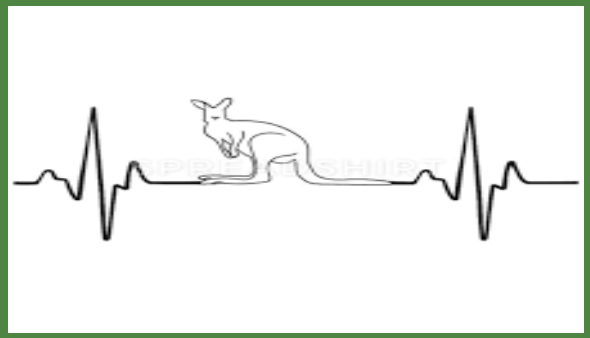

Fetal Heart Rate Monitoring NSW

2020

Nicole Hainsworth

Eileen Dowse

NSW GOVERNMENT | Health

Newcastle.

Thinking about Fetal heart rate monitoring?

- What is the aim of fetal monitoring?
- In your practice, what determines when a CTG is used?
- What do you say to women when ‘putting’ on CTG?

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Aim of this presentation

- Provide overview of NSW Fetal Heart Rate Monitoring guideline
- Background on electronic fetal heart rate monitoring (EFM)
- Criteria for Intermittent Auscultation (IA) and continuous electronic fetal monitoring.
- Algorithms for interpretation of antenatal and intrapartum FHR patterns
- Guide for clinical management including consultation and escalation.
- Discussion around similarities and differences within global context.

Terminology

Cardiotocograph (CTG)	Recording of (-graph) the fetal heart beat (cardio-) and uterine activity (-toco-)
Cardiotogography	Technical means of recording (-graphy) the fetal heart beat (cardio-) + uterine activity (–toco-)
CTG machine	The machine which is used to perform the monitoring.
Electronic Fetal monitor (EFM)	The machine used to perform a CTG may also be known as an electronic fetal monitor
Electronic Fetal monitoring (EFM)	The process of using an electronic fetal monitor, otherwise known as a CTG

Holistic approach

- Need to take into account the ‘whole’ clinical picture
- Recognise that every woman and her fetus/s are individual
- Recognise and acknowledge both fetal and maternal risk factors
- Move from pattern recognition alone- understanding fetal physiology- behavioural states.
- Recognise and understand the physiology behind the EFM patterns

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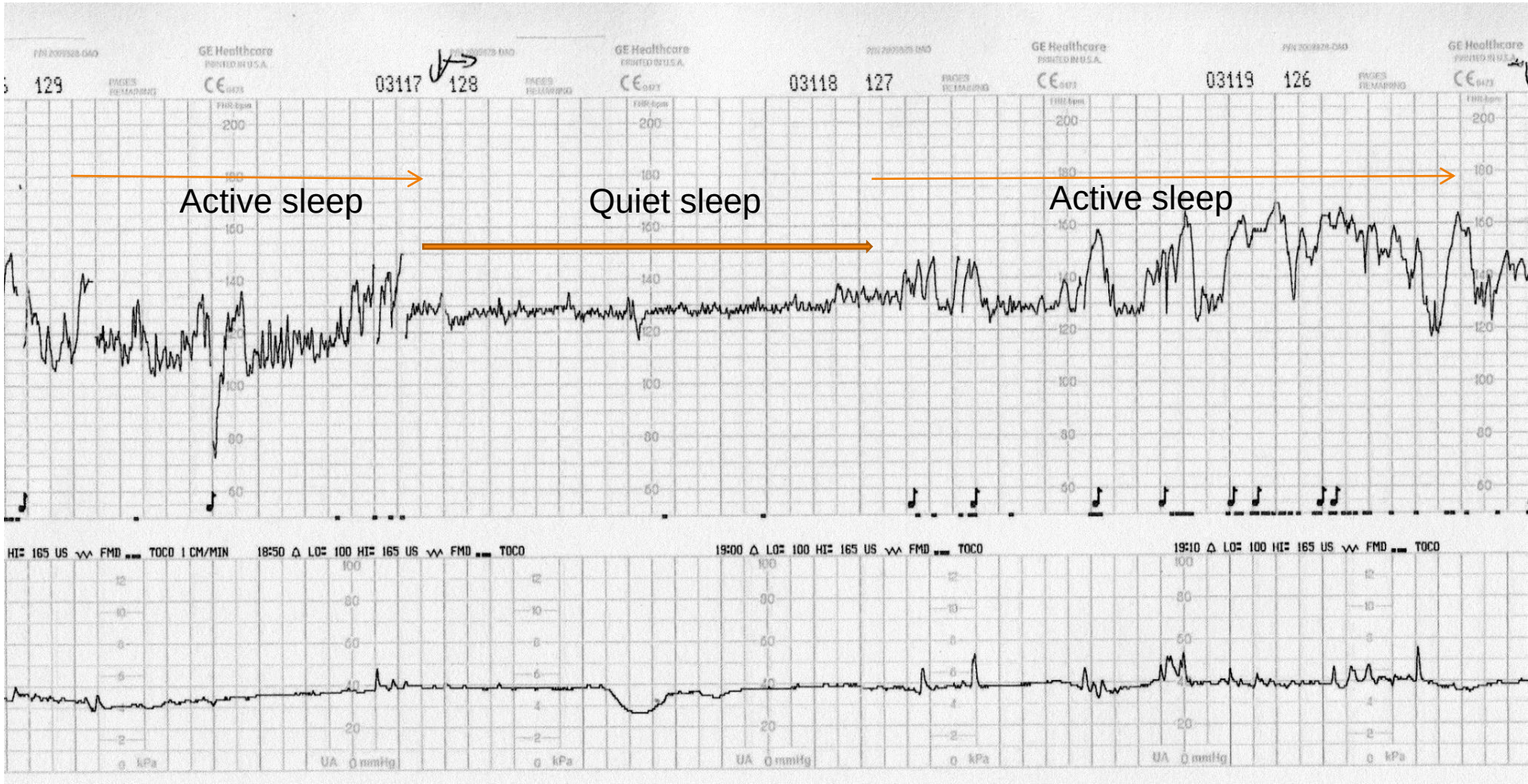
Key characteristics 2019:

- Antenatal algorithm - both <32 and > 32weeks gestation
- Cycling, variability >6.
- Intrapartum algorithm - risk banners- trigger questions identifying risk
- White, Blue, Yellow and Red Zone
- Categorised – NORMAL, ABNORMAL
- Decelerations – Early, Variable, Repetitive variable, repetitive complicated variables, repetitive late.

