I. PURPOSE

To provide guidelines for an experienced obstetrical nurse, midwife or physician who is familiar with electronic fetal/toco monitoring to initiate external fetal/toco monitoring when it is necessary.

II. REFERENCES

See Appendix A.

III. DEFINITIONS

See **Section X** below for detailed definitions.

IV. POLICY

It is the policy of the UCSF Birth Center that an experienced obstetrical nurse, midwife or physician familiar with electronic fetal/toco monitoring may initiate external fetal/toco monitoring when it is necessary. Nurses who use electronic fetal monitoring (EFM) should know the NICHD definitions for FHR characteristics and be able to recognize common FHR patterns and variant FHR patterns.

The NICHD FHR definitions should be used in written documentation and verbal communication. The Categories may be used by some institutions in verbal communication with CNM or physician in obtaining a bedside evaluation. These terms are included and described in **"Part IX –Characteristics, Interpretation and Notification Recommendations of Fetal Heart Rate Tracings"** outlined below and based on the NICHD terminology which is endorsed by ACOG, AWHONN, and ACNM.

STATEMENT OF POLICY AND PROCEDURE

A. INTRODUCTION

1. In 2008, the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) partnered with the American College of Obstetricians and Gynecologists (ACOG) and the Society for Maternal–Fetal Medicine to sponsor a workshop focused on electronic FHR monitoring. The workshop focused on three goals: 1) review and update definitions for FHR patterns; 2) assess existing classifications systems for interpreting specific FHR patterns and make recommendations about a system for use in the United States; and 3) make recommendations for research priorities for EFM.
2. Randomized controlled trials have shown that there is a decrease in the incidence of seizures in neonates that have continuous monitoring, compared with intermittent auscultation in labor. Studies have shown an increase in operative vaginal deliveries and c-sections in women whose labors are monitored with continuous monitoring vs. intermittent auscultation of the FHR.
3. FHR patterns are dependent on fetal gestational age and physiologic status as well as maternal physiologic status. Thus, FHR tracings should be evaluated in the context of clinical conditions including gestational age, prior

results of fetal assessment, medications, maternal clinical conditions, and fetal conditions.

B. GOALS OF FHR MONITORING

1. Research shows that a newborn with a cord umbilical artery (CUA) pH of 7.10 and a base excess (BE) 12 has not had significant acidemia immediately prior to birth. Values below a CUA pH of 7.10 and a base excess (BE) > 12 are associated with an increase in neonatal morbidity and mortality.
2. An alternative goal for providers would be an Apgar score of > 7 at 5 minutes. The utility of using the 5 minute Apgar score presumes that a newborn that is vigorous at 5 minutes of age is unlikely to be currently experiencing significant acidosis.
3. An important caveat is that the goal of birth without significant acidemia should be accomplished without an increase in unnecessary iatrogenic intervention(s).

C. INTERPRETATION OF FHR PATTERNS

1. Studies have found that FHR decelerations alone are poorly predictive of significant acidemia in the newborn. The majority of labors complicated by FHR decelerations result in uncomplicated outcomes.
2. The baseline variability exhibited by the tracing is the most sensitive predictor of acute fetal acidemia. Moderate variability is strongly associated (98%) with a cord pH of > 7.15 or Apgar at 5 minutes > 7.
3. The individual components of FHR that are defined do not occur in isolation and generally evolve over time. A full description of a FHR requires a qualitative and quantitative description of baseline rate, variability, and presence of accelerations, periodic or episodic decelerations, and changes or trends of FHR patterns over time.
4. Absent or minimal FHR variability in the presence of late or variable decelerations is the most consistent predictor of fetal acidemia (23%).
5. There is a positive relationship between the degree of acidemia and the depth of decelerations or bradycardia.
6. Except for sudden profound bradycardia (< 60 bpm), newborn acidemia generally develops over a period of 60-120 minutes rather than immediately, in association with decreasing FHR variability, recurrent decelerations or bradycardia. Fortunately, the gradual nature with which significant acidemia typically develops affords the provider time to observe the tracing and initiate conservative measures before operative delivery or c-section need be initiated.

D. MONITORING MODALITIES

1. Admission or Triage monitoring**:** Consider FHR monitoring for all patients with a viable fetus(es) to obtain at least a 20-minute fetal/toco tracing on

admission whether or not the individual is in active labor. The tracing should be continuous until it shows no evidence of uteroplacental insufficiency and/or an NST is performed. If the patient declines monitoring, the nurse should document the refusal and notify the provider.

a. A non-stress test (NST) is a method of assessing fetal well-being by observing the FHR in response to fetal movement. If after 20 min. the FHR is not reactive, the NST may be extended another 20 minutes to account for fetal sleep cycles. An NST may be indicated for a variety of conditions such as: postdates, preeclampsia, suspected intrauterine growth restriction, history of previous intrauterine fetal demise, diabetes/lupus (SLE), oligohydramnios, polyhydramnios, advanced maternal age, or complaint of decreased fetal movement.

i. Reactive tracing:

a) For ≥32 wks gestational age: 2 accelerations of FHR peaking ≥15 bpm above baseline and lasting 15 secs in a 20 min. period
b) For <32 wks gestational age: 2 accelerations of FHR peaking ≥10 bpm above baseline and lasting 10 secs in a 20 min. period
c) Baseline between 110-160 bpm
d) Moderate variability

ii. Nonreactive tracing:

a) Fewer than 2 accelerations as appropriate for gestational age
b) Minimal or absent variability
c) Baseline may be outside or within normal range

b. Consult with the OB provider for further evaluation when a reactive tracing is not obtained within 40 minutes and/or variant FHR patterns are noted during the NST.

