG and gestational age.

- The normal fetal heart rate varies with vagal and sympathetic tone adjustments and therefore varies with gestational age due to maturation of the autonomic nervous system

NOTE Lack of variability alone cannot be diagnosed on a CTG before 60 minutes.

The Dawes Redman Outcomes

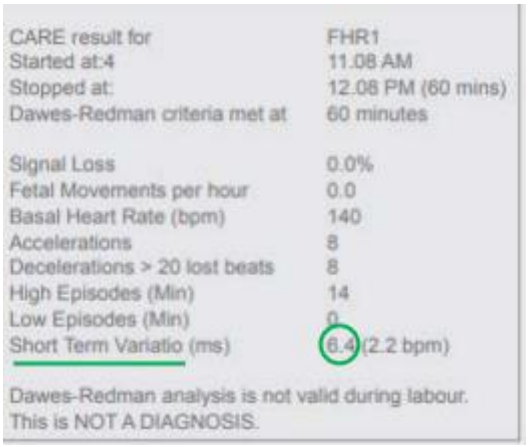
The Dawes Redman provides two possible outcomes:

1. Criteria Met
2. Criteria not met

Criteria Met

- If the CTG meets the Dawes/Redman criteria, this is a normal result.
- The CTG can be discontinued if the clinician is reassured.
- The practitioner who stops the CTG must circle the STV (see table 1. below), and then sign the CTG at the end of the printout. Include a visual assessment, to confirm that the CTG is normal, and complete the preformatted antenatal CTG sticker.

Table 1. **An example of a report demonstrating that the Dawes Redman Criteria have been met and that the STV is normal for the gestation**



CARE result for	FHR1
Started at:4	11.08 AM
Stopped at:	12.08 PM (60 mins)
Dawes-Redman criteria met at	60 minutes
Signal Loss	0.0%
Fetal Movements per hour	0.0
Basal Heart Rate (bpm)	140
Accelerations	8
Decelerations > 20 lost beats	8
High Episodes (Min)	14
Low Episodes (Min)	0
Short Term Variatio (ms)	6.4 (2.2 bpm)

Dawes-Redman analysis is not valid during labour.
This is NOT A DIAGNOSIS.

Criteria NOT Met

- If the Dawes-Redman criteria are not met the CTG should continue for the full 60 minutes,
- If there are pathological features or any cause for concern during this time, immediate escalation should take place
- If the criteria is still not met at 60 minutes, the computer will end the analysis and print the results on the trace.
- Request review by Band 7 Coordinator/ Obstetric Registrar / Consultant **AND** ensure that the Dawes Redman analysis is recommenced until review (on some machines may need to re-enter patients' details/ gestation)
- The reason(s) why the trace did not meet the criteria are highlighted as coded numbers alongside the 'criteria not met' message. These codes should be evaluated with the appropriate risk factors (See Appendix 1)
- Explore what may have affected the graphic recording e.g. loss of contact, mother pressing fetal movement marker.
- Look at the reasons for 'Criteria Not Met'.

- Check the Short-Term Variation (STV)(ms), circle the STV (see table1) Then follow actions below:

The STV is important and should be compared to any previous Dawes-Redman CTG analysis for the fetus. A low STV is most commonly associated with fetal growth restriction and chronic hypoxia.

IMPORTANT TO NOTE: The new Dawes/Redman programme will only give the STV at 60 minutes. For records shorter than this, the STV can be misleading and should not be relied upon

Short Term Variation

If STV becomes abnormal for gestation (see table below) request urgent obstetric review ,continue CTG and plan for urgent delivery.

Gestation	Abnormal STV on cCTG *
Between 26+0 and 28 +6	<2.6
Between 29+0 and 31+6	< 3.0
Between 32 and 33+6	<3.5
After 34 weeks	<4.5

*Expedite birth if Short Term Variability (STV) becomes abnormal for gestation.

In presence of normal STV review by Labour Ward Co-ordinator /Obstetric registrar is still required whenever criteria are not met at 60 minutes. Clinical assessment includes the whole clinical picture, STV and fetal movement rate.

Do NOT act based on CTG alone. CTG is an aid to pregnancy management and not a diagnostic tool. STV must also NOT be used in isolation as an indicator of fetal condition – you can have a normal STV with a severely compromised fetus particularly where the fetus is affected by infection or anaemia.

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Appendix 1 – Reasons for not meeting Dawes Redman and Codes

1	Basal heart rate outside normal range
2	Large decelerations
3	No episode of high variation
4	No movements or fewer than 3 accelerations
5	Baseline fitting is uncertain
6	Short Term Variation (STV) is less than 3ms
7	Possible error at end of record
8	Deceleration at end of record
9	High frequency sinusoidal rhythm
10	Suspected sinusoidal rhythm
11	Long Term Variation (LTV) in high episodes below accepted level
12	No accelerations

1. Basal Heart Rate outside normal range
The FIGO and NICE guidelines agree that a normal baseline fetal heart rate for a term fetus is 110 – 160 beats per minute. Baseline FH Rates must be assessed in consideration of expected baseline for a fetus of the gestation being monitored.