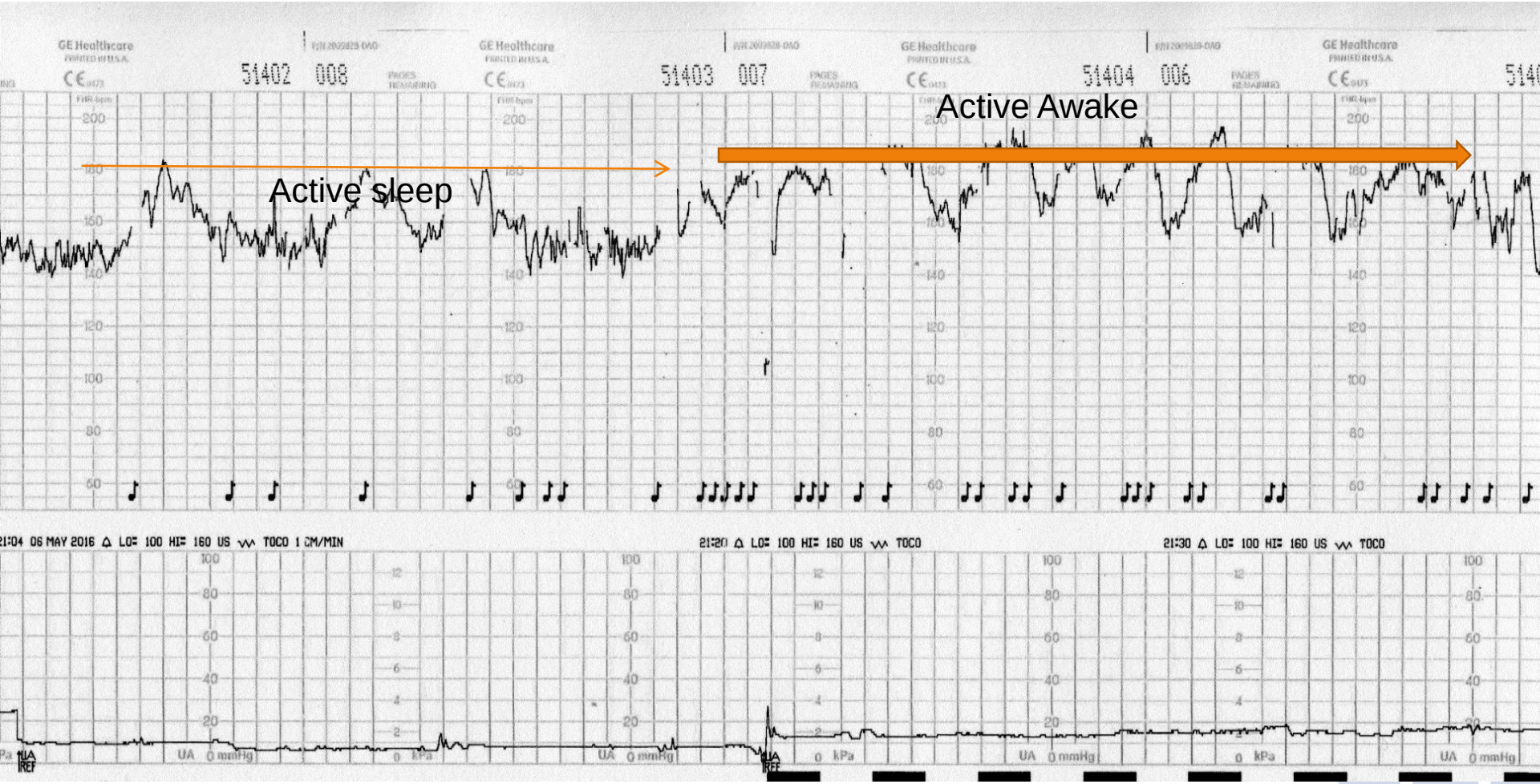
Cycling

- Fetal behavioural states change between quiet sleep, active sleep and active awake
- The alternation between different behavioural states in a fetus is termed **‘cycling’**
- Although the absence of accelerations is of uncertain significance during labour, the evidence of cycling should always be sought while interpreting CTG traces
- The absence of cycling may occur in hypoxia and fetal infections including encephalitis and intrauterine fetal stroke
- Evidence of ‘cycling’ between states provides 100% assurance of neurological integrity and the absence of significant acidaemia or acidosis

Cycling example



Cycling example



So how do we identify what level of fetal surveillance we require, what tool do we use???

Appendix 2. Risk factors for electronic FHR monitoring

Antenatal and intrapartum risk factors that increase fetal compromise in labour. Cardiotocography is recommended [2].

Antenatal risk factors	Intrapartum risk factors
• abnormal antenatal CTG • abnormal Doppler umbilical artery velocimetry • suspected or confirmed intrauterine growth restriction • oligohydramnios or polyhydramnios • prolonged pregnancy ≥42 weeks • multiple pregnancy • breech presentation • antepartum haemorrhage • prolonged rupture of membranes (≥24 hours) • known fetal abnormality which requires monitoring • uterine scar (e.g. previous caesarean section) • essential hypertension or pre-eclampsia • diabetes where medication is indicated or poorly controlled, or with fetal macrosomia • other current or previous obstetric or medical conditions which constitute a significant risk of fetal compromise (e.g. cholestasis, isoimmunisation, substance abuse) • fetal movements reduced (within the week preceding labour) • morbid obesity (BMI ≥40) • maternal age ≥42 • abnormalities of maternal serum screening associated with an increased risk of poor perinatal outcomes (e.g. low PAPP-A <0.4MoM) Additional indicators for antenatal EFM (Section 3.2)	• induction of labour with prostaglandin or oxytocin • oxytocin augmentation • regional anaesthesia* (e.g. epidural, or spinal) and paracervical block • abnormal vaginal bleeding in labour • maternal pyrexia ≥38°C • meconium or blood stained liquor • absent liquor following amniotomy • prolonged first stage as defined by referral guidelines+ • prolonged second stage as defined by referral guidelines+ • pre-term labour less than 37 completed weeks • tachysystole (more than five active labour contractions in ten minutes without fetal heart rate abnormalities) • uterine hypertonus (contractions lasting more than two minutes in duration or contractions occurring within 60 seconds of each other, without fetal heart rate abnormalities) • uterine hyperstimulation (either tachysystole or uterine hypertonus with fetal heart rate abnormalities)

*Following a decision to insert an epidural block, a CTG should be commenced to establish baseline features prior to the block's insertion.