2. Antepartum monitoring (patient not in labor):

a. Admission NST and then EFM is individualized per patient condition and gestational age.

3. Intermittent monitoring:

a. Intermittent monitoring is an approach that is used for observation when there is no increased risk for uteroplacental insufficiency and fetal acidemia. Intermittent monitoring combines the benefits of FHR surveillance with patient mobility and comfort. Intermittent monitoring can be accomplished by periodic use of the EFM or auscultation using a hand held Doppler. Using EFM to obtaining a 3–5 minute EFM tracing using both the tocodynamometer and ultrasound transducers, intentionally assessing before, during, and 1 minute after a contraction at the same specified intervals as IA.

I. Intermittent Auscultation (IA) with Doppler

- Use Leopold's maneuver to locate the correct site for auscultation over the fetal back. Note fetal movement.
- Obtain maternal pulse to compare it to the FHR.

- Palpate for uterine contractions to determine the relationship to the auscultated FHR.
- Place Doppler on maternal abdomen and auscultate prior to a uterine contraction for 60 seconds, during a uterine contraction and then for 60 seconds after a uterine contraction at a minimum.
- Determine baseline rate, rhythm (regular or irregular), presence/absence of increases or decreases from the baseline. Count continuous for 60 seconds to determine Baseline.
- If distinct changes such as decreases are noted in the FHR, implement continuous EFM to assess variability and presence/absence of accelerations and/or decelerations.

IA Category I

Category I FHR characteristics by auscultation include all of the following:

- Normal FHR baseline between 110 and 160 bpm
- Regular rhythm
- Presence of FHR increases or accelerations from the baseline
- Absence of FHR decreases or decelerations from the baseline

IA Category II

- Irregular rhythm
- Presence of FHR decreases or decelerations from the baseline
- Tachycardia (baseline >160 bpm, >10 minutes in duration)
- Bradycardia (baseline 10 minutes in duration)

Exclusion Criteria for Intermittent Monitoring:

I. Maternal Conditions
   a. Chronic disorders: Chronic HTN, antiphospholipid syndrome, uncontrolled thyroid disease, Active drug use
   b. Diabetes requiring insulin or uncontrolled gestation diabetes
   c. Obstetric history of IUFD
   d. Trial of Labor After Cesarean (TOLAC)
   e. No prenatal care
   f. Cholestasis
   g. Gestational hypertension
   h. Increased maternal serum AFP or HCG
   i. Malpresentation
   j. Twins
   k. Oligohydramnios
   l. Pre-eclampsia

m. Prematurity (less than 36 weeks)

II. Labor
   a. Chorioamnionitis
   b. Epidural, IV Narcotics (e.g. Fentanyl, PCA)
   c. Meconium
   d. Pitocin
   e. Vaginal bleeding greater then bloody show
   f. Misoprostol administration within 2 hours

III. Fetal conditions
   a. IUGR
   b. Known congenital anomaly
   c. Polyhydramnios
   d. Red cell alloimmuniization in the presence of erythroblastosis

4. Continuous monitoring**:**

- Certain clinical situations, such as those in the exclusion criteria for intermittent monitoring, are associated with a higher incidence of adverse neonatal outcomes. Risk screening and heightened surveillance for those women with risk factors is an inherent component of obstetric care and these women are considered candidates for continuous EFM. Medical conditions associated with decreased uteroplacental perfusion (e.g., postdates, IUGR, diabetes, hypertension,) or increased risks for neonatal morbidity (e.g., chorioamnionitis, prematurity) require provider evaluation.
- Optimal type of monitoring will be determined by the CNM or physician after patient evaluation.

ASSESSMENT AND DOCUMENTATION OF THE FHR

A. FHR Characteristics

1. A complete assessment of the FHR and uterine activity includes evaluation of:
   a. Uterine activity (frequency, duration, strength, and baseline tonus if internal monitoring)
   b. Baseline FHR rate
   c. FHR variability (variability is not assessed if auscultating the FHR with a hand-held Doppler)
   d. Presence or absence of accelerations
   e. Presence or absence of decelerations. If present, which type and whether the decelerations are recurrent or intermittent
   f. Changes in FHR over time

B. **Frequency of Assessment and Documentation**

1. Documentation of the FHR in the medical record may occur at intervals that are different from assessment. Monitoring modality will be determined by CNM or physician based on patient's risk factors.

   a. Antepartum, not in labor: Individualized per orders

   b. Latent phase labor: Individualized per orders, assess at least hourly
   c. Active phase labor
      i. Intermittent: Assess and document every 30 minutes, for 3-5 minutes : before, during and after a contraction
      ii. Continuous: Assess and document every 15 minutes

   d. Second stage of labor, actively pushing (if laboring down, document and assess as per active labor guidelines)

      i. Intermittent: Assess q 5 minutes during and after a contraction. Document q 15 minutes
      ii. Continuous: Assess q 5 minutes and document q 15 minutes

