

Computerised CTG Guidance on how to use and interpret

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1. **Aim of this guideline**

To assist midwives and obstetricians in when to use and how to interpret antenatal computerised CTG (cCTG) including the Dawes Redman Criteria.

NB. *Computerised CTG refers to an objective interpretation of an antenatal CTG by computer software using the Dawes Redman criteria. It DOES NOT refer to a digital CTG trace which is linked on Badger and appears on a central monitor.*

2. **Background of antenatal CTG monitoring**

There is no clear evidence that traditional antenatal CTG improves perinatal outcomes or has an impact on caesarean section rates. A comparison of computerised CTG (cCTG) versus traditional CTG showed a reduction in perinatal mortality with cCTG. Saving Babies' Lives Care Bundle 2 recommends the use of cCTG in antenatal fetal assessment. Computerised fetal heart rate analysis using Dawes Redman criteria offers advantages over traditional CTG (even when interpreted by an experienced expert), providing an objective and reproducible interpretation of the fetal heart rate. In addition, this type of CTG corrects the parameters analysed for gestational age, reduces the time for interpretation and includes the assessment of the short-term variation (STV), which has been shown to be the best predictor of fetal wellbeing.

NB. *STV is a measure of the beat-to-beat variation of fetal heart rate (expressed in milliseconds) which cannot be interpreted by the human eye. It is related to but NOT THE SAME as fetal heart rate variability (expressed in bpm).*

3. When to use cCTG

At present the decision to use computerised CTG should be made by medical staff.

- Where antenatal CTG assessment is required for a SGA/FGR baby (especially if umbilical artery Doppler is abnormal i.e. PI >95th centile or AREDF).
- Can be used from 26+0 weeks' gestation or beyond.

4. When NOT to use cCTG

- Where there is ANY uterine activity.
 - Latent or active phase of labour
 - Threatened or actual preterm labour
 - During induction of labour after onset of contractions
- Senior obstetrician discretion due to additional scan findings e.g. EFW <500g; confirmed or suspected fetal anomaly that is non survivable.

5. Duration and frequency of monitoring

Duration: The maximum length of analysis is 60 minutes. During this time, the computer analyses the CTG data and compares it with the Dawes Redman criteria at 10 minutes and every 2 minutes thereafter. The practitioner commencing the CTG must return within 10 minutes to ensure there is good quality pick up and assess visually whether there are any obviously abnormal features or not.

Frequency: cCTG should typically be performed no more frequently than every 24 hours. There is no evidence that repeating cCTG at 6-hourly or 12-hourly intervals improves outcomes, however in some circumstances medical staff may request for a repeat cCTG to be carried out earlier than 24 hours. Inpatients on cCTG monitoring do not require 6-hourly traditional CTG monitoring.

See appendix 1 for directions on how to set up and use the cCTG machine.

6. Interpretation of computerised CTG including Dawes Redman Criteria

CTG is not a replacement of clinical judgement. In the presence of other associated signs or symptoms suggestive of maternal or fetal compromise further assessment is required, even if a cCTG is deemed normal. It is also important to remember that intrapartum NICE CTG guidance is NOT applicable in the antenatal period. Dawes Redman analysis assesses fetal wellbeing based on a specific data set. Low STV is the best predictor of fetal acidaemia and risk of in utero demise. Mean STV increases as gestation advances. Typically, in healthy fetuses it increases from about 6ms at 26 weeks to 8ms at term. Considering information applied from TRUFFLE (Trial of Randomised Umbilical and Fetal Flow in Europe), if the STV falls below the threshold for

the gestation, delivery should be considered due to suspected hypoxia in the fetus. If any other features of the antenatal CTG are suspected to be abnormal, such as repeated decelerations, fetal bradycardia or sinusoidal pattern, an immediate obstetric review must be sought.

When a cCTG is carried out the following outcomes are possible:

1. **Dawes Redman Criteria MET (at any point \leq 60 mins):** Regard this as normal antenatal cCTG however it is still important to **look at the whole clinical context**. The patient can have ongoing antenatal care as per their obstetric plan.
2. **Dawes Redman Criteria NOT met after 60 mins but STV normal:** If on visual inspection the cCTG looks normal for the gestation and the STV is normal for the gestation (≥ 3.5 at 26+0 – 28+6 weeks, or ≥ 4.0 at 29+ weeks) this can also be regarded as a normal antenatal cCTG. The whole clinical picture and cCTG trace should be reviewed by a senior doctor (ST3 - ST7 or consultant), and a plan for ongoing management made.
3. **Dawes Redman Criteria NOT met after 60 mins and STV abnormal:** This requires **IMMEDIATE** senior obstetric review (ST3 – ST7 or consultant) to assess the whole clinical picture including visual inspection of the cCTG. If STV falls below the threshold for the gestation (< 3.5 at 26+0 – 28+6 weeks, or < 4.0 at 29+ weeks) this is an **ABNORMAL ANTENATAL cCTG** suggesting fetal hypoxia and immediate delivery should be considered. A consultant **MUST** be involved in the decision making in this situation.
4. **Clearly abnormal antenatal CTG (e.g. prolonged repeated decelerations, bradycardia, sinusoidal pattern):** As soon as this is recognised there should be **IMMEDIATE** senior obstetric review (ST3 -ST7 or consultant) to assess the whole clinical picture including visual inspection of the cCTG. An emergency CS delivery is likely to be indicated. A consultant **MUST** be involved in the decision making in this situation.

See Appendix 2 for guidance on how to interpret a cCTG in a flow chart format.

See Appendix 3 for the possible reasons for failure to meet the Dawes Redman criteria.

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Appendix 1: Directions for use:

1. Switch cCTG machine on.
2. Press and hold "Patient name, ID and gestational age" at top of screen.
3. Input patient name, CHI and gestational age.
4. Exit screen pressing X.
5. Locate FH and attach fetal monitoring and toco leads to woman.
6. Link CTG to Badger.
7. Press and hold printer icon on control bar at bottom left hand side of screen until it turns green.
 - a. The printed CTG trace will then commence.
8. Ensure "Dawes Redman" is visible on control bar at bottom of screen. This should be light purple.