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Conditions where an intrapartum CTG is not indicated when the condition occurs in isolation, but if multiple conditions are present, intrapartum cardiotocography should be considered	
Antenatal risk factors • pregnancy gestation 41.0 – 41.6 weeks' gestation • gestational hypertension • gestational diabetes mellitus without complicating factors • obesity (BMI: 30-40) • maternal age: ≥40 and <42 years	**Intrapartum risk factors** • maternal pyrexia ≥37.8 and <38 degrees

Table adapted from The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) Intrapartum Fetal Surveillance Clinical Guidelines, 2014.

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Antenatal

<32 weeks

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Antenatal Algorithm < 32 weeks gestation

Determine Risk/s and Indication/s for EFM Refer to Maternity Fetal Heart Rate Monitoring Guideline	Maternal	Any obstetric risk factors or change/s in maternal condition which may compromise fetal welfare. E.g. Pre-eclampsia or preterm uterine activity
	Fetal	Any condition/s that suggest or increase the risk of fetal compromise E.g. IUGR, absent or decreased fetal movements
	Are there fetal conditions that require altered calling criteria? If identified, a collaborative care plan should be documented. E.g. maternal magnesium infusion affecting fetal baseline variability	

Uterine Activity	**Baseline Rate (bpm)**	**Variability (bpm)**	**Reactivity / Cycling** Accelerations >15bpm for >15secs (2:20mins)	**Decelerations** >15bpm fall for >15secs Recurrent (more than one per hour)
Nil	≥125-160	6-25	Presence of accelerations Or Rise in baseline of >10 bpm associated with multiple fetal movements	Nil Decelerations with amplitude <40 bpm for <30 seconds with reactivity
Present <3:10 mild	115-124 >160-180	Reduced ≤5 or absent for more than 45 mins	Absent >45 mins	Single isolated <3 mins
Present ≥3:10 or regular strong contractions	<115 >180	Reduced ≤5 or absent for >90 mins Sinusoidal / sawtooth >15 mins	Absent >75 mins	Recurrent >30 secs or Prolonged >3 mins

Escalation and Management Plan – Clinical Response

NORMAL	Providing there is no continued risk to the mother and/or fetus requiring ongoing monitoring, then the CTG can be ceased when it meets all the normal criteria (White Zones) after consultation with a 2nd clinician. An appropriate ongoing care and assessment plan must be formulated
ABNORMAL	Inform midwife in charge and determine need for **Clinical Review.** Continue to monitor with ongoing assessment. Clinical Review by a medical officer **within 30 mins,** as per local CERS. An appropriate ongoing care and assessment plan must be formulated **If there are two or more Yellow Zone features, escalate as a Rapid Response**
ABNORMAL	Escalate to a **Rapid Response** as per local CERS; this should involve notifying a medical officer for urgent review. Consider further fetal welfare assessment and/or expediting birth. NOTE: *Do not give food or oral fluids*

Note: A clinician, woman, her partner or family member may call for a clinical review at any time if they are concerned or unsure. **Version 1 2018**

Antenatal label < 32 weeks gestation

ANTENATAL < 32 WEEKS	Name		MRN		Date	Time	Gest Age
Determine Risk / Indication for CTG				Fetal movements		Maternal Pulse	
Altered Calling Criteria	☐ NO	☐ YES	Collaborative care plan in place	☐ YES	☐ NO		
Uterine Activity	**Baseline**	**Rate**	**Variability**	**bpm**	**Reactivity**	**Decelerations**	
Nil	≥125-160		6-25		Present	Nil Decelerations with amplitude <40bpm for <30 seconds with reactivity	
Present < 3:10 mild	115-124 >160-180		Reduced ≤5 or absent for more than 45 minutes		Absent >45 mins	Single isolated <3 mins	
Present ≥ 3:10, or regular strong contractions	<115 >180		Reduced ≤5 or absent for >90mins Sinusoidal / sawtooth >15 mins		Absent >75 mins	Recurrent >30 secs or Prolonged >3 mins	
Clinical Escalation Response							
Normal	Abnormal Yellow feature-Clinical Review within 30 mins 2 or more Yellow Zone features - Call a Rapid Response Time of call			Abnormal Red Zone feature/s - Call a Rapid Response Time of call			
Name (s) Signature(s)		Date		Time			
Name (s) Signature(s)		Date		Time		Agree with Clinical Response ☐ Yes ☐ No	

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Antenatal

≥32 weeks

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Indications for Antenatal EFM????

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Antenatal algorithm ≥ 32 weeks

Determine Risk/s and Indication/s for EFM **Refer to Maternity Fetal Heart Rate Monitoring Guideline**	**Maternal**	Any obstetric risk factor/s or change in maternal condition which may compromise fetal welfare. For example, **administration of mechanical or chemical cervical ripening agents**
	Fetal	Any condition/s that suggest or increase the risk of fetal compromise. E.g. IUGR, absent or decreased fetal movements
	Are there fetal conditions that require altered calling criteria? If identified, a collaborative care plan should be documented. E.g. Maternal magnesium infusion affecting fetal baseline variability.	

Uterine Activity	**Baseline Rate** (bpm)	**Variability** (bpm)	**Reactivity / Cycling** Accelerations >15 bpm rise for >15 secs (2:20 mins)	**Decelerations** >15 bpm fall for > 15 secs Recurrent (more than one per hour)
Nil or gestation ≥37/40	≥110-160	6-25	Present	Nil Single <90 secs on a trace with reactivity
Present <37/40	100-109 >160-180	Reduced ≤5 or absent for >45 mins; or >25 for >15 mins	Absent >45 mins	Single prolonged >90 sec and <3 min Recurrent on a trace with reactivity
Present and occurring >5:10 Lasting ≥2 mins and/ or <60 secs between contractions	<100 >180	≤5 for >90 mins Sinusoidal/ sawtooth >15 mins	Absent >90 mins	Prolonged >3 mins Recurrent on a trace without reactivity

