Policy Title/Number: **Fetal Heart Rate Monitoring** AS 201111-20.01

Manual: Area Specific—Labor and Delivery

Categories: Practice Guidelines

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Review Responsibility: Labor and Delivery Clinical Policy Committee
OB Patient Care Center (PCC) Committee
OB PCC Executive Committee

Effective Date: 1976

Last Revised Date: 1/2009

Team Members Performing:
- All faculty and staff
- All faculty and staff providing direct patient care or contact
- MD
- RN
- LPN
- VUSN/VUSM students
- Other licensed staff (specify): Certified Nurse Midwives, Advanced Practice Nurses,

Physicians

- Other non-licensed staff (specify):
- Not Applicable

Guidelines Applicable to:
- VUH
- VMG*
- VCH
- VPH
- VUSM
- VUSN
- Other (specify): Labor & Delivery, 4 South, 4 East, Center for Women’s Health
- Exceptions (specify): where fetal monitoring is necessary and transfer to selected areas is not possible
- Not Applicable

* Includes satellite sites unless otherwise specified.

Specific Education Requirements:   X  Yes   No  Not Applicable
Completion of Unit Orientation which includes Fetal Monitoring competency
Completion of Annual Unit Based Fetal Monitoring Competency

Physician Order Requirements:   X  Yes   No  Not Applicable
Fetal Heart Rate Monitoring

I. **Outcome Goal:** To outline the management of patients requiring fetal heart rate and uterine activity monitoring.

II. **Policy:** Qualified personnel collaboratively develop and plan the care of patients requiring fetal heart rate monitoring.

III. **Equipment/Supplies:**
May include but not limited to:
- electronic fetal monitoring equipment
- doppler
- ultrasound

IV. **Protocol:**

A. **Methods of Assessment**

1. **Auscultation** involves intermittent assessment of the fetal heart rate (FHR) and may be accomplished using a doppler or ultrasound (US) transducer from the electronic fetal monitor. To obtain a baseline, the FHR is auscultated between contractions and for a full 60 seconds. The rate is counted in beats per minute (BPM). If the patient is contracting, the FHR is auscultated before, during, and after a uterine contraction to assess for the presence of audible accelerations or decelerations. The FHR is auscultated for a full 60 seconds after the contraction in order to assess the fetal response to the contraction.

2. **Palpation** involves use of the examiner’s hand to assess for uterine activity and resting tone. The examiner palpates the fundus of the uterus for frequency, intensity, and duration of contractions and the tone of the uterus between contractions (uterine tone).

3. **Electronic Fetal Monitoring (EFM)** may be accomplished by the following two methods:
   (a) **External appliances**:
      (i) Ultrasound transducer permits evaluation of baseline FHR, baseline fetal heart rate variability and the presence or absence of periodic patterns.
      (ii) Tocodynamometer permits evaluation of uterine contraction (UC) frequency and approximate duration. Intensity of the UC and the resting tone is estimated by palpation.
   (b) **Internal appliances**
      (i) Fetal ECG electrode permits evaluation of FHR baseline, baseline variability and the presence or absence of episodic and periodic patterns. Fetal ECG electrode may be placed when the information obtained from the external appliance is inadequate.
      (ii) Intrauterine Pressure Catheters (IUPC) permit evaluation of contraction frequency, duration, intensity, and resting tone. An IUPC is placed when the information obtained from the external appliance is inadequate.

Uterine activity can be quantified by calculating Montevideo units (MVU). The desired goal for adequate uterine activity is MVU of 180-240. When MVU are in this range, labor progression is expected. (see Appendix B)
B. Assessment Parameters

1. Auscultation and Palpation:
   (a) Auscultation
      FHR assessment includes the following:
      (i) Rate in beats per minute
      (ii) Presence/absence of audible decelerations or accelerations
   
   (b) Palpation
      Uterine activity assessment may be completed at the time of FHR assessment and includes:
      (i) Palpation of frequency, duration and intensity of uterine contractions
      (ii) Uterine resting tone – relaxed or not relaxed

2. EFM (Electronic Fetal Monitoring)-electronic fetal heart rate monitoring is utilized only in the fetus that is 24 weeks gestation or greater. When using intermittent or continuous EFM as the method of assessment, the following parameters are assessed:
   
   (a) FHR assessment, including:
      (i) Baseline rate (See Glossary)
      (ii) Baseline variability (See Glossary)
      (iii) Presence or absence of episodic or periodic patterns (accelerations and decelerations). If decelerations are present the type of deceleration is documented.
   