ASSESSMENT AND DOCUMENTATION USING INTERMITTENT AUSCULTATION

	Latent phase <4cm	Active phase	Second Stage (passive fetal descent)	Second Stage (active pushing)
Low risk without oxytocin	Per provider order, hourly is reasonable	Every 15-30 minutes	Every 15 minutes	Every 5-15 minutes

2. When EFM is used to record FHR data, periodic documentation can be used to summarize evaluation of fetal status at the recommended frequencies by AAP and ACOG (2017). For example, evaluation of the FHR may be occurring every 5 minutes with a summary note including findings of fetal status being documented in the medical record every 15 minutes.

ASSESSMENT AND DOCUMENTATION OF UTERINE CONTRACTIONS

A. **External Monitoring Equipment**

1. An external tocodynamometer will detect the frequency and duration of uterine contractions.

B. **Internal Monitoring Equipment**

1. An intrauterine pressure catheter (IUPC) may be used if needed when membranes are ruptured and cervical dilation is at least one centimeter. An

IUPC allows detection of baseline tonus and Montevideo units (MVU) which are a measure of contraction strength or intensity

2. MVUs are determined by taking the sum of the acme of the contractions in a 10 minute period.

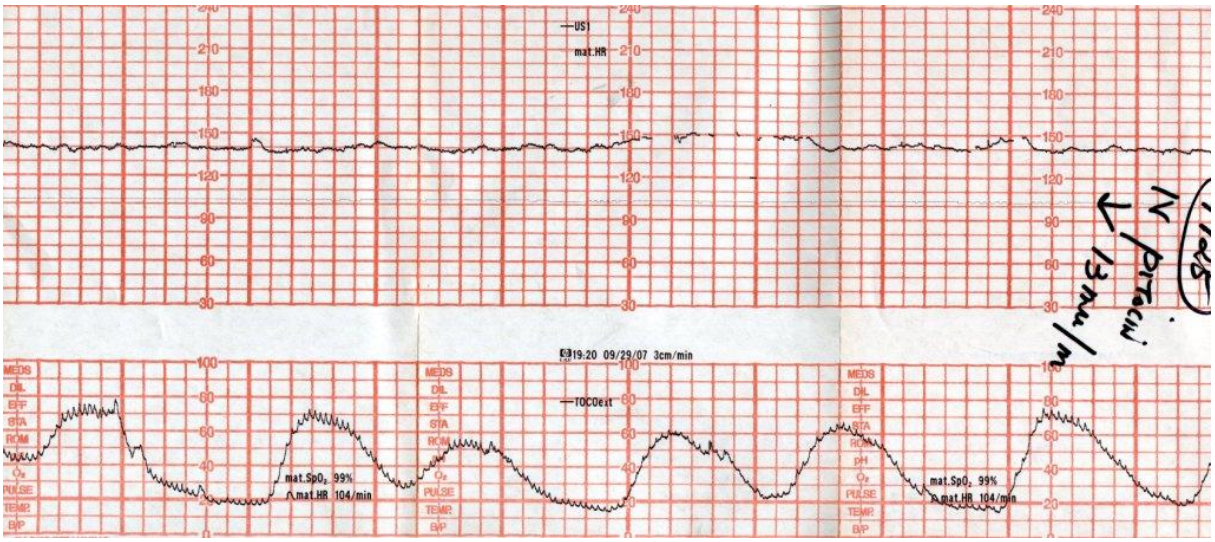


Figure 1. Montevideo units of 240 (baseline tone subtracted).

3. Adequate MVUs are considered to be in the following ranges:
   a. 200-240 mm Hg if you subtract the baseline uterine tone from the total.
   b. 240-300 mm Hg if the baseline tonus is included in the total.
   c. Maximal uterine activity is considered to be 280-300 MVU
4. Adequacy of uterine activity with an IUPC may also be established when the following criteria are met:

   a. An established pattern of uterine contractions which are 2- 3 minutes apart with,
   b. Uterine contractions that are at least 50 mm Hg above the baseline tone.
5. Average baseline tonus is considered to be 5 - 20 mm Hg. An elevated baseline tone of > 20 mm Hg may warrant further evaluation. If an amnioinfusion is ongoing, an artificial increase in baseline resting tone to 35-40 mm Hg may be present. See the Amnioinfusion policy for other precautions. When the amnioinfusion is shut off, average resting tone should be restored.

V. PROCEDURES

A. External FHR Monitoring

1. Indications: Admission, active labor or as ordered
2. Precautions/Contraindications:

a. None known, although some patients may exhibit sensitivity to Aquasonic gel. KY lubricating jelly may be used in place of Aquasonic gel.