Escalation and Management Plan – Clinical Response

NORMAL	Providing there is no continued risk to the mother and/ or fetus requiring ongoing monitoring, then the CTG can be ceased when it meets all the normal criteria (White Zones) after consultation with a 2nd clinician. An appropriate ongoing care and assessment plan must be formulated.
ABNORMAL	Inform midwife in charge and determine need for **Clinical Review.** Continue to monitor with ongoing assessment. Clinical Review by a medical officer **within 30 mins,** as per local CERS. An appropriate ongoing collaborative care and assessment plan must be formulated. **If there are two or more Yellow Zone features, escalate as a Rapid Response.**
ABNORMAL	Escalate to a **Rapid Response** as per local CERS; this should involve notifying a medical officer for immediate review. Consider further fetal welfare assessment and / or expediting birth NOTE: *Do not give food or oral fluids.*

Note: A clinician, woman, her partner or family member may call for a clinical review at any time if they are concerned or unsure. **Version 1 2018**

Antenatal label ≥ 32 weeks

ANTENATAL ≥ 32 WEEKS	Name		MRN		Date	Time	Gest Age
Determine Risk / Indication for CTG				Fetal movements		Maternal Pulse	
Altered Calling Criteria	☐ NO	☐ YES	Collaborative care plan in place	☐ YES	☐ NO		
Uterine Activity	**Baseline**	**Rate**	**Variability**	**bpm**	**Reactivity**	**Decelerations**	
Nil or gestation ≥37 weeks gestation	≥110-160		6-25		Present	Nil Single <90 secs on a trace with reactivity	
Present < 37 /40	100-109 >160-180		Reduced ≤5 or absent for >45 mins; or >25 for >15 mins		Absent >45 mins	Prolonged >90 sec and <3 min Recurrent on a trace with reactivity	
Present and occurring > 5:10, Lasting ≥ 2 mins and/or <60 secs between contractions	<100 >180		Reduced <5 or absent >90 mins Sinusoidal /sawtooth >15 mins		Absent >90 mins	Prolonged >3 mins Recurrent on a trace without reactivity	
Clinical Escalation Response							
Normal	**Abnormal Yellow feature - Clinical Review within 30 mins** **2 or more Yellow features=Red Zone=Call a Rapid Response** **Time of call**				**Abnormal Red Zone feature/s - Call a Rapid Response** **Time of call**		
Name (s) Signature(s)			Date		Time		
Name (s) Signature(s)			Date		Time	**Agree with Clinical Response** ☐ Yes ☐ No	

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Intrapartum

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New Birthing Unit design.

Intermittent Auscultation

IA of the FHR is the preferred fetal welfare assessment during labour and should be routinely offered to all women in established labour who do not have risk factors.

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Scoping Review

- RESEARCH ARTICLE **Intermittent auscultation fetal monitoring during labour: A systematic scoping review to identify methods, effects, and accuracy**
- Ellen BlixID1*, Robyn MaudeID2, Elisabeth Hals3, Sezer Kisa1, Elisabeth Karlsen4, Ellen Aagaard Nohr5, Ank de Jonge6, Helena Lindgren7, Soo Downe8, Liv Merete Reinar9, Maralyn Foureur10, Aase Serine Devold Pay11, Anne Kaasen1
- **Aim:**
- Specific aims were to 1) systematically map the techniques and protocols for performing IA; 2) map any effect or evidence of the accuracy of IA; and 3) map the findings to support recommendations given in international and national guidelines.
- Conclusion
- Although IA is the recommended method, no trials have been published that evaluate protocols on how to perform it.
- Few have assessed to what degree clinicians can describe FHR patterns detected by IA. We found no evidence to recommend Doppler device instead of the Pinard for IA, or vice versa.

Indications for Intrapartum EFM

There is no evidence to support EFM on admission or during established labour in woman who do not have any risk factors.

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Intrapartum Algorithm

DR: Determine Risk. Is continuous electronic fetal monitoring required?								
Antenatal risk factors	**Refer to antenatal records/management plans and review risk factors**							
Intrapartum risk factors	Oxytocin	Uterine scar	Second stage	Epidural	Abnormal labour progress	Persistent pain	Vaginal bleeding	Other
Fetal reserve risk factors	IUGR	Hypertension/ Pre-eclampsia	Temperature/Infection	Meconium	Prematurity	Diabetes		

	Contractions	**Baseline Rate (bpm)**	**Baseline Variability (bpm)**	**Accelerations**	**Decelerations** *Decelerations are repetitive when associated with >50% contractions
EFM Features	Normal uterine activity ≤5 in 10 mins	110-160	6-25 Presence of cycling	Present	Nil
	Abnormal uterine activity ≥6 in 10 minutes Lasting ≥2 minutes <60 seconds between contractions	100-109 >160 Rising baseline rate >10%	Absence of cycling in last 60 minutes	Absent **The absence of accelerations is unlikely to be associated with fetal compromise**	Early or occasional variable Repetitive variable Single prolonged >90 seconds and <3 minutes
		<100 for >10 mins	Reduced ≤5 or absent for >50 minutes Increased >25 for >30 mins Sinusoidal pattern >30 mins		Repetitive complicated variable Repetitive late Prolonged >3 mins and no sign of recovery

Variable decelerations should be classified as <u>complicated</u> if they occur with one or more of the following

- Rising baseline rate
- Large amplitude (falls by 60bpm or to 60bpm) and/or long duration (>60 secs)
- Reducing baseline variability
- Presence of smooth post-deceleration overshoots (temporary smooth increase in FHR above baseline)
- Fetal tachycardia
- Slow return to baseline FHR after the end of the contraction

Clinical Response For all identified risk factors-ensure a collaborative plan is documented and in place.		**Risk of Hypoxia**	**Fetal Blood Sampling**	
			pH	**Lactate**
Normal	• Continue monitoring as required	Low risk	≥7.25	<4.2
Blue Zone Alert	• Escalate to midwife in charge – initiate appropriate clinical action and document e.g. change maternal position		7.21-7.24	4.2-4.8
Yellow Zone Abnormal	• Escalate to midwife in charge and determine need for **Clinical Review.** Continue to monitor with ongoing assessment. Clinical Review by a medical officer **within 30 mins,** as per local CERS. • Identify any reversible causes – change maternal position, give IV fluids if appropriate • Abnormal uterine activity – cease or reduce Syntocinon, consider use of terbutaline • **2 or more Yellow Zone features = Red Zone. Call a Rapid Response** (as per local CERS)			
Red Zone Abnormal	• **Rapid Response** is required (as per local CERS). Notify midwife in charge and a medical officer • Identify any reversible causes – cease Syntocinon, change maternal position • Consider further assessment of fetal wellbeing including FBS, or expediting birth by most appropriate means if a significant abnormality persists	High risk	≤7.20	≥4.9

Note: A clinician, woman, her partner or family member may call for a Clinical Review or Rapid Response at any time if they are concerned or unsure.