   (b) Uterine Activity, including:
      (i) Frequency, duration, and intensity of uterine contractions
      (ii) Uterine resting tone
      (iii) MVU is calculated when IUPC is used

C. Interpretation of Data

When assessing fetal heart rate and uterine activity the clinician considers the following parameters: baseline rate and variability, presence of accelerations, periodic or episodic decelerations, changes in the parameters over time, medications administered, and the presence of disease state in the mother or fetus.

Interpretations of fetal heart rate patterns are based on the Three-Tier Fetal Heart Rate Interpretation System presented at the 2008 National Institute of Child Health and Human Development Workshop Report on Fetal Monitoring (Macones et al., 2008). See Appendix A

D. Interventions

A. Auscultation:
   1. Category I - continue assessment at appropriate intervals
2. Category II or III – initiate continuous EFM and notify provider. Further interventions are based on assessments, diagnosis, gestational age of the fetus, maternal status, and provider orders.

B. EFM (Electronic Fetal Monitoring):
   1. Category I- continue assessment at appropriate intervals
   2. Category II- continue assessment at appropriate intervals
      Notify provider to review FHR tracing
   3. Category III: – Initiate interventions listed below:
      a) Lateral positioning of patient – AVOID SUPINE POSITION
      b) Oxygen administration by face mask at 10 L/minute
      c) Evaluate maternal blood pressure status (consider treatment of hypotension or hypertension)
      d) Place intravenous access if not already obtained and initiate 500 cc bolus of crystalloid solution when appropriate
      e) If oxytocin is infusing, decrease or discontinue the infusion
      f) Vaginal exam when appropriate to check for prolapsed cord or imminent delivery
      g) Notify provider of interventions initiated and the fetal response to intervention
      h) Terbutaline to bedside (do not give unless ordered by provider)
      i) Anticipate need for preparation of patient for cesarean section

C. Loss of fetal heart tones or difficulty obtaining fetal heart tones
   1. Notify provider immediately
   2. Initiate interventions for Category III FHR tracings as listed above

E. Frequency of Assessments

1. Antepartum Patients (Stable)
   a. If less than 24 weeks, FHR assessment is done by auscultation only
   b. Antepartum testing (NST, BPP) is done per provider order
   c. Auscultation of the fetal heart rate is done every eight hours
   d. For patients on the Antepartum unit, each monitor strip is assessed by two care providers (two RNs or RN and MD/CNM)

2. Labor Patients (Low Risk)
   a. FHR and uterine activity is assessed every 30 minutes in the first stage of labor and every 15 minutes in the second stage of labor.
   b. If intermittent auscultation or intermittent monitoring is selected as the primary method of surveillance the patient has an initial reactive tracing after which the frequencies of assessments may be the same as those listed as above. With intermittent fetal monitoring, the nurse documents the fetal heart rate before, during and after the contraction. Contractions are assessed using palpation.
3. Labor Patients (High Risk)
   a. FHR and uterine activity are assessed every 15 minutes in the first stage of labor and every 5 minutes in the second stage of labor.
   b. In the second stage of labor for high risk patients, the nurse remains at the bedside and documents a summary statement regarding fetal heart rate responses during this period.
   c. If a summary statement is planned, the nurse documents the assessments every fifteen minutes rather than every five minutes.

4. Antepartum Patients (Evaluation and Stabilization Period)
   a. External fetal monitoring is initiated on all patients greater than 24 weeks unless otherwise ordered.
   b. FHR and uterine responses are assessed every thirty minutes when the patient is on continuous monitoring.
      Once the patient has been evaluated and stabilized, frequency of assessments may be per provider order.

5. Patient requiring Oxytocin Induction or Augmentation of Labor
   a. Continuous electronic fetal monitoring is utilized on all patients requiring oxytocin administration.
   b. FHR and uterine activity assessments occur with each titration of oxytocin (increase or decrease).
   c. When oxytocin dose is not being titrated, assessment of FHR and uterine responses occur at least every thirty minutes.

6. Patients who are being evaluated for non-obstetric issues have documentation of fetal viability only. They do not require continuous electronic fetal heart rate monitoring.