3. Procedures:

a. Assess the need for FHR monitoring.
b. Consider IA for low risk laboring patients.
c. Operate and set up monitoring equipment appropriately.
d. Explain to the patient the need for FHR monitoring and what data the monitoring will provide.
e. Assess that the monitor is functioning properly. Monitor function may be checked by pushing the Test button.
f. Assess fetal presentation and position.
g. Apply transmission gel to EFM monitor piece.
h. Position EFM monitor piece on maternal abdomen at the point where the fetal heart tones (FHT's) are clearest (usually over the fetal back or scapula).
i. Observe the FHR tracing for consistency to verify clarity of input
j. Secure abdomen strap or assess snugness of girdle
k. When monitoring is in progress:
    i. Observe area of abdomen under EFM monitor piece for redness –adjust as needed.
    ii. Reapply transmission gel as needed.
l. Whenever in doubt, auscultate FHR and check maternal heart rate by applying the pulse oximeter (or manually if a pulse oximeter is not available) - some monitors may halve a fast FHR or double a slow FHR. Applying the pulse oximeter will allow for visual distinction of maternal heart rate as separate from the fetal heart rate.

B. **Internal Fetal Monitoring (IFM) with Fetal Scalp Electrode (FSE)**

1. Indications:

a. Internal fetal monitoring via application of a FSE is a direct measure of fetal EKG. IFM is used when external monitoring is unable to continuously record the FHR. A FSE can be placed after membranes are ruptured, the cervix is dilated one to two centimeters, and the presenting part is reachable via vaginal exam (vertex or breech). At UCSF, the CNM or physician applies the FSE.

2. Precautions/Contraindications.

a. May cause superficial skin infection at site of insertion although this is rare.
b. Contraindications include: active genital herpes or prodromal symptoms, HIV positive, mother with known carrier status for hemophilia and fetus is affected or fetal status is unknown, known

placenta previa, inability to determine presenting fetal part, or fetus at risk for thrombocytopenia.
c. Relative contraindications: Active hepatitis B or hepatitis C, active sexually transmitted infection
d. A FSE should not be applied to the fetal face, fontanels, genitalia, or brow.

3. Procedure:

a. Refer to The Birth Center Policy, BC.15 Application of fetal scalp electrode (FSE), for additional information and the procedure.

C. **External Uterine Monitoring with Tocodynamometer**

1. Indications: External uterine monitoring is an indirect means of detecting uterine contractions. The tocodynamometer (toco transducer) is used to determine frequency and duration of contractions only.
2. Precautions/Contraindications: No known contraindications.
3. Procedure:

a. Position the woman comfortably. Ensure uterine displacement (to reduce compression of the inferior vena cava) and position toco transducer on abdomen where fundus is most easily palpable and least maternal tissue is present. Avoid placing toco transducer over umbilicus.
b. Secure abdomen strap or assess snugness of girdle
c. Adjust the control button between contractions to record an artificial baseline tonus of approximately 10 mm Hg to prevent the tracing from failing to record.
d. Observe tracing for proper positioning; tracing should ripple with respiration and spike when the woman coughs.
e. When monitoring is in progress, check under the toco transducer for redness on the maternal abdomen and reposition every few hours.

D. **Internal Uterine Monitoring with Intrauterine Pressure Catheter (IUPC)**

1. The CNM or physician inserts intrauterine pressure catheters (IUPC) when necessary to determine uterine forces or to administer an amnioinfusion (Refer to The Birth Center policy, BC.02 Amnioinfusion, for additional information about use of amnioinfusion).
2. Indications:

a. IUPC monitoring is a direct means of detecting frequency, duration, and intensity of contractions. An IUPC may be indicated to:
b. Adequately titrate an oxytocin infusion
c. Assess a slow slope active phase, or active phase arrest
d. Assess contractions during labor induction or augmentation if contractions cannot be adequately assessed via external toco.

3. Precautions/Contraindications:

a. May increase risk of uterine infection especially in the context of prolonged rupture of membranes.

4. Procedure:

a. Connect IUPC monitor cable into the tocodynamometer connection.
b. Position the patient. Insertion is most easily accomplished if the patient is in dorsal lithotomy or side-lying.
c. Assist CNM or physician as needed for insertion of catheter
d. Zero the IUPC per manufacturer's instructions.
e. Connect the IUPC monitor cable to the catheter once zeroed.
f. Secure catheter to patient's thigh to avoid accidental removal.
g. To remove catheter, apply gentle traction and pull out.
h. Never reuse or re-sterilize the catheter.

VI. CHARACTERISTICS, INTERPRETATION, AND NOTIFICATION GUIDELINES OF FETAL HEART RATE PATTERNS

A. FHR patterns:

1. Baseline characteristics (e.g. rate, variability, accelerations, sinusoidal pattern)
2. Periodic changes in FHR occur in association with uterine activity (e.g. early or late decelerations)
3. Episodic changes of FHR occur without any obvious association with uterine activity
4. Variable decelerations can be either periodic or episodic

B. Quantification of Periodic Changes:

1. Decelerations are considered "recurrent" when they occur with >50% of the contractions in any 20 minute segment. Decelerations that occur with <50% of uterine contractions in any 20 minute segment are defined as "intermittent".

C. FHR Baseline:

1. The baseline FHR is determined by approximating the mean FHR rounded to increments of 5 beats per minute (bpm) during a 10-minute window, excluding accelerations and decelerations and periods of marked FHR variability. FHR is reported as one number (not as a range).

2. The baseline FHR is calculated during a period without contractions. There must be at least 2 minutes of identifiable baseline segments (not necessarily contiguous) in any 10-minute window, or the baseline for that period is indeterminate. In such cases, it may be necessary to refer to the previous10-minute window for determination of the baseline.

a. **Normal: 110-160 bpm**

i. Interpretation: A normal baseline with moderate variability is associated with fetal wellbeing and an absence of fetal academia

b. **Tachycardia: > 160 bpm**

i. Interpretation: Tachycardia may be a transitory physiologic response to mild hypoxia or a sign of chorioamnionitis and fetal inflammatory response. Mild tachycardia can be a normal rate for premature fetuses (less than 34 weeks gestation).

ii. FHR >180-200 bpm may be secondary to fetal supraventricular tachycardia (SVT)

c. **Bradycardia: < 110 bpm**

i. Interpretation:

a) Any bradycardia with absent variability is a category III FHR pattern and requires urgent bedside evaluation by a CNM or physician for evaluation and plan for delivery.
b) Mild bradycardia (90-110 bpm) notify CNM or physician
c) Moderate bradycardia (80-90 bpm) with moderate variability is rare unless the fetus has a congenital heart block. At this baseline rate, the variability is commonly decreased and will be minimal or turn to absent as the baseline decreases to < 70 bpm. Thus, this pattern requires urgent CNM or physician evaluation and possible transfer to the operating room if vaginal birth cannot be achieved urgently.
d) A bradycardia of < 60-70 bpm is an obstetric emergency that signifies the need for urgent delivery.

D. FHR Variability:

1. Baseline FHR variability is defined as fluctuations in the baseline FHR of 2 cycles per minute or greater. These fluctuations are visually jagged, unpredictable and irregular in amplitude and frequency, and are quantified as the peak-to-trough in bpm. The FHR variability is determined during periods when there is no uterine contraction, FHR acceleration, or FHR deceleration.

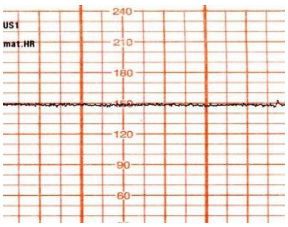
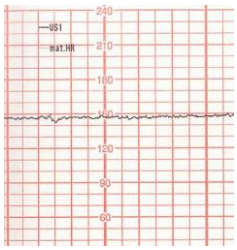
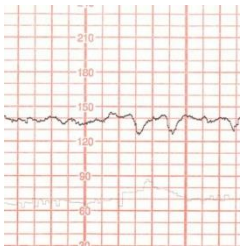
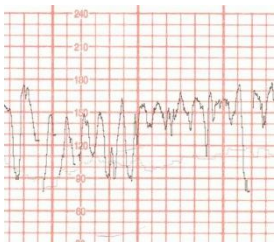
a. Sinusoidal pattern is specifically excluded in the evaluation of FHR variability.

b. Moderate variability, usually signifies adequate fetal central nervous system oxygenation.

Figure 2. The Four Categories of FHR Variability

Descriptive Term	Amplitude Range
Absent	Undetectable (0-2 bpm)
Minimal	> undetectable - 5 bpm
Moderate	6 - 25 bpm
Marked	>25 bpm

Absent Variability | Minimal Variability | Moderate Variability | Marked Variability

E. Accelerations:

1. **Accelerations** are a visually abrupt increase (defined as onset of acceleration to peak in < 30 seconds) in FHR above baseline. The peak is >15 bpm above the baseline and lasts > 15 seconds and < 2 minutes from the onset to the return to baseline (i.e. 15x15).
2. Before 32 weeks, accelerations only need a peak of 10 seconds above the baseline lasting > 10 seconds (i.e. 10x10).
3. **Prolonged acceleration** is distinguished from an acceleration based on its duration; the acme is > 15 bpm above the baseline, and the acceleration lasts > 2 minutes and < 10 minutes. An acceleration lasting > 10 minutes is considered a baseline change.
4. Interpretation: Accelerations are associated with fetal well-being and an absence of fetal acidemia.

F. **Sinusoidal Pattern**:

1. The sinusoidal FHR pattern is characterized by an extremely regular, smooth, uniform wavelike pattern with a usual frequency of approximately 3-6 per minute that persists for > 20 min. and an amplitude range of up to 30 bpm.
2. Interpretation: The sinusoidal pattern is rare and can signify fetal anemia and/or fetal hypovolemia. This is a category III FHR pattern and requires urgent bedside evaluation by a CNM or physician for evaluation and plan for delivery.

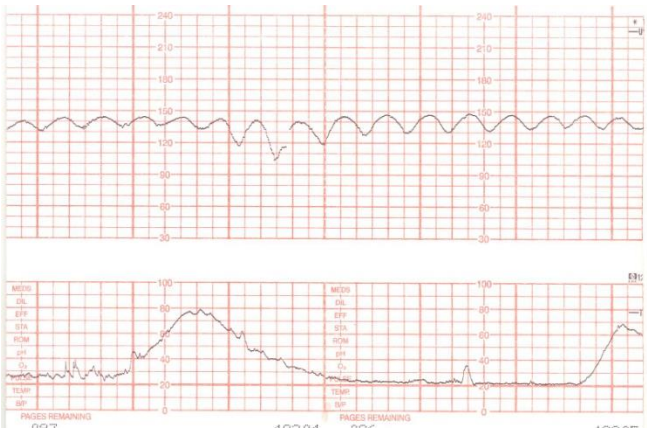
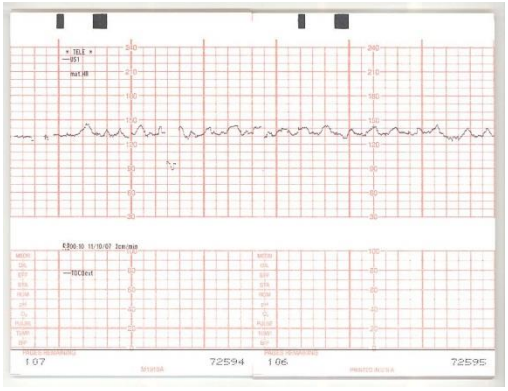


Figure 3: Sinusoidal Pattern

G. **Sinusoidal-Appearing Pattern**:

1. The sinusoidal-appearing FHR pattern is a benign pattern distinguished from sinusoidal patterns by the lack of uniformity of the sine wave pattern. Sinusoidal-appearing patterns are thought to be a variant of moderate variability. This pattern may occur following administration of opioids such as fentanyl and has been noted to occur with fetal thumb sucking in utero (assessed by ultrasound).
2. Interpretation: Sinusoidal-appearing patterns are intermittent and generally last less than an hour. They are preceded and followed by periods of moderate variability. This FHR pattern is associated with normal fetal acid/base balance and no acidemia.



H. **Early Decelerations**:

1. Defined as a visually apparent, usually symmetrical gradual decrease in FHR and return to baseline in association with a uterine contraction.
   a. A gradual FHR decrease is defined as onset to nadir of the deceleration > 30 seconds.
   b. The nadir of the deceleration occurs at the same time as the peak of the contraction. The decelerations are the mirror image of the contraction and are associated with moderate variability.
   c. They can appear with each contraction or intermittently.
2. Interpretation: Early decelerations are associated with adequate cerebral oxygenation at the point in time of the observation.

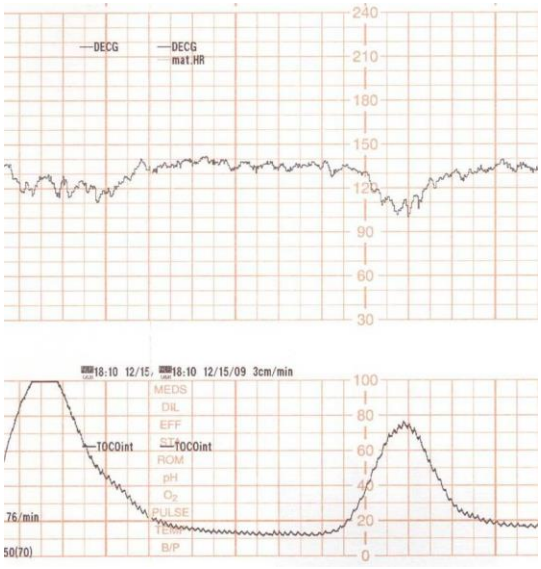


Figure 5: Early deceleration

I. **Late Decelerations:**

1. Defined as a visually apparent, usually symmetrical gradual decrease in FHR and return to baseline associated with a contraction.
   a. A gradual decrease in FHR which is defined by an onset to nadir of the deceleration of ≥30 seconds.
   b. The decrease in FHR is calculated from the onset to the nadir of the deceleration. The deceleration is delayed in timing with the nadir occurring after the peak of the contraction.
   c. The onset, nadir and recovery of the deceleration occur after the beginning, peak, and ending of the contraction respectively. i.e., always "late" in relationship to the contraction.
   d. Late decelerations can be intermittent or recurrent.
2. Interpretation: Late decelerations require further evaluation and consideration:
   a. When intermittent late decelerations occur in the context of moderate variability and a normal baseline, they are not associated with fetal acidemia and may be observed without intervention or conservative measures such as position change and increased fluids.
   b. Recurrent late decelerations require CNM or physician notification and possible conservative intervention measures.
   c. When late decelerations are associated with minimal variability the CNM or physician should be notified for a bedside evaluation.
   d. When late decelerations are associated with absent variability the risk of fetal acidemia is significant. This is a category III FHR pattern and requires bedside evaluation by a CNM or physician and plan for delivery.

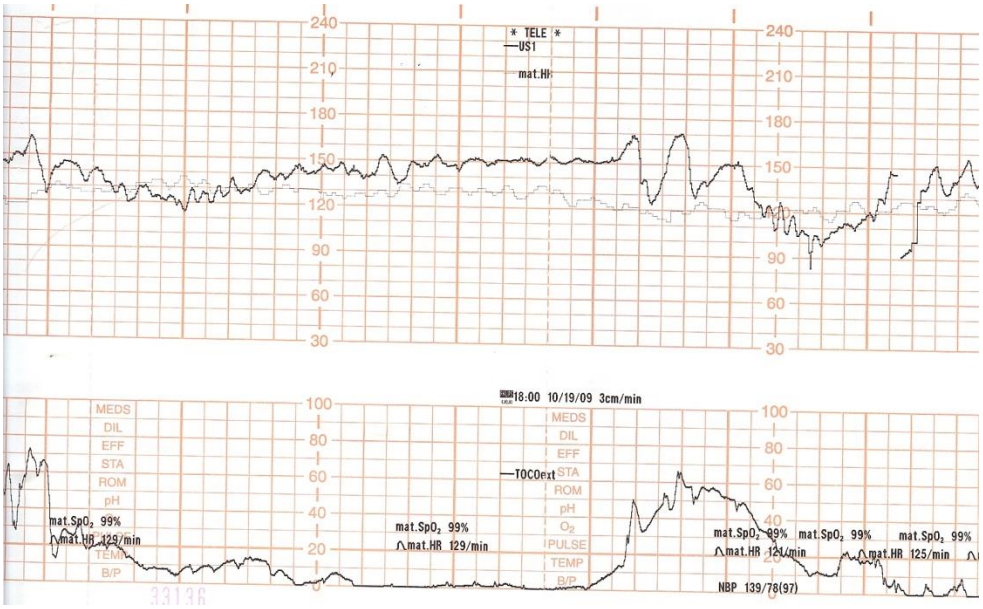


Figure 6: Late deceleration with moderate variability

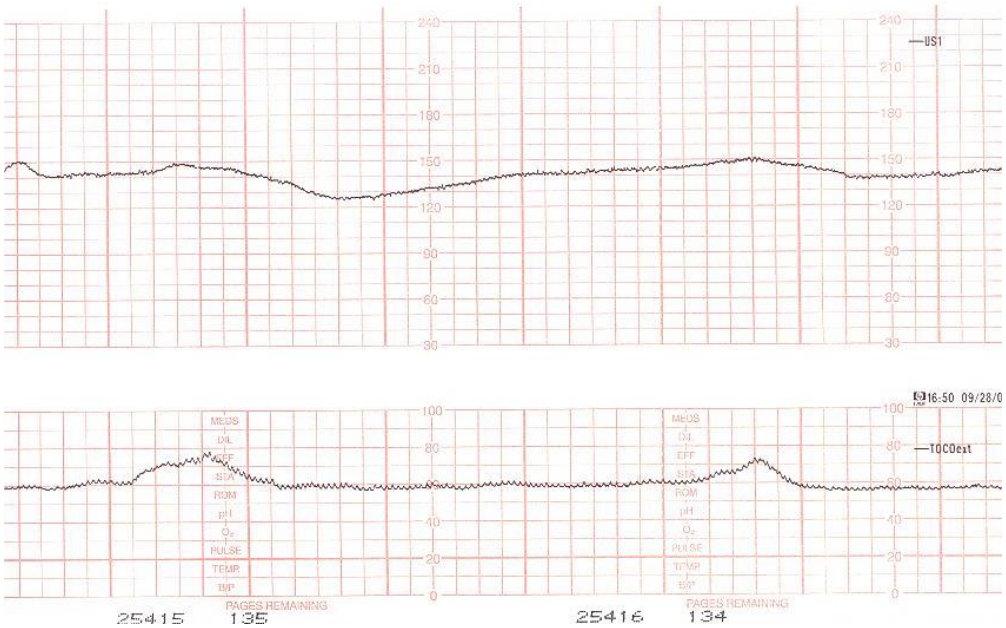


Figure 7: Recurrent late decelerations with absent variability

J. **Variable Decelerations**:

1. **Variable decelerations** have a visually abrupt decrease in FHR below the baseline. An abrupt FHR decrease is defined as onset of deceleration to nadir is < 30 seconds. The decrease in FHR is > 15 bpm below the baseline, lasting > 15 seconds, and < 2 minutes.

2. Variable decelerations may be either periodic or episodic, are identified based on their shape and have the following characteristics:
   a. They are variable in duration, shape and depth.
   b. They are abrupt in onset & cessation.
   c. They are not always recurrent.
   d. When variables are associated with uterine contractions, their onset, depth, and duration may vary with successive contractions.
3. Variable decelerations likely occur as a result of baroreceptor stimulated vagal activity. Variable decelerations are clinically associated with cord compression and conditions associated with cord compression (oligohydramnios, ROM, nuchal cord, bandolier cord and a true knot of the cord). Vagal activity induced by head compression, particularly in the second stage of labor, is another well-documented source of variable decelerations.
4. Interpretation: Variable decelerations require further evaluation and consideration:
   a. When intermittent variable decelerations occur in the context of moderate variability and a normal baseline, they are not associated with fetal acidemia and can be observed without intervention or with use of conservative measures such as position change, increased fluids or amnioinfusion.
   b. When recurrent variables with nadir > 20 bpm below baseline occur, notify CNM or physician.
   c. When variable decelerations are associated with minimal variability, notify the CNM or physician.
   d. When variable decelerations are associated with absent variability, the risk of fetal acidemia is significant. This is a category III FHR pattern and requires bedside evaluation by a CNM or physician and plan for delivery