Version 1 2018

Intrapartum label

INTRAPARTUM	Name				MRN	Date	Time	Gest Age	Mat Pulse
Antenatal risk factors									
Intrapartum Risk Factors	Uterine scar	Second stage	Epidural	Oxytocin	Abnormal labour progress	Persistent pain		Vaginal bleeding	Other
Risk Factors Affecting Fetal Reserve	IUGR	Hypertension / Pre-eclampsia	Temperature / Infection		Meconium	Prematurity		Diabetes	
Altered calling criteria	☐ No	☐ Yes	Collaborative care plan in place		☐ Yes	☐ No			

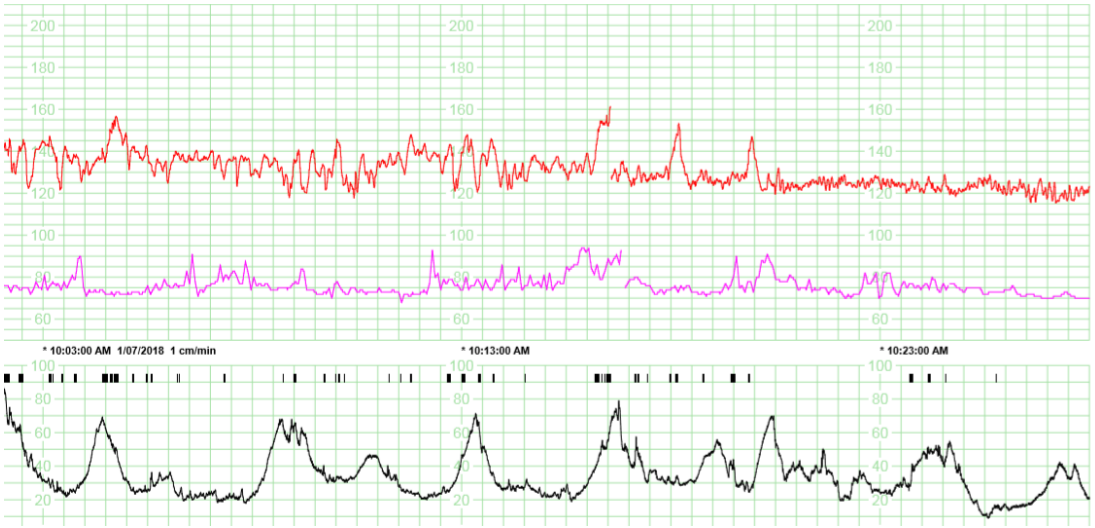
Contractions	Baseline	Rate	Variability	bpm	Accelerations	Decelerations
Normal uterine activity ≤5 in 10 minutes	110-160		Normal 6-25 Cycling present		Present	Nil
Abnormal uterine activity ≥6 in 10 minutes or lasting ≥2 minutes <60 seconds between contractions	100 to 109 >160 Rising baseline >10%		Absence of cycling in last 60 minutes		Absent *The absence of accelerations are unlikely to be associated with fetal compromise*	Early Occasional variable
						Repetitive variable Single prolonged >90 seconds and <3 minutes
	<100 for >10 minutes		Reduced ≤5 or absent for >50 minutes Increased >25 for >30 minutes Sinusoidal pattern >30minutes			Repetitive complicated variables Repetitive late Single prolonged (>3 minutes and no signs recovery)

Clinical Escalation Response			
Normal	Blue Zone Alert	Abnormal Yellow feature - Clinical Review within 30 mins 2 or more Yellow features=Red Zone=Call a Rapid Response Time of call	Abnormal Red Zone feature/s - Call a Rapid Response Time of call

Name Signature	Date Time	Name Signature	Date Time Agree with Clinical Response ☐ Yes ☐ No

Training Only

Example of a label



INTRAPARTUM	Name Paula Cook			MRN 123456	Date 1/7/18	Time 1030	Gest Age 38+3	Mat Pulse 88
Antenatal risk factors	Nil							
Intrapartum Risk Factors	Uterine scar	Second stage	Epidural / Oxytocin	Abnormal labour progress	Persistent pain	Vaginal bleeding	Other	
Risk Factors Affecting Fetal Reserve	IUGR	Hypertension / Pre-eclampsia	Temperature / Infection	Meconium	Prematurity	Diabetes		
Altered calling criteria	☑ No	☐ Yes	Collaborative care plan in place	☐ Yes	☑ No			

Contractions	Baseline	Rate	Variables	bpm	Accelerations	Decelerations
Normal uterine activity <5 in 10 minutes	110–160	130	Normal 6–25 Cycling present	6-25	Present	Nil
Abnormal Uterine activity ≥6 in 10 minutes or lasting >2 minutes <60 seconds between contractions	100 to 109 >160 Rising baseline >10%		Absence of cycling in last 60 minutes		Absent The absence of accelerations are unlikely to be associated with fetal compromise	Early Occasional variable
	<100 for >10 minutes		Reduced ≥5 or absent for >30 minutes Increased >25 for >30 minutes Sinusoidal pattern >30 minutes			Repetitive variable Single prolonged >90 seconds and <3 minutes Repetitive complicated variable Repetitive late Single prolonged (>3 minutes and no signs recovery)

Clinical Escalation Response

Normal	Blue Zone Alert	Abnormal Yellow feature - Clinical Review within 30 mins 2 or more Yellow features=Red Zone=Call a Rapid Response Time of call	Abnormal Red Zone features - Call a Rapid Response Time of call
Name Sally Ward Signature SWard	Date 1/7/18 Time 1035	Name Paul Richards Signature PRichard	Date 1/7/18 Time 1035 Agree with Clinical Response ☑ Yes ☐ No

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Paula is a 24 year old, G1 PO who is 38 weeks and 3 days pregnant. She has arrived at the level 4 Birth Suite contracting for the past 4 hours.

Paula has gestational diabetes and is on medication with well controlled blood sugars.

Midwife Sally undertakes a full assessment and commences a CTG recording.

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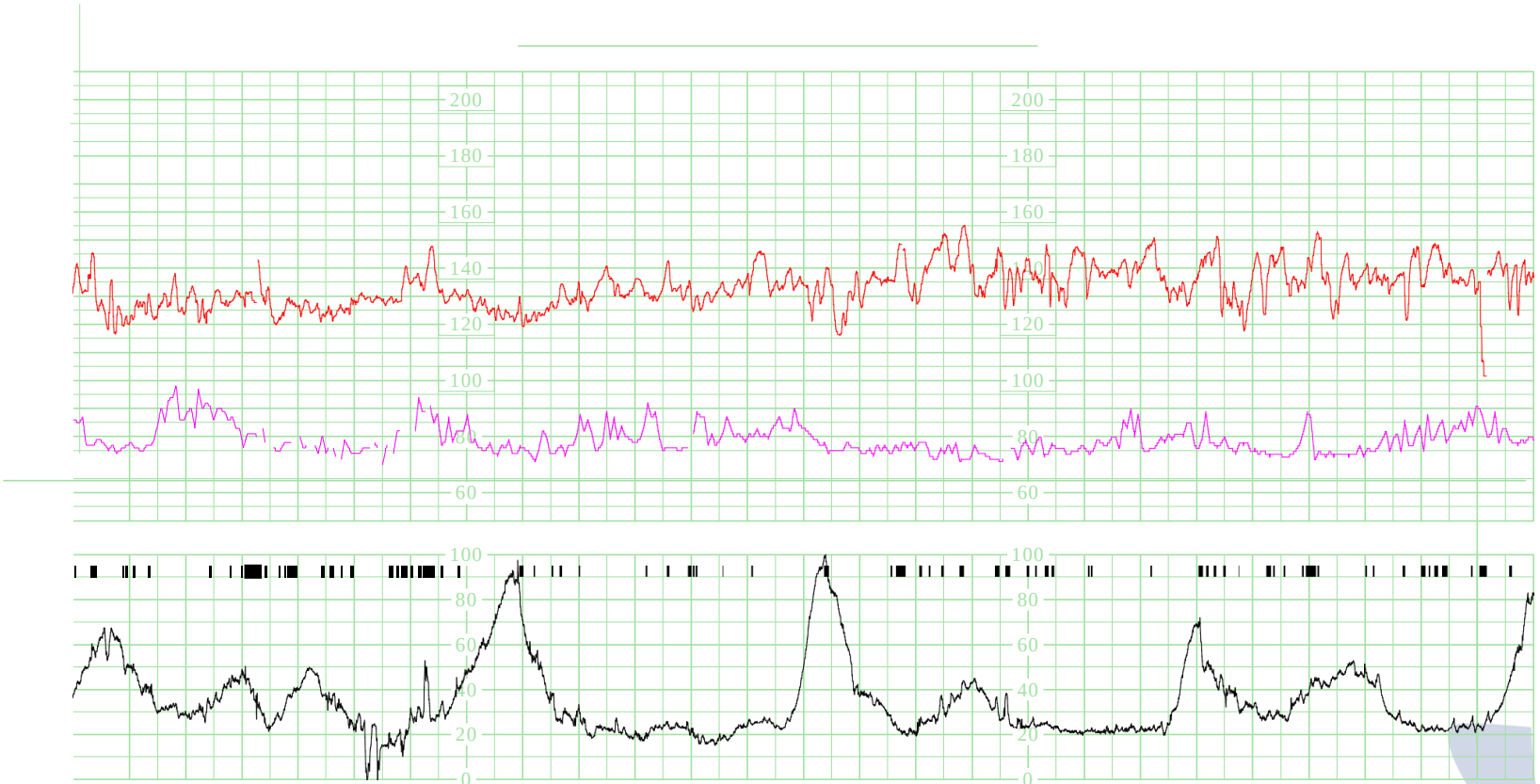
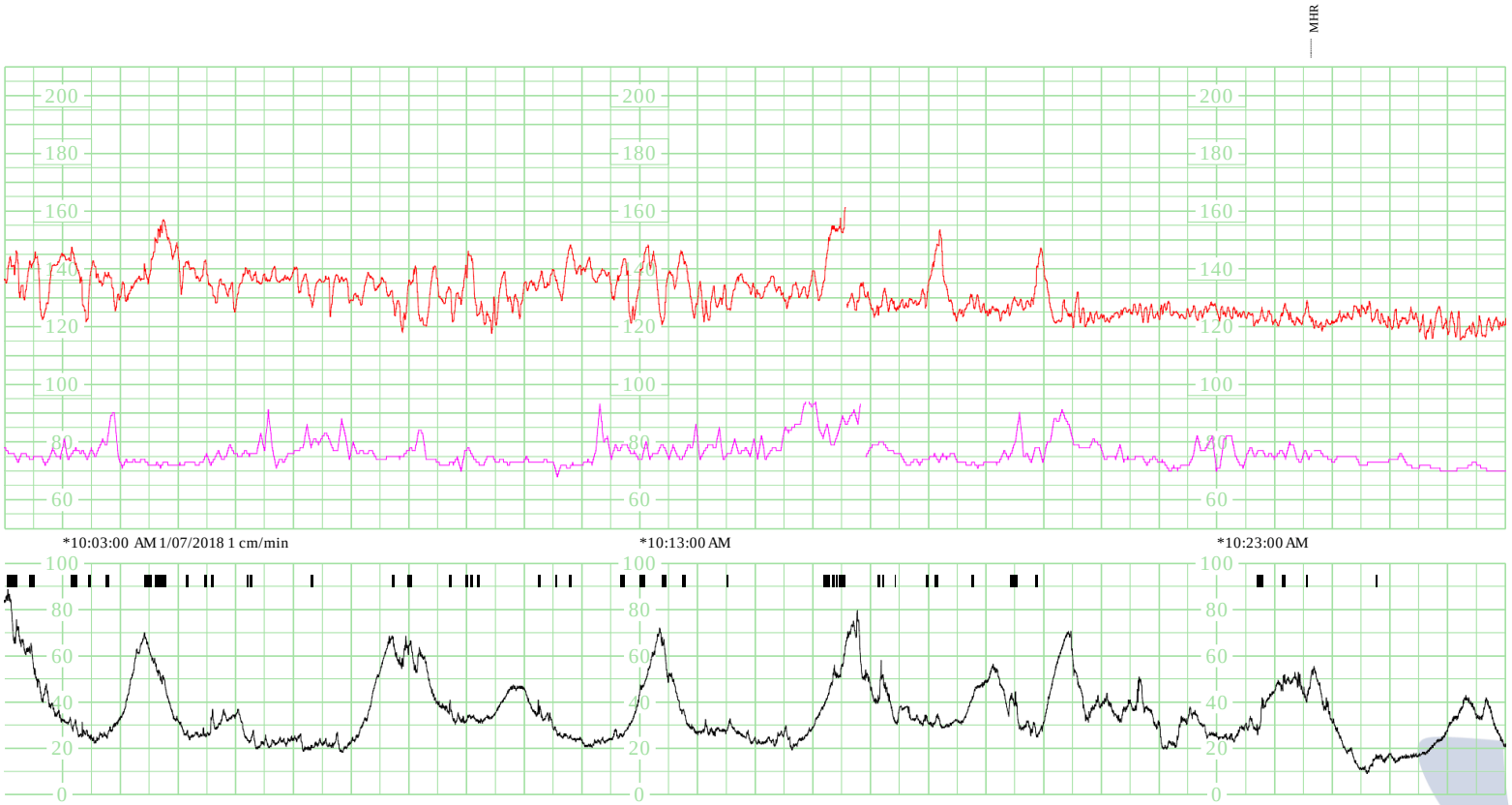
Active sleep



