Electronic Fetal Heart Rate Monitoring Tutorial

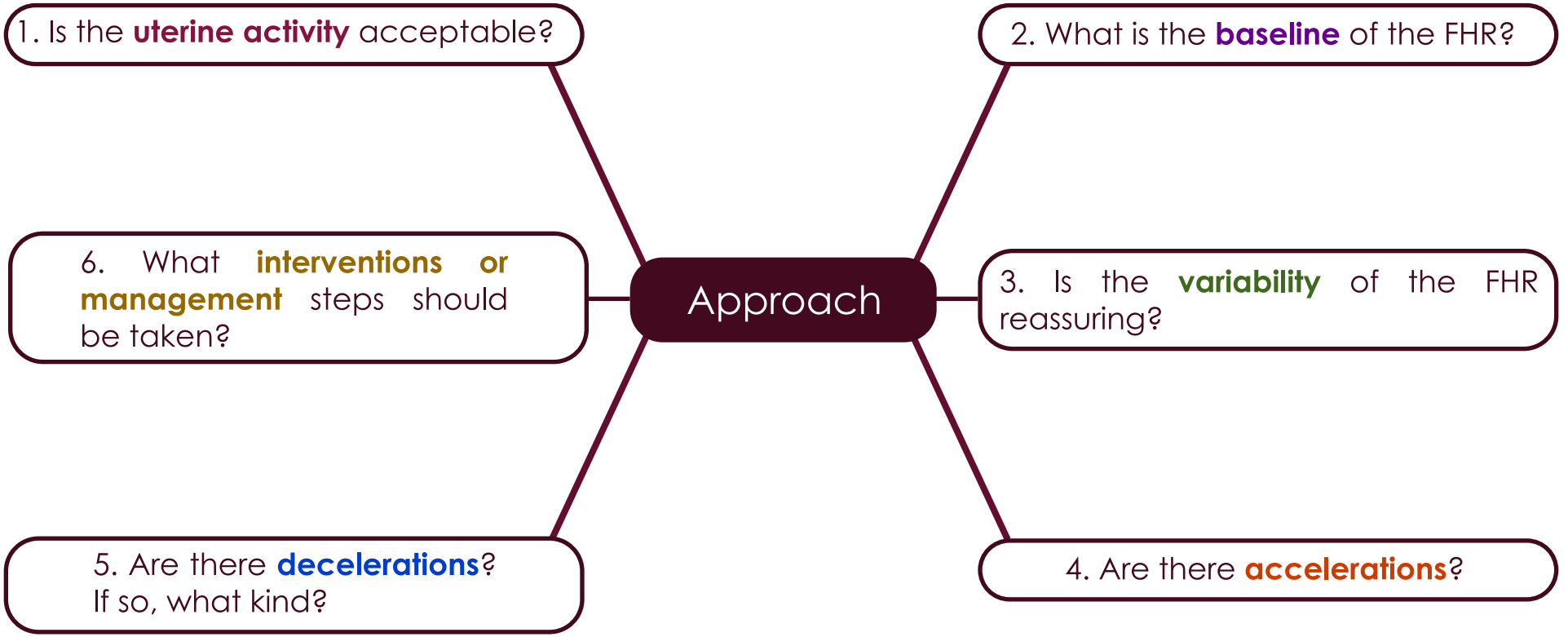
Introduction

- Uterine activity is measured by a tocometer
  - 20 seconds = 1 small square*
  - 1 minute = 3 small squares*
- Fetal Heart Rate (FHR) is described in terms of its **baseline**, **variability** (short term, long term) and **periodicity** (accelerations, decelerations)

**This may vary by machine*

Antenatal Fetal Assessment.
SOGC Practice Guidelines Committee, June 2000, 90

Content: Salikah Iqbal and Lindsay Sherriff
Design: Heidi Paulin


Approach
1. Is the **uterine activity** acceptable?
2. What is the **baseline** of the FHR?
3. Is the **variability** of the FHR reassuring?
4. Are there **accelerations**?
5. Are there **decelerations**? If so, what kind?
6. What **interventions or management** steps should be taken?

Uterine Activity

- Frequency of contractions
  - **Tachysystole**: ≥10 contractions in 20 minutes
  - Compromises fetal and placenta perfusion
- Duration of contractions
  - **Hypertonus**: contractions > 90 seconds
  - Increases period of fetal anoxia
- Increased intensity of contractions

Baseline

- Average FHR excluding accelerations or decelerations
- Normal range considered to be between 110-160 bpm
- Baseline evaluated over 20 minutes
- Variability is evaluated when there are no contractions
- **Bradycardia**: <110 bpm (r/o fetal hypoxia)
- **Tachycardia**: >160 bpm (r/o maternal fever or drug effects)

Variability

- Powerful predictor of fetal health
- Decreases intermittently even in a healthy fetus due to the effects of the vagus nerve on the fetal heart
- If absent >40 minutes, need to assess fetal well-being (e.g. biophysical profile)
- Causes of **minimal variability** (<5 bpm):
  - Persistent hypoxia (! acidosis)
  - Fetal sleep
  - Maternal smoking
  - Drugs - narcotics, sedatives, β-blockers, $MgSO_4$
  - Preterm fetus
  - Fetal tachycardia
  - Congenital anomalies