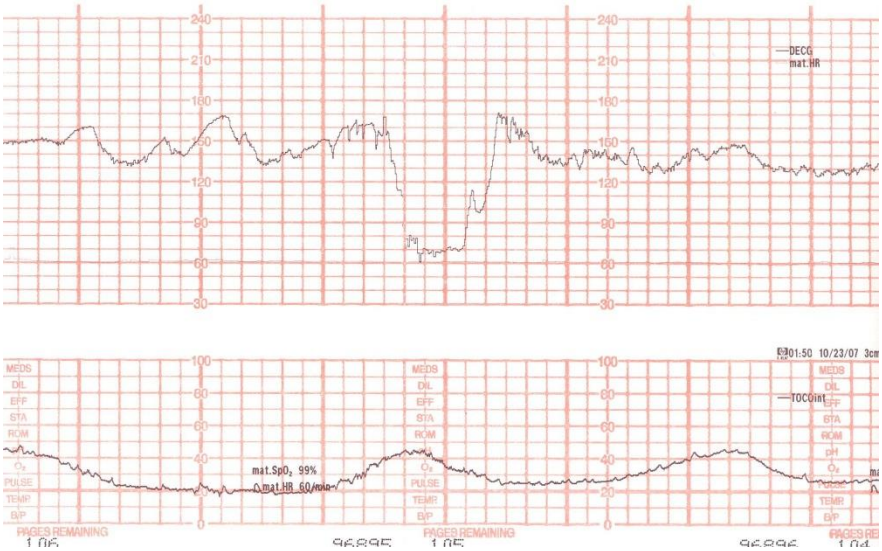


Figure 8: Variable deceleration with moderate variability

K. **Prolonged Decelerations**:

1. **Prolonged decelerations** share features common to both variable decelerations and fetal bradycardia. Prolonged decelerations are defined as a decrease from baseline of > 15 bpm, which lasts > 2 minutes but < 10 minutes from onset to return to baseline. Prolonged deceleration > 10 minutes is a baseline change. The CNM or physician should be notified if there is a prolonged deceleration.

    a. Interpretation: Prolonged decelerations' clinical significance is based on an assessment of the accompanying variability which in turn will be affected by the nadir decrease in FHR below baseline, the duration of the deceleration in seconds/minutes from the beginning of the deceleration to the end (return to baseline), and the frequency with which they present.

    b. Prolonged decelerations may be clinically managed similar to a FHR tracing complicated by other types of decelerations, or as a fetal bradycardia, depending on their presenting features/clinical significance.

Category I Normal	**Category II Indeterminate**	**Category III Abnormal**
• Baseline rate: 110–160 beats per minute • Moderate baseline FHR variability • Late or variable decelerations: absent • Early decelerations: present or absent • Accelerations: present or absent	• Bradycardia not accompanied by absent baseline variability • Tachycardia • Minimal baseline variability • Absent baseline variability with no recurrent decelerations • Marked baseline variability • Absence of induced accelerations after fetal stimulation • Recurrent variable decelerations accompanied by minimal or moderate baseline variability • Prolonged deceleration more than 2 minutes but less than10 minutes • Recurrent late decelerations with moderate baseline variability • Variable decelerations with other characteristics such as slow return to baseline, "overshoots", or "shoulders"	• Absent baseline FHR variability and any of the following: —Recurrent late decelerations —Recurrent variable decelerations —Bradycardia • Sinusoidal pattern

Figure 9: NICHD Categories for EFM

Adapted from Macones, et al 2008

VII. CHARACTERISTICS, INTERPRETATION, AND NOTIFICATION GUIDELINES OF UTERINE CONTRACTIONS

A. Uterine Contraction Definitions

1. Uterine contractions are quantified as the number of contractions present in a 10-minute window, averaged over 30 minutes. Contraction frequency alone is partial assessment of uterine activity. Other factors such as duration, intensity, relaxation time between contractions, and Montevideo Units (MVUs) if an internal IUPC is in place
2. Duration: Counted from when the contraction starts to when it ends
3. Frequency: Time interval from the beginning of one contraction to the beginning of the next contraction
4. MVUs: Calculated by counting the peak intensity or amplitude in mm Hg and subtracting the baseline tone for each contraction occurring in a 10 minute period of time. These numbers are then totaled.

B. Interpretation

1. Normal: ≤ 5 contractions in ten minutes averaged over 30 minutes
2. Tachysystole: > 5 contractions in 10 minutes, averaged over 30 minutes Tachysystole should always be qualified by the presence or absence of FHR variant patterns. Tachysystole applies to both spontaneous and stimulated labor. The clinical response to tachysystole may differ depending on whether contractions are spontaneous or stimulated.
3. MVU of ≥ 200 mm Hg after subtracting the baseline tonus is considered adequate force of contraction activity.
4. The terms hyperstimulation and hypercontractility are not defined and should be abandoned.

VIII. RESPONSIBILITY

For questions regarding this policy contact the Birth Center Clinical Nurse Specialist or Birth Center Unit Leadership.

HISTORY OF THE POLICY

Revised: February 2022 by M. Duck, RNC-OB, MS, CNS

Last Approved: March 2022, Melissa Rosenstein, MD, MAS, Naghma Farooqi, MD, Vanessa Tilp, CNM

Appendix A

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