Active sleep going into quiet sleep



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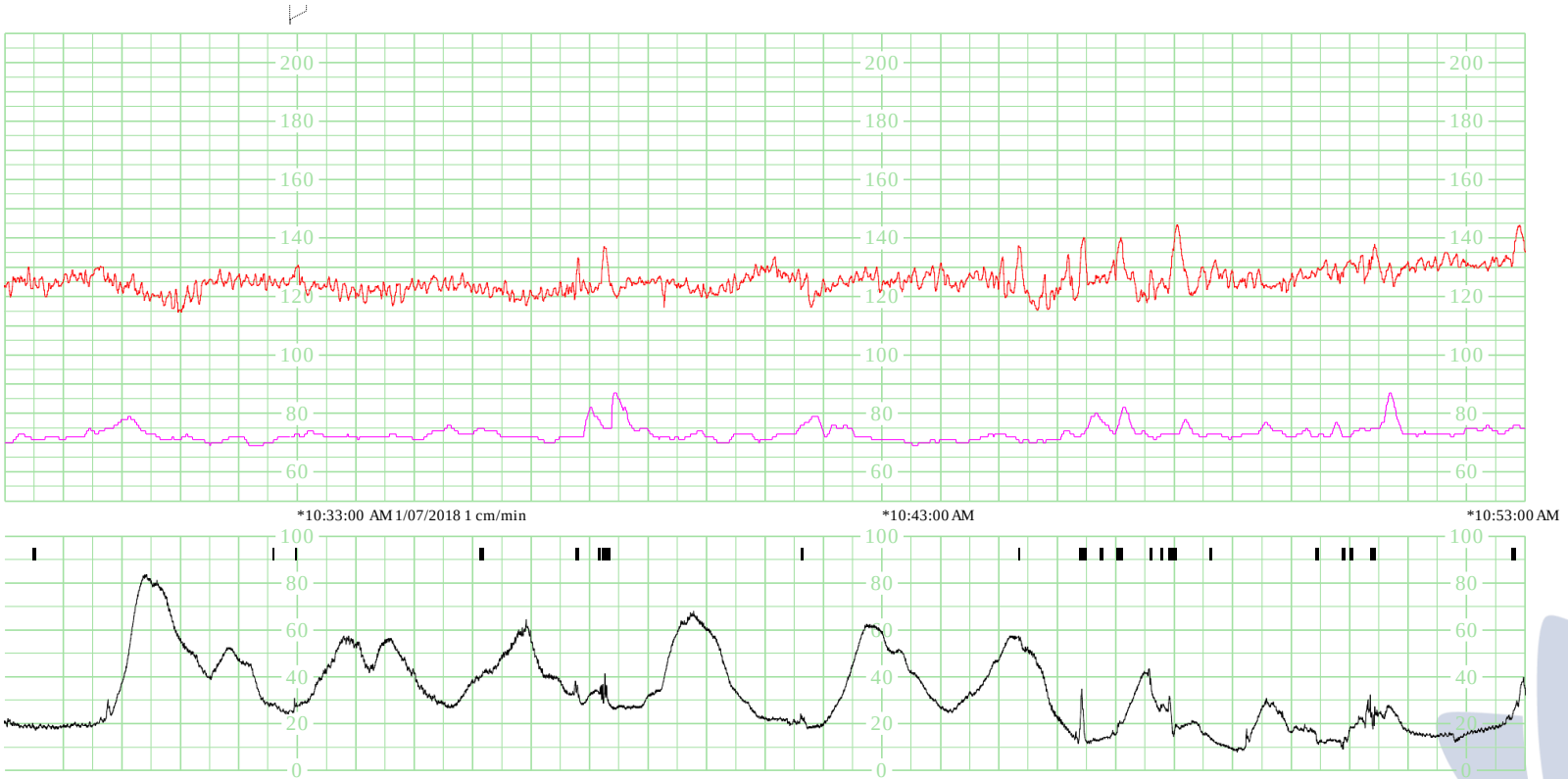
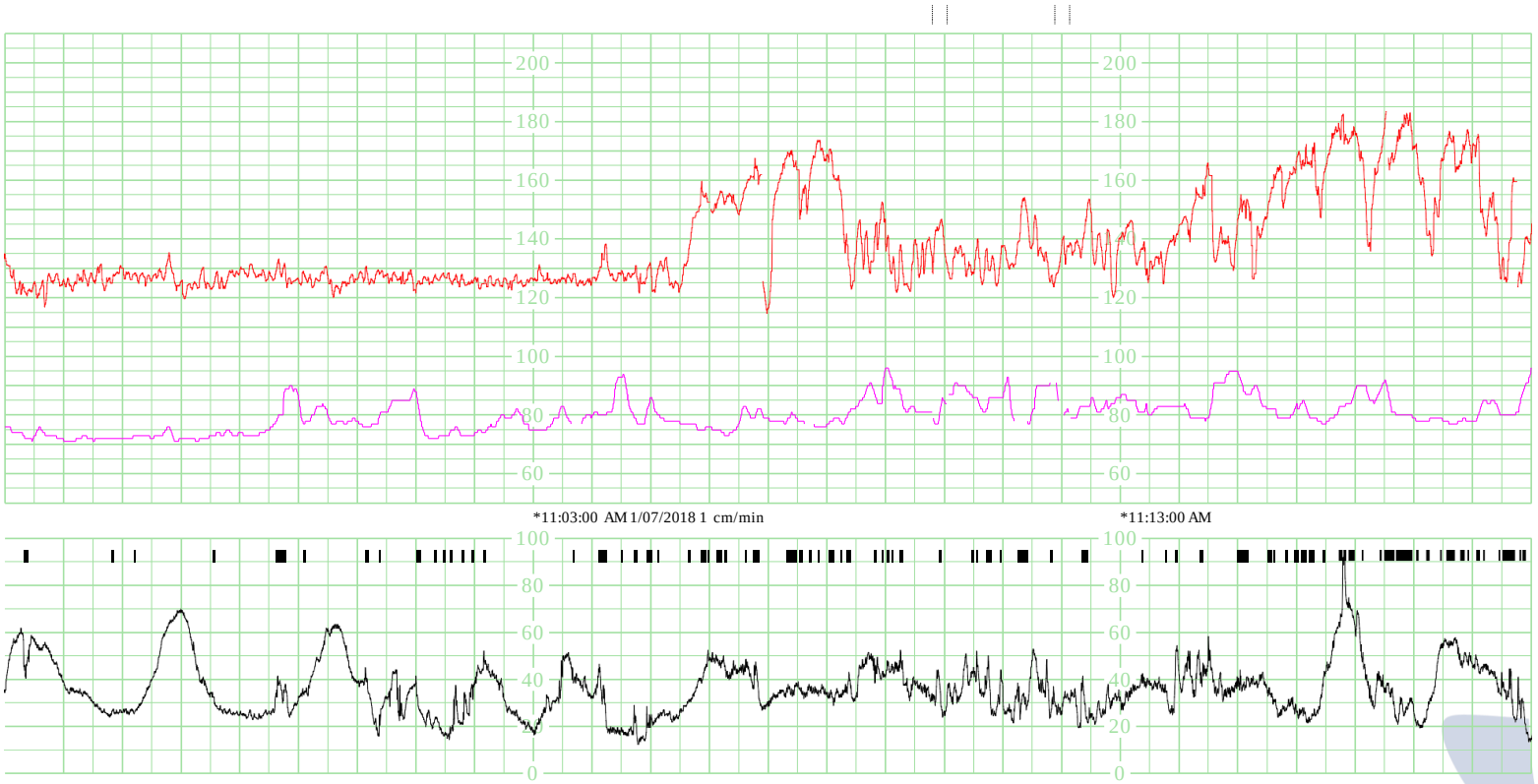
Quiet sleep to active sleep