The Dawes/ Redman analyses the intervals between beats and converts into a Basal Heart Rate. Basal rate is not the same as baseline rate and may deviate significantly from a visual assessment of baseline rate.

2. Large decelerations
These will be unprovoked decelerations. Review by obstetric Registrar. Immediate intervention if the trace is otherwise abnormal, or significant clinical concerns.

3. No episodes of high variation
Long Term Variation (LTV) is essentially equivalent to traditional baseline variability. Measured over 1-minute, the difference between the high and low FH values is analysed. Important evidence of normality is the episodic variation in the baseline heart rate.
LTV is reported as “High” or “Low” episodes. In deep sleep the fetal heart rate is relatively constant with lower short-term variation but this should not normally exceed 50 minutes. In other words, it indicates absence of cycling.

4. No movements and fewer than 3 accelerations.
This is significant and requires review by the obstetric team.

5. Baseline fitting is uncertain
If all else is normal and the baseline falls within normal parameters then this can be ignored.

6. Short-term variation (STV) is less than 3ms
Short-term variation is a computerised measure of the micro fluctuations of the fetal heart. These are not visible to the human eye. **A value of less than 3ms is strongly linked to the development of metabolic acidaemia and impending intrauterine death.** Particularly with the absence of an episode

of high variation. STV can only be analysed after a full 60 minutes. STV of less than 3ms is significant and should be discussed and reviewed by the Obstetric Registrar or Consultant. Urgent review is required if the CTG visual assessment is also abnormal.

7. Possible error at end of the record
This occurs when the machine detects a possible abnormality at the end of the trace which would otherwise be passed as “CRITERIA MET”. In this event the trace may be continued or, if the clinical evaluation is that it is significantly abnormal, for example prolonged deceleration, then action should be taken as appropriate.

8. Deceleration at the end of the record
In this event the trace should be continued, and action taken as appropriate. Review by Obstetric Registrar or Consultant on call.

9. High frequency sinusoidal rhythm
Sinusoidal FHR patterns are associated with either severe fetal anaemia or severe/prolonged fetal hypoxia with acidosis and are associated with poor fetal outcomes. The analysis of the Dawes Redman system should be acted on immediately and discussed with the Obstetric Registrar or Consultant on call.

10. Suspected sinusoidal rhythm
Sinusoidal FHR needs to be distinguished from a pseudosinusoidal FHR which, while it closely resembles a sinusoidal pattern, is usually transient, resolves spontaneously and is associated with a good fetal outcome. Where a diagnosis of Sinusoidal FHR pattern is made, immediate intervention is required with probable emergency delivery if intrauterine resuscitation is not appropriate. The CTG should be continued. Maternal blood should be taken for an urgent Kleihauer test to assess the degree of any feto-maternal haemorrhage. The Obstetric Registrar, Obstetric Consultant, Neonatal Paediatricians and Haematologist, should be alerted.

11. Long-term variation in high episodes below acceptable level
This should be acted upon in the same way as STV.

12. No accelerations
In this event the CTG trace should be continued but should be reviewed by Obstetric Registrar or Consultant. (Dawes Redman analyses acceleration using a slightly lower threshold (>10bpm) than FIGO and NICE definitions

Appendix 2 – Antenatal CTG Proforma

ANTENATAL CTG Review			Hywel Dda University Health Board
Gestation:	Fetal movements normal: Y/N		Membranes ruptured: Y / N Maternal pulse:
Indication for CTG/ Risk assessment:			
Regular, painful uterine activity felt by woman:	If Present ➢ Analyse with Intrapartum CTG classification sticker		If Absent ➢ Analyse with Antenatal CTG classification sticker
	Reassuring features		Non-reassuring features
Baseline rate (bpm)	>110 and <160bpm (Appropriate for gestation?)		<110 OR >160bpm
Variability	Between 5 and 25 bpm		<5 for 50mins or >25 for 30mins or Sinusoidal>10 mins
Accelerations	Present		Absent >50mins
Decelerations	Absent		Present
Evidence of cycling	Present		Absent
Dawes Redman criteria	Met criteria at mins		Criteria NOT Met at 60 mins. MW to inform Obs Reg and Coordinator.
Overall Impression	Normal CTG		Abnormal CTG (x1 non reassuring feature)/chronic hypoxia/other. MW to inform Obs Reg and Coordinator
Plan of care:			
Date:	Time:	Signature:	Print Designation: