Aneurin Bevan University Health Board

Antenatal Fetal Surveillance Guideline

N.B. *Staff should be discouraged from printing this document. This is to avoid the risk of out-of-date printed versions of the document. The Intranet should be referred to for the current version of the document.*

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Contents

Background

Auscultation of the fetal heart forms part of fetal surveillance. Its aim is to detect those babies who may be compromised or potentially compromised by a shortage of oxygen (fetal hypoxia), or by non-hypoxic causes. If the shortage of oxygen is both prolonged or severe, babies are at risk of being born with a disability or of dying in utero either during labour or shortly after (ACOG, 2021).

As identified in The 4th Confidential Enquiry into Stillbirths and Deaths in Infancy Report (CESDI, 1997) almost three decades ago, the misinterpretation of cardiotocography, failure to integrate clinical picture, incoherent team functions and delay in action and appropriate action once a decision to deliver is made, were all identified as common themes in cases of poor fetal outcome and these themes continue to influence case outcomes (NHS Resolution, 2023).

For a woman who is healthy and has had an uncomplicated pregnancy, intelligent intermittent auscultation (IIA) should be offered and recommended in labour to monitor fetal wellbeing, regardless of birth setting (Wales Maternity and Neonatal Network, 2022).

However, cardiotocography - continuous electronic fetal monitoring (EFM) is recommended where there are risk factors identified during the initial assessment or arise during labour and for high-risk pregnancies. ST Analysis (STAN) can be used in labour as an aid/adjunct to interpretation of CTG and clinical management but does not replace the clinical judgement of an appropriately qualified professional. Both the Nursing and Midwifery Council (NMC) and the General Medical Council (GMC) codes of conduct, require that registrants take part in continued professional development to maintain their competence to ensure the safety of those receiving care.

Please see intrapartum fetal surveillance guideline for guidance on CTG and monitoring during labour.

This guideline applies to all people who are pregnant and may use the term woman but recognises that not all people having babies within Aneurin Bevan University Health Board, identify as women.

1. Abbreviations

ABUHB – Aneurin Bevan University Health Board
ANC – Antenatal Clinic
APH – Antepartum Haemorrhage
cCTG – Computerised Cardiotocography
CEFM – Computerised Electronic Fetal Monitoring
CS – Caesarean Section
DAU – Day Assessment Unit
DHR – Digital Health Record
ECTG – Electronic Cardiotocography
EDD – Estimated Due Date
EFM – Electronic Fetal Monitoring
FGR – Fetal Growth Restriction
FSE – Fetal Scalp Electrode
GMC – General Medical Council
IIA – Intelligent Intermittent Auscultation
IUGR – Intrauterine Growth Restriction
LMP – Last Mensural Period
MSAF – Meconium-Stained Amniotic Fluid
NMC – Nursing and Midwifery Council
OH – Online House
PET – Pre-eclampsia
PIH – Pregnancy Induced Hypertension
STAN – ST Analysis
STV – Short Term Variation
SOP – Standard Operating Procedure

2. Aims

- ABUHB demonstrates a standardised approach to the use and interpretation of intermittent auscultation of the fetal heart, computerised and electronic fetal monitoring.

- Demonstrates compliance with the All Wales Fetal Surveillance Standards through annual training and appraisals.

3. Antenatal Fetal Monitoring

- Intermittent auscultation of the fetal heart should not be undertaken at routine antenatal assessments unless requested by the woman or fetal concerns identified (NICE, 2021).

- Women must be included in the decisions around the method of fetal monitoring in labour. The principles of informed choice must be employed and the woman's decision respected. This discussion should take place during the antenatal period as part of the birthplace discussion at 36 weeks of pregnancy with the named Midwife or Obstetrician, and should include information on the use of fetal scalp electrodes (FSE), continuous fetal monitoring and hand held doppler.

- A Risk Assessment should be completed on Badgernet at the onset of labour for all woman, to determine the appropriate method of monitoring taking into consideration the woman's wishes. This will be in the form of the 'assessment unit' or 'smart home assessment' form. Please look to the AWCPNL for reference (All Wales Care Pathway for Normal Labour)

4. Computerised CTG/Dawes-Redman Analysis

4.1 Computerised CTG (cCTG)

The aim of antenatal fetal surveillance is to identify fetuses at risk of intrauterine hypoxia and acidaemia. Timely, appropriate intervention will avoid fetal neurological damage or death.

There is no clear evidence that antenatal CTG improves perinatal outcomes or caesarean section rates. However, a comparison of cCTG versus traditional CTG showed a significant reduction in perinatal mortality with cCTG (Heelan-Fancher, et al, 2019).

cCTG provides objective CTG interpretation. It allows communication of robust, numeric facts instead of opinion, however
CTG interpretation must still be used within the context of the clinical situation.

4.2 What is Dawes -Redman Analysis?

Dawes-Redman analysis is a software tool that provides a numeric analysis of the CTG trace and provides interpretation based on the Dawes-Redman Criteria. The analysis has a database of 100,000 traces; by using this vast numeric data and relating it to outcomes, it acts as an expert assistant for CTG interpretation and accurate interpretation criteria.

Dawes Redman analysis is a tool and does not replace clinical judgement of a trained professional.

4.3 Suitability of cCTG

cCTG using Dawes-Redman analysis is to be used for women 26+0 gestation onwards in any setting (DAU/maternity triage/antenatal ward) when fetal surveillance is required per clinical indications in the absence of uterine activity.

Less than 26/40 cCTG is not licenced. These women should be offered IIA with a handheld doppler.

Women who attend for IOL: Dawes-Redman analysis can only be used for the initial assessment before commencing an intervention **in the absence of uterine activity**.

Dawes-Redman analysis is **NOT** appropriate for intrapartum fetal monitoring and should be discontinued in the presence of uterine activity.

See appendix for SOP (Appendix 1)

4.4 Setting up cCTG monitor using Dawes-Redman Analysis

- Ensures cCTG monitor is clean, fully equipped and correct cCTG tracing paper is used. Paper speed should be 1cm/minute.

- cCTG monitor must be checked to ensure the date and time clocks are correctly set. Any inaccuracies must be rectified or the machine taken out of use.

- Abdominal palpation should be performed prior to any cCTG to determine fetal lie and any potential abnormalities i.e., liquor volume, fetal growth, abnormal presentation.

- Auscultate the fetal heart rate using a Pinard stethoscope or sonicaid doppler. The maternal pulse is palpated simultaneously with the fetal heart rate in order to differentiate between the two. Maternal pulse must be documented.

  • Ensure the mother's comfort, avoiding aorto-caval compression. Enquire as to latex allergy, it is preferable to use single use non latex straps. The toco transducer needs to sit on top of the fundus for optimal tracing. Straps should be correctly secured.

  • Turn on the machine by touching the on/off switch for 3 seconds (front, upper right of machine) Ensure toco pressure is correctly set to

10 to 15 (Some CTG monitors automatically reset this at 20). Position the toco and ultrasound transducers.

- Connect the fetal event marker and show the patient how to use it.

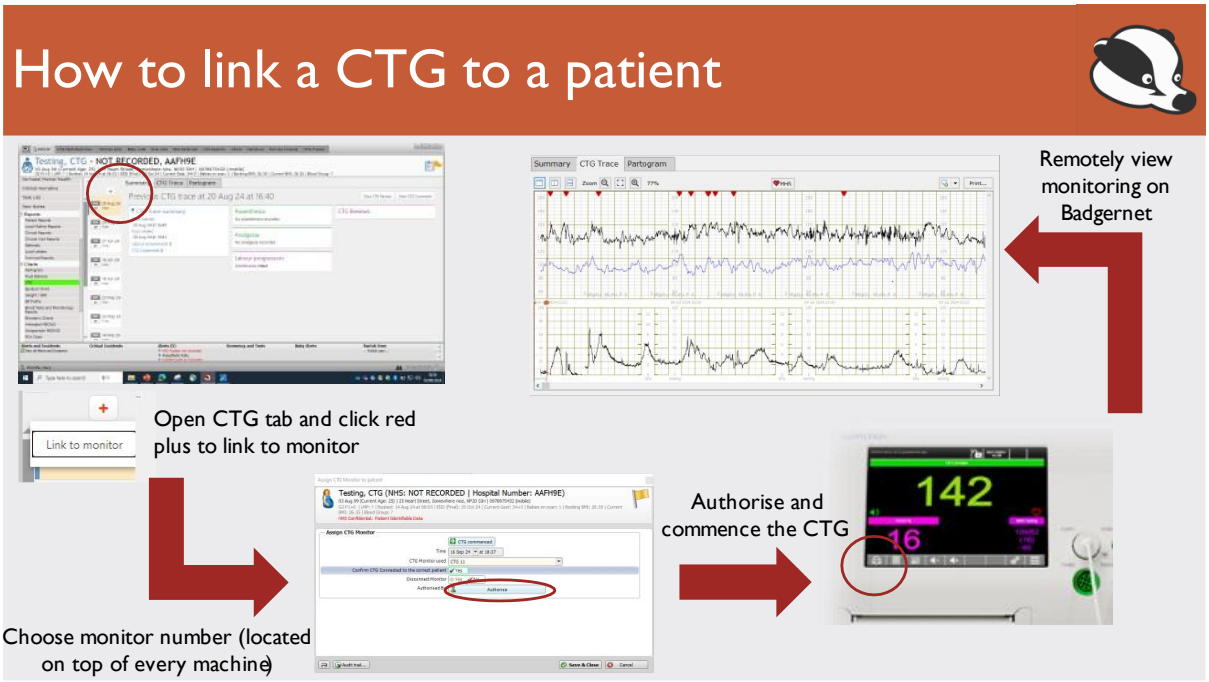
- Input patient name, hospital number and EDD (from scan), gestational age. DO NOT use LMP. The Dawes-Redman analysis will not start unless the gestation is entered.

Details below to be documented on printed CTG:

- Woman's name
- Case note number
- Date of trace
- Time commenced
- Maternal pulse
- Pinnard/sonicaid auscultation
- Indication for EFM
- Name of midwife
- Clear, legible signature of Midwife

- Ensure the CTG machine is operating correctly i.e., paper moving freely and sitting correctly on rollers, tracing clear and readable.

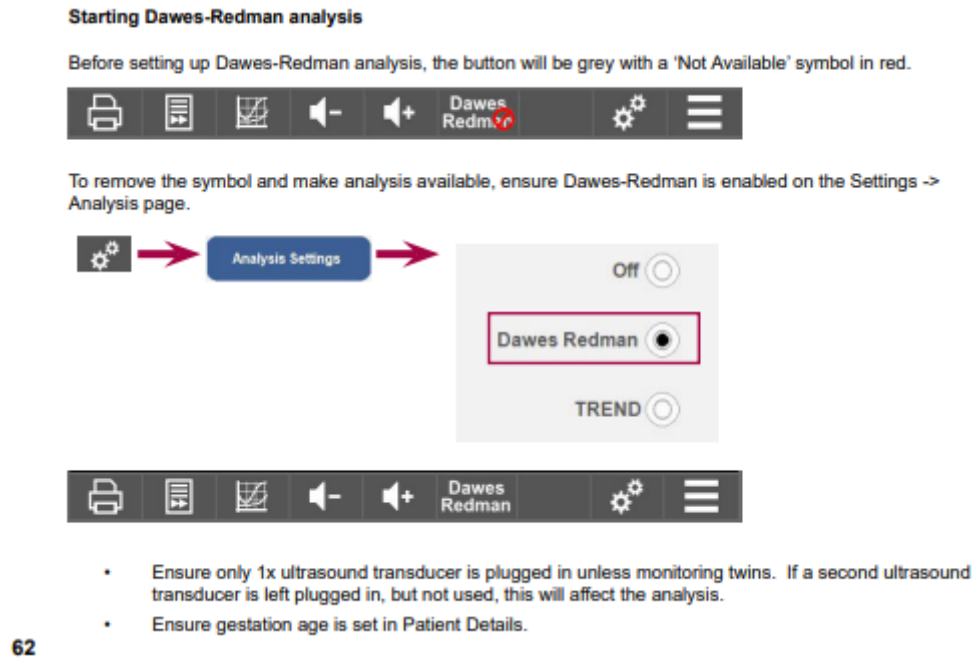
- In the instance of Computerised Electronic Fetal Monitoring (CEFM) and use of Badgernet, ensure the cCTG is linked to the appropriate Badgernet profile. (See below)



- All staff changeover of care should be noted on the trace with a clear legible signature or 'CTG Comment' on Badgernet.

- If not appropriate to use Dawes-Redman analysis (See Appendix 1 for reference), ensure the Dawes-Redman analysis setting is turned OFF via the settings page on the monitor as shown below. If Dawes-Redman analysis has been used but disregarded, ensure you comment on this during CTG review.

(For more information please see Instructions for Use - Team3 Fetal Monitor)



4.5 Duration of Monitoring

- The computer analyses the CTG data and compares it with the Dawes-Redman criteria at 10 minutes and every 2 minutes thereafter.

- The maximum record length for Dawes-Redman analysis is 60minutes and at this point criteria is either Met or Not Met.

- If the criteria are met the cCTG can be discontinued.

- If the criteria are NOT MET the trace must be reviewed by a senior obstetrician. If there are clear abnormalities with the cCTG it should be continued until review.

- If there are signs of abnormality prior to 60 minutes, **DO NOT** wait until 60 minutes to escalate to a senior obstetrician. Please escalate as soon as there are signs of an abnormal CTG monitoring or clinical concern and continue CTG until review by

a senior obstetrician. Dawes-Redman analysis is a tool and does not replace clinical judgement.

4.6 Documentation

Please document rationale for antenatal cCTG in maternal notes.

- Any event, review or action related to the CTG will be entered on Badgernet under the tab 'CTG comment' or 'CTG Review'.

- At the end of the CTG, the CTG classification should be documented on Badgernet under the tab 'CTG review'. The CTG must be labelled 'complete' at this time and an authorisation, at the bottom of the document, is required to link your e-signature to the document.

4.7 Storage

For women booked on paper

- Antenatal CTG paper print outs must be stored in a suitable sized envelope or polly pocket with the patient's other paper notes and uploaded in a timely manner.

- The envelope must be identified with the patient's name, and hospital number; include the date, location and reason for CTG.

For women booked on Badgernet

- Antenatal CTG paper print outs must be stored in a suitable sized envelope or polly pocket with the patient's other paper notes in a DHR file and uploaded in a timely manner.

- This DHR file should be tracked out and put in the collection box for OH to collect and upload to CWS.

The envelope must be identified with the patient's name, and hospital number; include the date, location and reason for CTG.

4.8 Results and Actions Criteria MET or NOT MET

Criteria met

• If Dawes-Redman criteria are met on the cCTG, this indicates normality at the time of monitoring. Unless there are other clinical concerns, the analysis can be stopped and a report of the analysis is printed. (Appendix 2)

• The criteria can be met as early as 10 minutes into monitoring. The CTG does not need to be continued if there are no clinical concerns and the practitioner is able to visually assess the monitoring to confirm normality. If you are unsure, leave the CTG in situ and escalate for a review.

Criteria NOT met

- The CTG must continue for the full 60 minutes for computer analysis and classification that criteria have not been met. If the CTG has been stopped before 60 minutes or criteria met Dawes-Redman analysis results are not valid.

• If it the criteria is not met at 60 minutes, the computer will end the analysis and a report of the analysis is printed on the trace but the trace will continue.

• If the criteria are NOT met at 60 minutes this indicates that normality has not been demonstrated, in this instance the cCTG should be reviewed by a senior Obstetrician for a full holistic assessment and plan.

• The reason or reasons that the criteria do not meet are highlighted as coded numbers. Continue the cCTG until the case

is reviewed by a senior obstetrician if there are additional concerns with the trace.

4.9 Reasons for NOT meeting 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 (STV) is less than 3ms
7	Possible error at the end of the recording
8	Deceleration at the end of the recording
9	High frequency sinusoidal rhythm
10	Suspected sinusoidal rhythm
11	Long-term variation (LTV) in high episodes below acceptable level
12	No accelerations

Please see appendix 3 for reasons and possible actions when Dawes-Redman Criteria not reached

The STV is a computerised measure of the micro fluctuations of the fetal heart. These are not visible to the human eye. Short term variation (STV) cannot be assessed visually and can only be analysed after 60 minutes of monitoring. If the analysis has been stopped before criteria are met or before 60 minutes it is not valid.

The STV should be taken into account but MUST NOT be used in isolation as an indicator of fetal condition.

If there are no clinical concerns and the CTG has met criteria the risk of hypoxia and still birth is very low if the STV is >8ms (Bhide et al, 2023).

A value of less than 3ms is strongly linked to the development of metabolic acidaemia and impending intrauterine death - Particularly with the absence of accelerations.

STV (ms)	<2.6	2.5-3.0	>3.0
Metabolic Acidaemia	10.3%	4%	2.7%
IUD	24.1%	4.3%	0.0%

STV of less than 3ms is significant and should be discussed and reviewed by a senior Obstetrician. Urgent review is required if the CTG visual assessment is also abnormal.

5. Audit

- Audit of study day attendance, compliance with IIA online package and case reviews/ discussions on an annual basis by Fetal Surveillance Lead Midwife.

References

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Cochrane review, (2015) *Antenatal cardiotocography for fetal assessment*. Wiley Online.

Heelan-Fancher, et al. (2019) *Impact of continuous electronic fetal monitoring on birth outcomes in low-risk pregnancies. Birth*.; 46: 311–317. https://doi.org/10.1111/birt.12422

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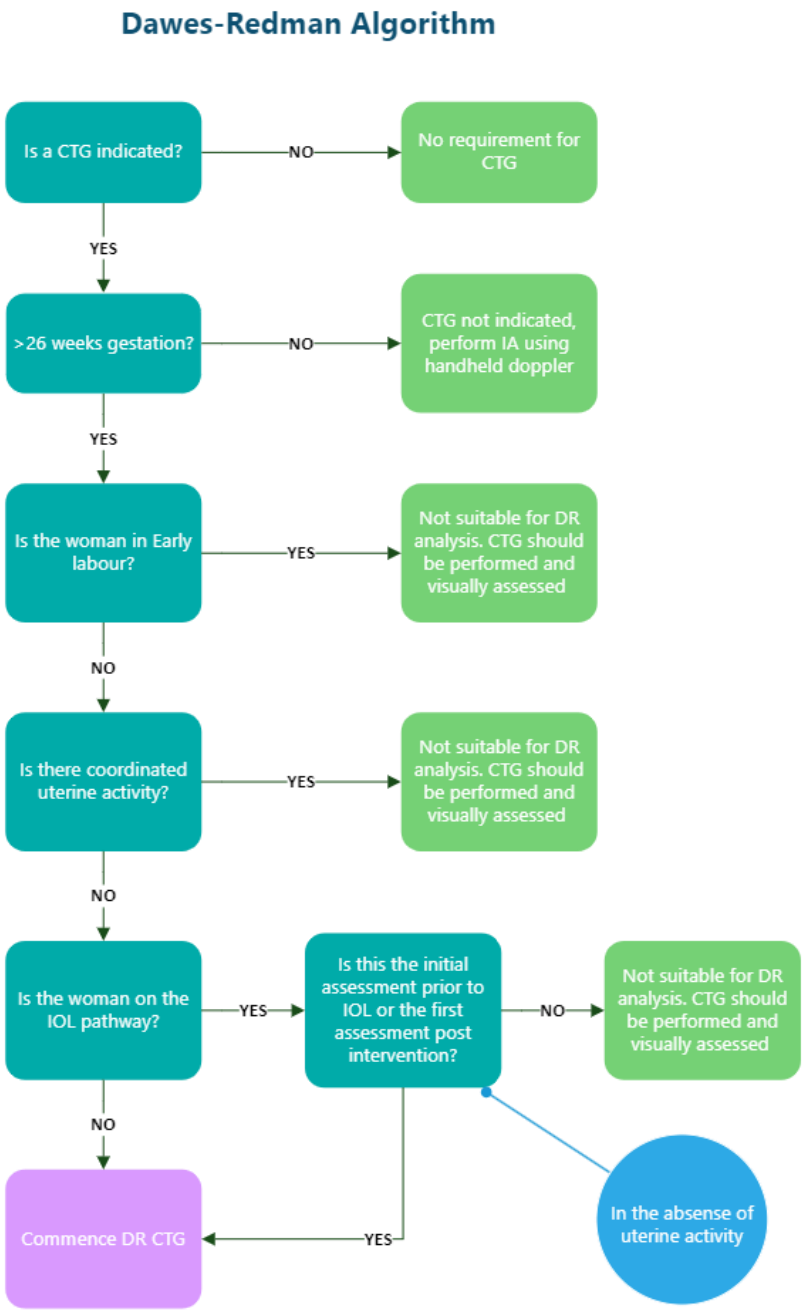
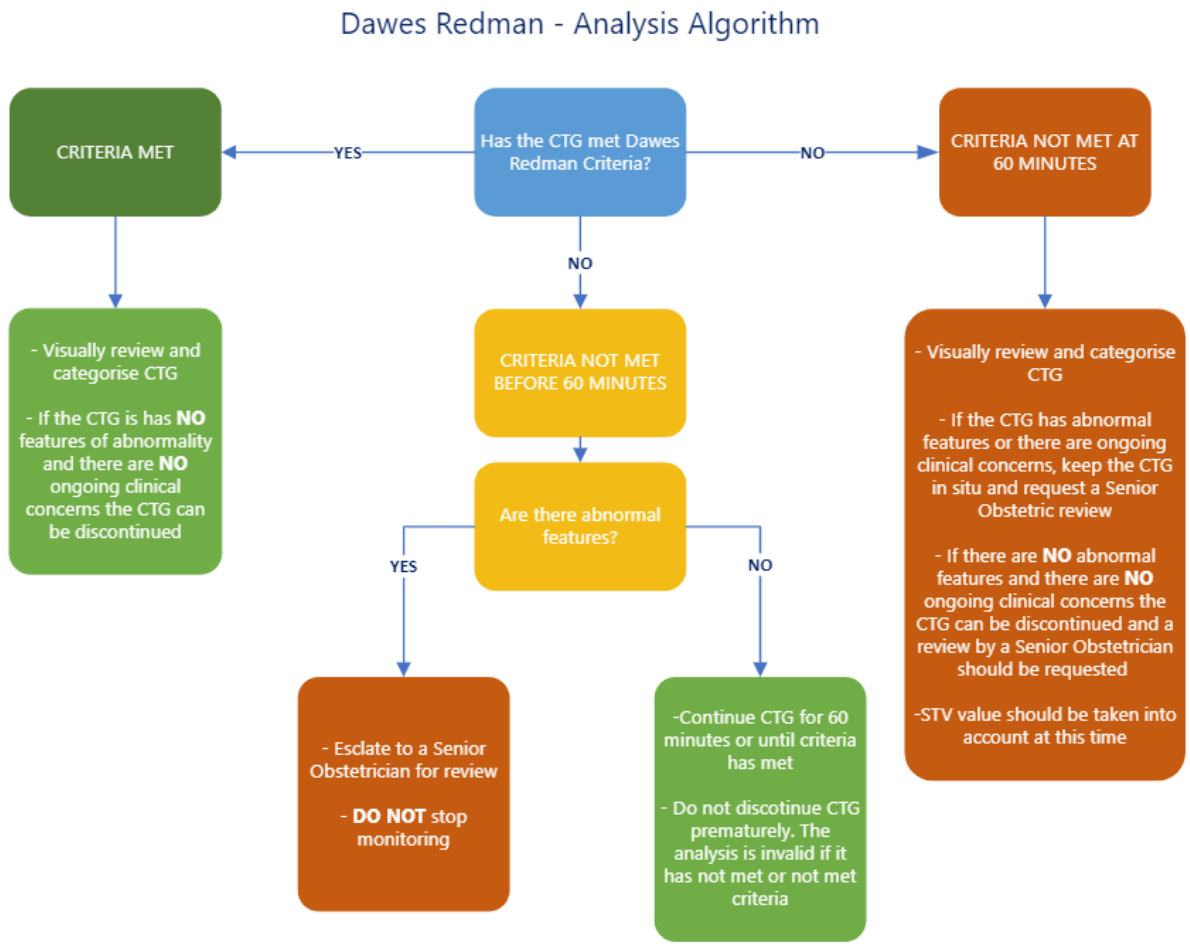
Wales Maternity and Neonatal Network (2018) *All Wales Intrapartum Fetal Surveillance Standards*. wisdom.nhs.wales/all-wales-guidelines/all-wales-guidelines/all-wales-intrapartum-fetal-surveillance-standards-v2-july-2023-pdf/

Wales Maternity and Neonatal Network (2022) *All Wales Midwifery-Led Care Guideline 6th Edition.* wisdom.nhs.wales/all-wales-guidelines/all-wales-guidelines/all-wales-midwifery-led-care-guideline-2022/

Appendix 1


Dawes-Redman Algorithm
Is a CTG indicated?
NO
No requirement for CTG
YES
>26 weeks gestation?
NO
CTG not indicated, perform IA using handheld doppler
YES
Is the woman in Early labour?
YES
Not suitable for DR analysis. CTG should be performed and visually assessed
NO
Is there coordinated uterine activity?
YES
Not suitable for DR analysis. CTG should be performed and visually assessed
NO
Is the woman on the IOL pathway?
YES
Is this the initial assessment prior to IOL or the first assessment post intervention?
NO
Not suitable for DR analysis. CTG should be performed and visually assessed
NO
In the absense of uterine activity
Commence DR CTG
YES

Appendix 2


Dawes Redman - Analysis Algorithm
Has the CTG met Dawes Redman Criteria?
YES
NO
CRITERIA MET
CRITERIA NOT MET AT 60 MINUTES
NO
- Visually review and categorise CTG
- If the CTG is has NO features of abnormality and there are NO ongoing clinical concerns the CTG can be discontinued
CRITERIA NOT MET BEFORE 60 MINUTES
- Visually review and categorise CTG
- If the CTG has abnormal features or there are ongoing clinical concerns, keep the CTG in situ and request a Senior Obstetric review
- If there are NO abnormal features and there are NO ongoing clinical concerns the CTG can be discontinued and a review by a Senior Obstetrician should be requested
-STV value should be taken into account at this time
Are there abnormal features?
YES
NO
- Esclate to a Senior Obstetrician for review
- DO NOT stop monitoring
-Continue CTG for 60 minutes or until criteria has met
- Do not discotinue CTG prematurely. The analysis is invalid if it has not met or not met criteria

Appendix 3

Reasons for not meeting Dawes-Redman criteria and actions

Reason	Action
1. Basal Heart Rate outside normal range	Baseline FH Rates must be assessed in consideration of expected baseline for a fetus of the gestation being monitored. Also consider the baseline in relation to the baseline on any previous CTG. 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 slightly from a visual assessment of baseline rate.
2. Large decelerations	These will be unprovoked decelerations. Review by Band 7 or senior registrar and above. Immediate intervention if the trace is otherwise abnormal, or significant clinical concerns. If the trace is otherwise normal and there are no clinical concerns, the CTG should be should be repeated later, as per Band 7 or ST6 and above management plan.
3. No episodes of high variation	Long Term Variation (LTV) is essentially equivalent to traditional baseline variability. Measured over a 1-minute sample, 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.
4. No movements and fewer than 3 accelerations	This is significant and requires review by the Band 7 or senior registrar and above.
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	**DO NOT rely on STV values if cCTG has been on for less than 1 hour.** 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 Band 7 or senior registrar and above. Urgent review is required if the CTG visual assessment is also abnormal. **Please see table above on figures of STV**
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. Review by Band 7 or senior registrar and above.
8. Deceleration at the end of the record	In this event the trace should be continued and action taken as appropriate. Review by Band 7 or senior registrar and above.
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 Band 7 or senior registrar and above.
10. Suspected sinusoidal rhythm	Sinusoidal FHR needs to be distinguished from a pseudo sinusoidal 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 Keilhauer test to assess the degree of any fetomaternal haemorrhage.

	The Band 7, Obstetric Registrar, Obstetric Consultant, Neonatologist 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 Band 7 or senior registrar and above. (Dawes-Redman analyses acceleration using a slightly lower threshold (>10bpm) than FIGO and NICE definitions).

DO NOT RELY ON THE ANALYSIS IN ISOLATION

It may not always identify abnormal patterns that may be more obvious from visual interpretation with a holistic expert assessment of the whole clinical scenario.