Accelerations

- Abrupt increase in FHR of at least 15 bpm persisting for at least 15 seconds and lasting less than 2 minutes
- Must have minimum of 2 in 20 minutes for a reassuring fetal heart strip
- Indicates a normal pH and rules out metabolic acidosis
- **Most important indicator** of fetal well being

Decelerations

Comparison of Decelerations

	Early	Variable	Late
Uniformity	Gradual decrease in FHR baseline caused by head compression	Any shape - V, U, W, often due to umbilical cord compression	Gradual onset and gradual recovery
Onset	Begins and ends with contractions	No correspondence to contractions	Begins at onset of contraction, lowest depth at the peak of the contraction
Shape	Gradual onset and recovery, rarely falls more than 20-30 bpm below baseline	No consistent depth, frequently falls below 90 bpm	Smooth decrease in FHR, usually 10-20 bpm below baseline
Variability	Normal variability	Often associated with normal or increased variability	Associated with absent or minimal variability
Duration	Mirror image of contraction	Varies from a few seconds to 2 minutes	Proportional to the duration of the contraction, returns to baseline after uterus is relaxed
Repetition	Likely with each contraction	Not necessarily repetitive	Likely with each contraction
Management	None (normal response)	Rule of 60s suggest severe variable decelerations: • Decelerations to < 60 bpm • 60 bpm below baseline • 60 seconds in duration with a slow return to baseline	Non-reassuring - consider as a response to hypoxia and uteroplacental insufficiency regardless of amplitude. Assess fetal wellness (e.g. scalp electrodes, VE)

Management

- Document findings and the plan on the progress note
- Notify patient
- Consult obstetrics and pediatrics
- Maximize fetal oxygenation
- Consider further evaluation:
  - Fetal spiral electrode
  - Fetal scalp blood sampling
  - Biophysical profile
  - Umbilical cord sampling
- Prepare for delivery or transfer of care

Examples

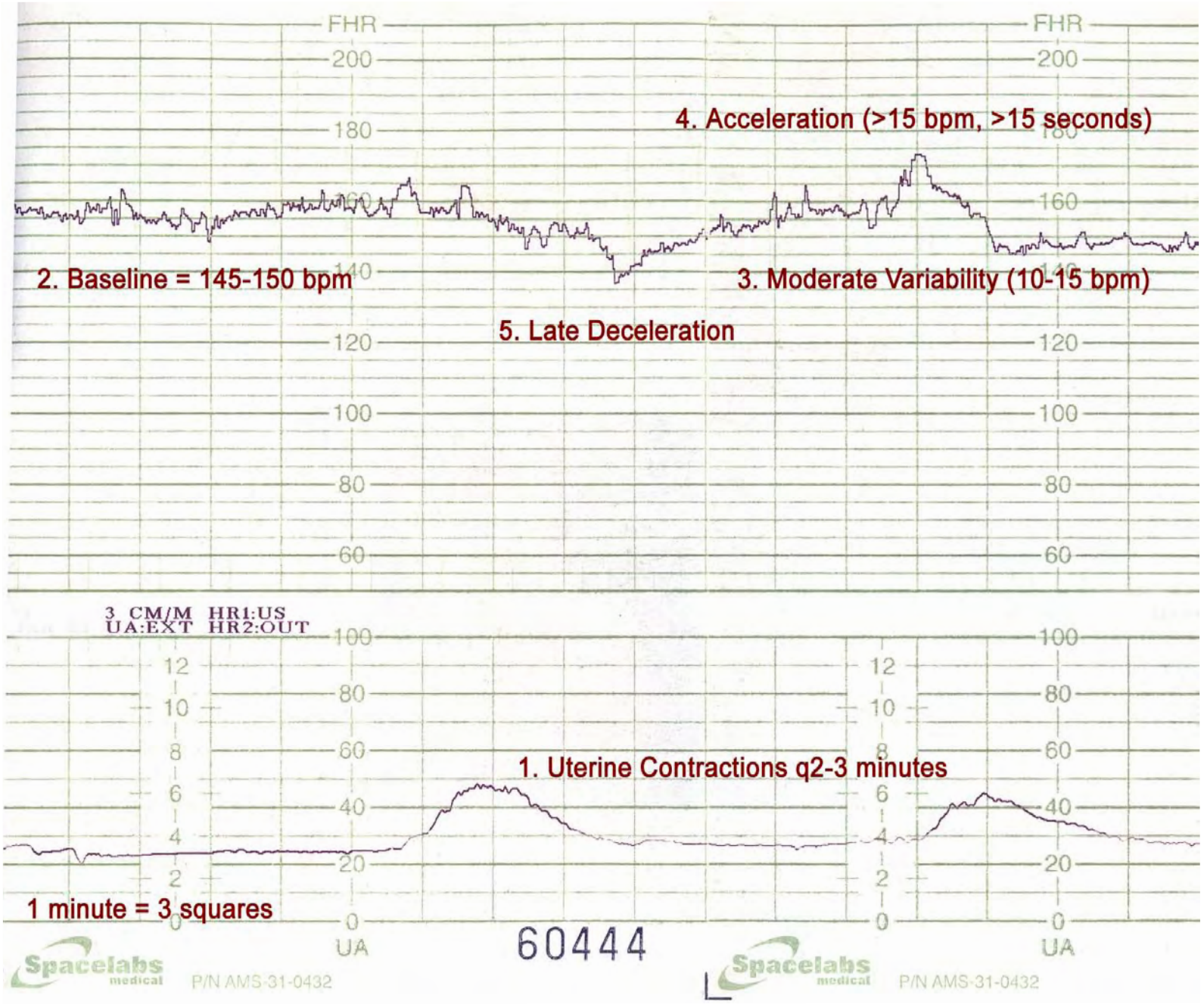


Figure 1: Fetal Heart Strip with Reassuring Variability

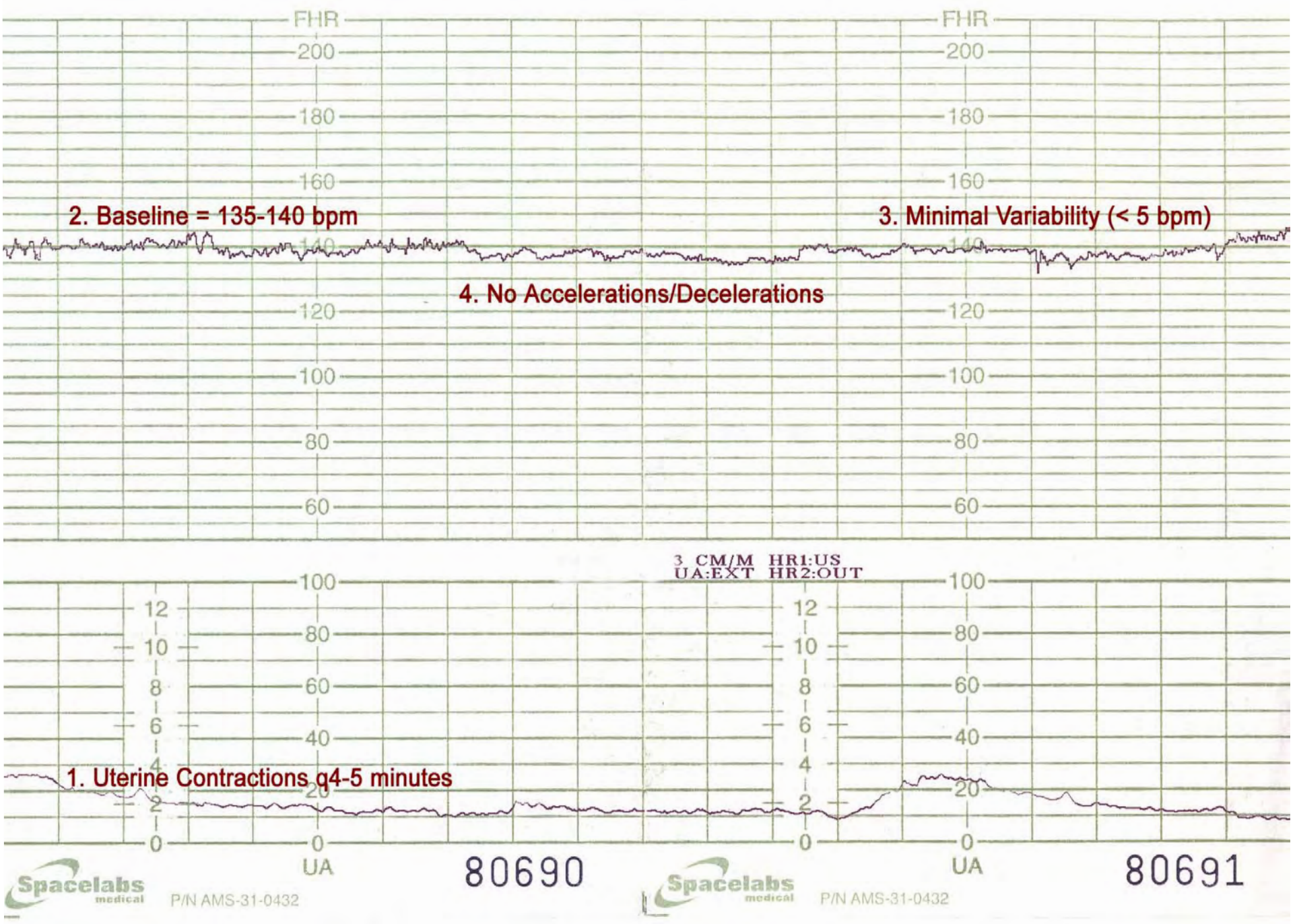


Figure 2: Fetal Heart Strip with Minimal Variability