7. Patient undergoing vaginal birth after cesarean (VBAC) who are in active labor will have continuous electronic fetal monitoring. For the purposes of this policy, active labor is defined as regular, painful contractions and cervical dilation of 4 or more centimeters.

V. Documentation

Documentation of fetal heart rate and uterine activity occurs with each assessment.

   Documentation includes
   - Baseline fetal heart rate
   - Baseline variability
   - Presence of criteria accelerations (10x10 if < 32 weeks gestation, 15x15 if ≥ 32 weeks gestation)
   - Presence or absence of decelerations and type of deceleration if present
   - Uterine activity – frequency, duration, intensity and resting tone
   - Interventions performed related to fetal heart rate

VI. Nursing Implication
   Notify Provider of the following
   1. Loss of fetal heart tones or difficulty obtaining fetal heart tones
   2. Category II or III fetal heart rate tracings.
3. Interventions initiated and patient response to interventions
4. Cervical exam of 10 centimeters
5. Imminent delivery
6. Change in baseline vital signs
   a. Hypotension – when pt is symptomatic (dizzy, pale, weak, tachycardic) or changes in fetal heart rate occur
   b. Hypertension
   c. Sustained maternal tachycardia (maternal heart rate greater than 120)
   d. Maternal temperature 100.4 or greater.
7. New onset vaginal bleeding or increase in vaginal bleeding

VII. Patient/Family Education:

Plan of Care
Unit Routine
Electronic Fetal Monitoring

VIII. Cross References:

Guidelines for Electronic Documentation and Fetal Monitor Storage and Archive in the QMI System

Epidural Analgesia: Nursing Care of the Pregnant Patient in Labor and Delivery

Management of Patients in Labor

Management of Patients Requiring Induction, Augmentation, or Active Management of Labor

Vaginal Birth After Cesarean (VBAC)

IX. References:


Ferrara, L. (2005). Is the non-stress still useful? Evidence of the value of antepartum fetal surveillance is largely circumstantial. Studies suggest, however, that the NST can provide useful information when done alone, and even more so when combined with other variables. *Contemporary OB/GYN, 50*(2), 38-45.


**XI. Endorsements** – Clinical Practice Committee

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GLOSSARY

**Acceleration (accel):** A visually apparent abrupt increase (defined as onset of acceleration to peak in <30 seconds) in FHR above the baseline. The increase is calculated from the most recently determined portion of the baseline. At 32 weeks gestation and beyond, the acme is ≥ 15 bpm above the baseline, and the acceleration lasts ≥ 15 seconds and < 2 minutes from the onset to return to baseline. Before 32 weeks of gestation, accelerations are defined as having an acme ≥ 10 bpm above baseline, and a duration of ≥ 10 seconds and < 2 minutes. *Prolonged acceleration* is of duration ≥ 2 minutes and < 10 minutes. Accelerations of ≥ 10 minutes in duration is a baseline change.

**Artifact:** False fetal or maternal data printed on the tracing.

**Baseline:** The approximate mean FHR rounded to increments of 5 bpm during a 10 minute segment, excluding periodic or episodic changes, periods of marked FHR variability or segments of the baseline which differ by > 25 bpm. In any 10-minute window the minimum baseline duration must be at least 2 minutes, otherwise the baseline for that period is indeterminate.

**Baseline Fetal Heart Rate Variability:** Fluctuations in the baseline FHR of 2 cycles per minute or greater. The fluctuations are irregular in amplitude and frequency, and are visually quantitated as the amplitude of the peak-to-trough in bpm as follows:

- Amplitude range undetectable - absent FHR variability
- Amplitude range detectable but 5 bpm or less - minimal FHR variability
- Amplitude range 6-25 bpm - moderate (normal) FHR variability
- Amplitude range > 25 bpm - marked FHR variability

No distinction is made between short-term variability and long-term variability because in actual practice they are visually determined as a unit.

**Bradycardia:** Fetal heart rate baseline less than 110 bpm for at least 10 minutes, however, some fetuses have a normal baseline rate of 100-110 bpm.

**Contraction Stress Test (CST):** Antepartum surveillance method using induced or spontaneous contractions to evaluate fetal response. A negative test implies no late decelerations are seen. A suspicious test implies at least one late deceleration is seen. A positive test implies that late decelerations are seen with 50% or more contractions occurring in a 10 minute period.

**Early Deceleration (early):** A visually apparent gradual decrease (defined as onset of deceleration to nadir ≥ 30 seconds) and return to baseline FHR associated with a uterine contraction. The decrease is determined from the most recently determined portion of the baseline. The nadir of the deceleration occurs at the same time as the peak of the contraction.

**Electronic Fetal Monitoring (EFM):** Instrument used to show graphically and continuously the relationship between maternal uterine activity and FHR.

**Fetal Heart Rate (FHR):** Generally refers to the rate in beats per minute.
Fetal ECG Electrode (FECG): a bipolar terminal that detects the difference in voltage between the fetal presenting part and vaginal wall of the mother.

Intrauterine Pressure Catheter (IUPC): A fluid-filled or transducer tipped catheter inserted transvaginally into the uterus. Intra-uterine pressure is conducted through the catheter, exerted on a diaphragm and transformed to an electronic signal, then printed on the tracing.

Late deceleration (late): a visually apparent gradual decrease (defined as onset of deceleration to nadir > 30 seconds) and return to baseline FHR associated with a uterine contraction. The decrease is determined from the most recently determined portion of the baseline. The deceleration is delayed in timing, with the nadir of the deceleration occurring after the peak of the contraction.

Montevideo Units (MVU’s): the sum total in mmHg of the strength of all contractions occurring during a 10 minute period, excluding uterine resting tone.

Non-Stress Test (NST): antepartum surveillance method used to evaluate fetal condition and placental function in a stable state. A reactive result implies that at least 2 accelerations of the FHR are seen within a 20 minute period. A non-reactive (NR) baseline does not meet the above criteria.

Oxytocin Challenge Test (OCT): A CST which is conducted by stimulation of uterine contractions with intravenous oxytocin.

Periodic Pattern: FHR changes, either accelerations or decelerations from the baseline lasting less than 10 minutes.

Prolonged Deceleration: a visually apparent decrease in FHR at least 15 bpm below the baseline, lasting > 2 minutes but < 10 minutes from onset to return to baseline.

Tachycardia: baseline FHR greater than 160 bpm lasting for 10 minutes or longer.

Tocodynamometer (toco): An external device used to measure uterine activity.

Transducer: various devices which convert mechanical energy into electrical energy.

Uterine Contractions (UC): periodic increase in intrauterine pressure. When externally palpated, uterine contractions are classified as mild, moderate or strong.

Uterine resting tone: baseline intra-uterine pressure measured between UC’s. Average resting tone is 5-15 mm Hg when using IUPC. If resting tone is greater than 20 mmHg palpation is required to further assess resting tone. When externally palpated, uterine resting tone is classified as relaxed or non-relaxed.
Variable Deceleration (variable): visually apparent abrupt decrease (defined as onset of deceleration to beginning of nadir < 30 seconds) in FHR below the baseline. The decrease in FHR (below the baseline) is at least 15 bpm below the baseline, lasting > 15 seconds and < 2 minutes from onset to return to baseline.
APPENDIX A

Three-Tier Fetal Heart Rate Interpretation System (Macones et al., 2008)

Category I
*Category I fetal heart rate (FHR) tracings include all of the following:*
  • Baseline rate: 110–160 beats per minute (bpm)
  • Baseline FHR variability: moderate
  • Late or variable decelerations: absent
  • Early decelerations: present or absent
  • Accelerations: present or absent

Category II
*Category II FHR tracings include all FHR tracings not categorized as Category I or Category III. Category II tracings may represent an appreciable fraction of those encountered in clinical care.*

*Examples of Category II FHR tracings include any of the following:*

**Baseline rate**
  • Bradycardia not accompanied by absent baseline variability
  • Tachycardia

**Baseline FHR variability**
  • Minimal baseline variability
  • Absent baseline variability not accompanied by recurrent decelerations
  • Marked baseline variability

**Accelerations**
  • Absence of induced accelerations after fetal stimulation

**Periodic or episodic decelerations**
  • Recurrent variable decelerations accompanied by minimal or moderate baseline variability
  • Prolonged deceleration ≥2 minutes but <10 minutes
  • Recurrent late decelerations with moderate baseline variability
  • Variable decelerations with other characteristics, such as slow return to baseline, “overshoots,” or “shoulders”

Category III
*Category III FHR tracings include either:*
  • Absent baseline FHR variability and any of the following:
    - Recurrent late decelerations
    - Recurrent variable decelerations
    - Bradycardia
  • Sinusoidal pattern
APPENDIX B

Electronic Fetal Monitoring for Multiple Gestation Pregnancy

The goal of electronic fetal monitoring in a multiple gestation pregnancy is to ensure that each fetus is being monitored individually and that the data obtained is sufficient for interpretation of fetal well being.

Prior to the initiation of electronic fetal monitoring an ultrasound exam will be done to:

a. Confirm that the fetuses are all alive
b. Assist the nurse in obtaining correct placement of the Doppler ultrasound transducer.
c. If more than 24 hours have passed since ultrasound documentation of fetal position, then a repeat examination is necessary prior to monitoring
d. If there are any delays in completion of the ultrasound exam, the nurse may initiate fetal heart rate monitoring but be alert for any indication that the tracings are of the same fetus or that the maternal heart rate is tracing. If either of these situations occurs the ultrasound exam must be done immediately to validate the fetal heart rates.

Procedure for Twin gestation

1. After the ultrasound examination has been complete apply the Doppler ultrasound transducers to the maternal abdomen in the locations identified during the exam as being the best suited for signal transmission
2. A separate transducer will be used for each fetus
3. Identify the fetuses in the following manner:
   a. The fetus that is presenting (closest to the maternal cervix) will be labeled as fetus A
   b. The non-presenting fetus will always be identified as fetus B
4. When a fetal spiral electrode is used for monitoring the presenting twin, a transducer will still be used to monitor Twin B. Once the FECG is in place, the transducer that was previously being used on Twin A will be removed from the maternal abdomen and disconnected from the monitor
5. Each tracing will be assessed for the following: baseline rate and variability, presence or absence of accelerations and decelerations, and type of decelerations (if present).
6. Frequency of assessments will depend on diagnosis and risk status.
7. During assessments the nurse will compare tracings looking for characteristics that identify each tracing as unique.
8. During assessments the nurse will also compare the fetal heart rate tracings with the maternal heart rate. If there is any question that a maternal heart rate is being traced in place of a fetal heart rate, an ultrasound exam will be done to verify the fetal heart rate and assist with repositioning of the transducer. In addition, if this question arises consider using an electronic maternal pulse meter such as an ECG or pulse oximeter to document maternal heart rate clearly on the tracing. This should be used until the identity of the tracing is confirmed.

Procedure for Triplet or higher multiple gestations

1. Fetal monitoring for these patients will be ordered by the provider on an individual basis.
APPENDIX C

Non Stress Testing

The non stress test (NST) is a noninvasive prenatal screening procedure performed in pregnancies of more than 28 weeks' gestation. It is performed to assess fetal well-being. A reactive non stress test indicates that the flow of blood and oxygen to the fetus is adequate.

Indications for a non stress test include but are not limited to: maternal report of decreased fetal movement, suspicion of placental insufficiency, postdates pregnancies and high risk pregnancies (such as those complicated by maternal hypertension, gestational diabetes, intrauterine growth restriction or previous stillbirth).

Procedure:

1. The procedure is explained to the patient and the patient’s identity is verified using two identifiers per hospital policy.

2. The patient is positioned for comfort in a side-lying position or semi-propped position to either side. The supine position should be avoided due to the risks of supine hypotension due to the pressure of the gravid uterus on the maternal blood vessels.

3. The fetal monitor ultrasound and uterine tocodynamometer are placed on the patient’s abdomen to assess fetal heart rate and uterine contraction pattern.

4. Continuous external fetal monitoring and uterine contraction monitoring are performed for 20 to 30 minutes.

5. The fetal heart rate is assessed for the following:
   a. The FHR baseline is between 120-160 beats per minute.
   b. Moderate variability is present.
   c. FHR reactivity is present. Term reactivity is determined by the presence of 2 term accelerations (15 beats x 15 seconds) in 20 minutes. Preterm reactivity is defined as the presence of two preterm accelerations (10 beats x 10 seconds) in 20 minutes.

6. If any of these components listed above (baseline within normal limits, variability, or accelerations) are absent within 40 minutes, the NST is considered nonreactive.