Quiet sleep to active awake



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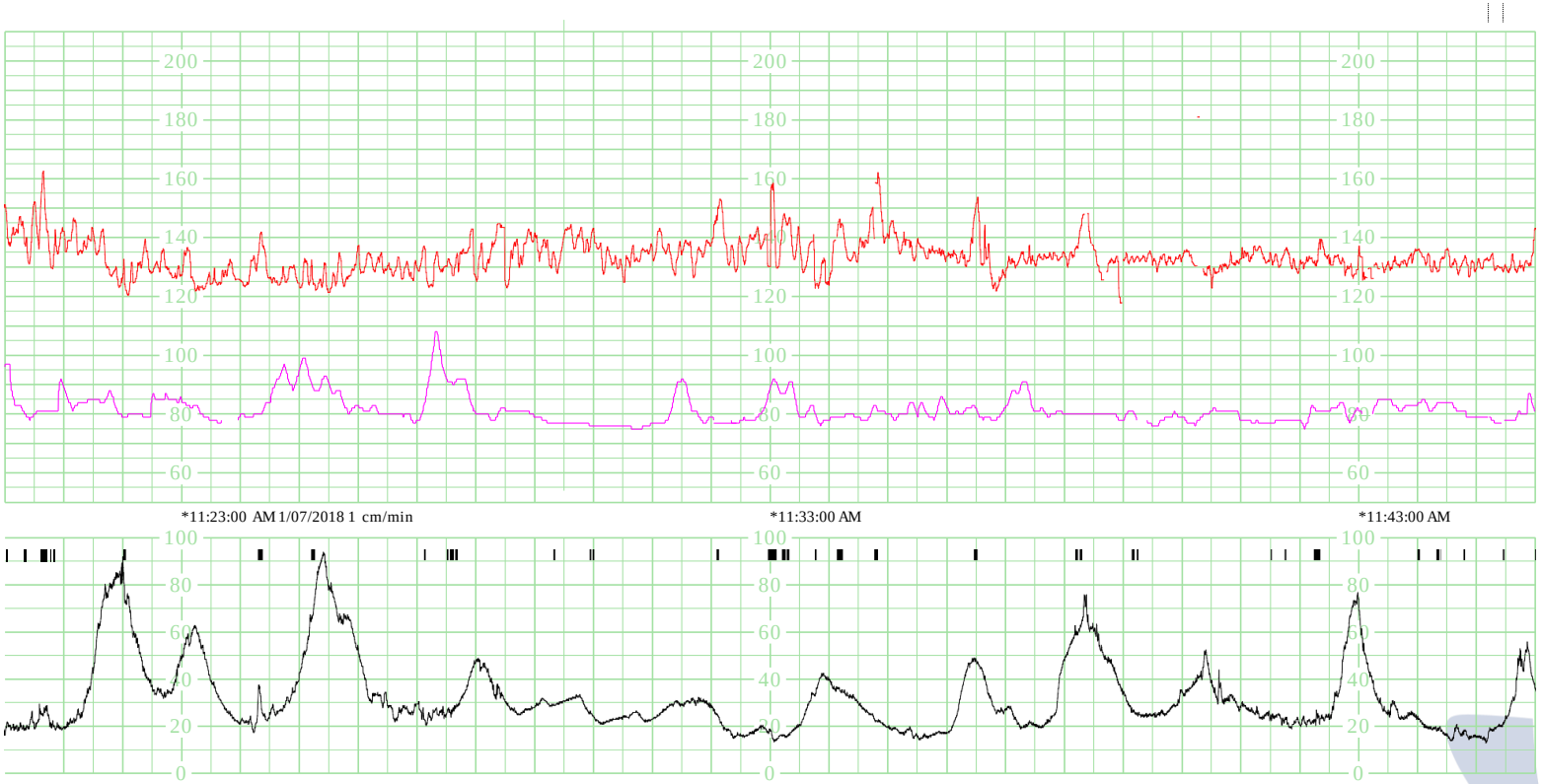
Active sleep to quiet sleep



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Questions??