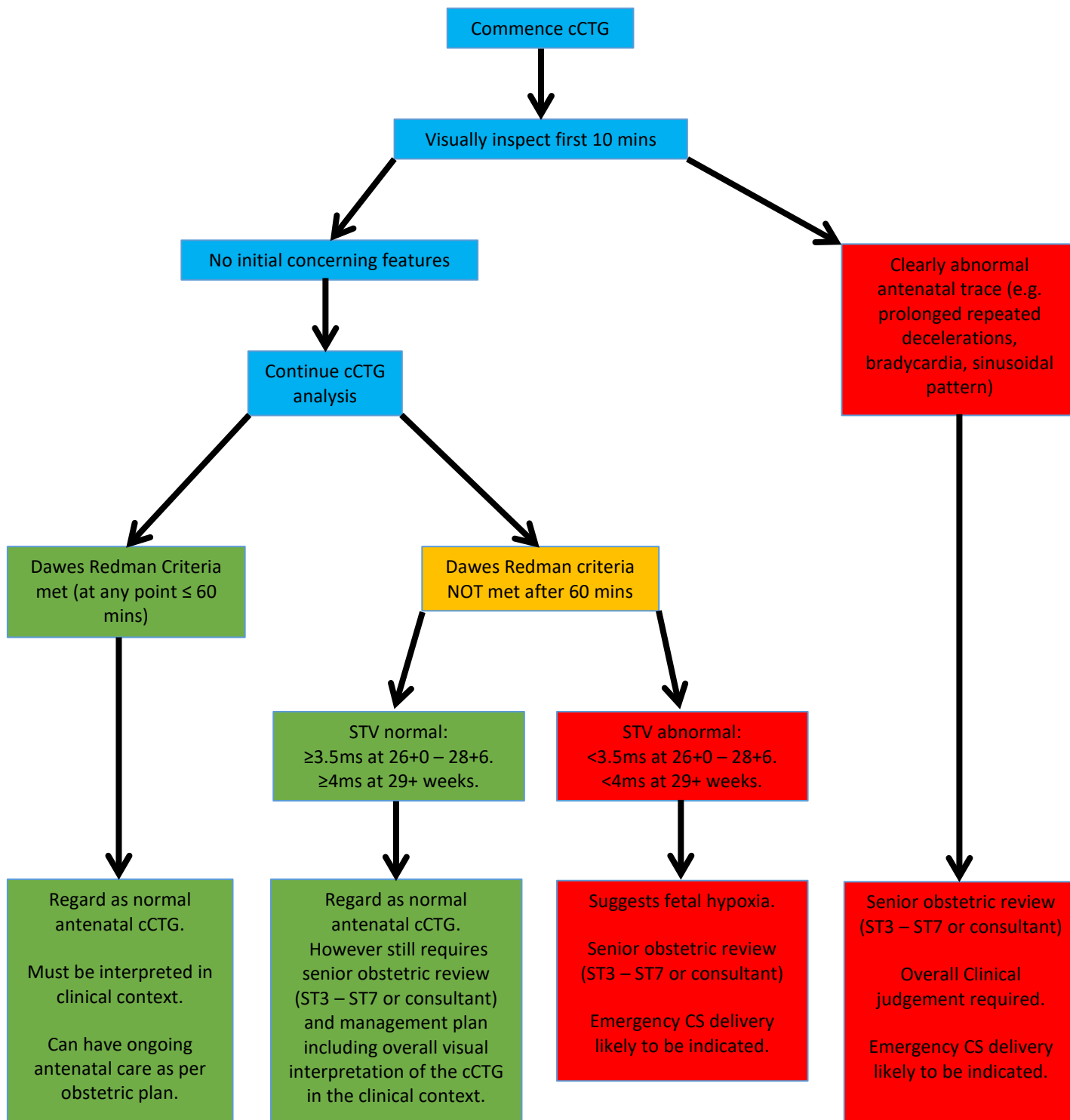
9. Up to 60 minutes of analysis will then automatically commence.
10. Check CTG to ensure not obviously pathological e.g. recurrent decelerations, sinusoidal pattern or fetal bradycardia. (NB. Alert obstetric ST3 – ST7/consultant for urgent review if present)
11. Wait up to 60 minutes for full analysis.
12. While printing or recording
 - a. For the first 10 minutes the Dawes-Redman button will be **light purple**.

- b. Between 10 and 60 minutes, if the Criteria are not yet met, the Dawes Redman button will be **dark purple**.
 - c. At any time between 10 and 60 minutes, if the Criteria are met, the Dawes-Redman button will be **green**.
 - d. After 60 minutes, if the Criteria are not met, the Dawes-Redman button will be **light blue**.
 - e. Analysis stops at 60 minutes (regardless of whether all the criteria have been met or not) and after printing the table of results, monitoring of the fetus and the mother continues.
13. If Dawes Redman criteria are met at any time during the analysis a report can be printed by pressing the printer icon.
14. If after 60 mins the Dawes Redman criteria are NOT met inform the obstetric on call ST3 – ST7 or consultant for review.
15. Ensure the outcome of the cCTG including the STV has been documented within the appropriate CTG note in Badger.

The following is 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.	

Appendix 2: Flow chart for cCTG interpretation.



Appendix 3: Reasons for failure to meet Dawes Redman criteria.

1. Basal heart rate outside normal range
2. Large decelerations
3. No episodes of high variation
4. No movements and fewer than 3 accelerations
5. Baseline fitting is uncertain
6. Short-term variation is abnormal for the gestation
7. Possible error at the end of the record
8. Decelerations at the end of the record
9. High-frequency sinusoidal rhythm
10. Suspected sinusoidal rhythm
11. Long term variations in high episodes below acceptable levels
12. No accelerations

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