7. If a nonreactive NST is present, the provider is notified for further evaluation.

8. If a reactive NST is present, the fetal and uterine contraction monitors are removed and the fetal heart rate tracing is reviewed by the provider.

9. If any decelerations or contractions are noted while performing the NST, the provider must be notified.

10. The nurse will document the NST in the appropriate electronic medical record.

11. The nurse will present the FHR tracing to a faculty provider who will provide electronic attestation.
APPENDIX D

Fetal Acoustic Stimulation

Fetal acoustic stimulation (FAS) is used as an adjunct for the assessment of fetal condition in both the antepartum and intrapartum periods.

I. Fetal acoustic stimulation may be applied in the following situations:

A. Antepartum Testing

1. Acoustic stimulation is performed after 10 minutes of established FHR baseline and only if the test is not reactive.

2. The NST is read as reactive if 2 FHR accelerations occur in a 20 minute window. The NST may also be read as reactive if a single prolonged acceleration occurs following acoustic stimulation. Additionally, the test can end on a prolonged acceleration without return to baseline as long as the baseline can be determined from the preceding test segment.

3. Expected benefits include:
   a. decreased testing time
   b. a decrease in false non reactive tests and fewer follow-up tests (biophysical profile, contraction stress test) required

B. Intrapartum Fetal Surveillance (consider fetal scalp stimulation first)

1. FHR patterns without reactivity are not uniformly associated with fetal acidemia but further clarification of fetal condition is warranted

2. Spontaneous or stimulus-evoked FHR accelerations, such as those stimulated by FAS, are considered to be a reliable indicator of fetal well-being. FAS provides a rapid, easily performed, non-invasive means for eliciting FHR accelerations.

3. Current data suggest that a reactive response to FAS (FHR acceleration) is associated with fetal pH >7.20. Approximately 50% of fetuses who do not exhibit accelerations will be associated with an acidemic fetus.

4. Expected benefits
   a. rapid, easily performed, non-invasive yet effective adjunctive method of determining intrapartum fetal well-being.
   b. decrease in number of cervical exams for the purpose of scalp stimulation

II. Equipment and Technique

A. Acoustic stimulation may be accomplished with an fetal acoustic stimulator

B. The stimulator is to be placed on the maternal abdomen over the fetal vertex and stimulus applied for < 3 seconds. The stimulus may be repeated at 1 minute intervals for a maximum of three attempts.
Internal Uterine Pressure Catheters (IUPC)

Internal uterine pressure catheters (IUPC) are inserted internally into the uterus via the vagina and cervix. The purpose of the IUPC is to objectively measure the pressures and characteristics of uterine contractions and uterine resting tone. The decision to use an IUPC is based on the clinical need for information beyond what is available through maternal description, abdominal palpation or tocodynamometer data. An IUPC may also be used as a tool to infuse fluid into the uterine cavity (amnioinfusion). Rupture of membranes and cervical dilation are required before an IUPC may be inserted.

Indications for Use

May include but not limited to:
1. Lack of progress in labor
2. Previous uterine scarring
3. External methods of assessment are inadequate
4. Amnioinfusion – for thick meconium and/or variable decelerations
5. Withdrawal of amniotic fluid for testing

Procedure

1. Provider assesses and determines need for IUPC placement
2. Provider places IUPC following directions for that specific model
3. Assist provider with placement of the catheter, using appropriate cable.
4. Obtain baseline uterine tone readings in the left, right, and supine (with lateral tilt) positions. Intraterine hydrostatic pressure is altered by maternal position changes and affects the uterine resting tone as read by sensor-tipped catheters. Obtaining baseline pressure reading in the different positions demonstrates these changes on insertion thus preventing misinterpretations of resting tone changes following position changes during the labor process. Document baseline readings.
5. Quantify the uterine activity – calculate the Montevideo units (MVU) with every assessment and prior to titration of oxytocin. (see the example below)
6. Document the MVU and uterine resting tone with each titration of oxytocin and with every uterine activity assessment.
7. The goal for MVU is between 180 and 240 mmHg in a ten minute segment of the FHR tracing

Procedure when IUPC is used for amnioinfusion only

1. Obtain catheter for amnioinfusion. If using for amnioinfusion only, zeroing of the IUPC is not necessary
2. Assist provider with placement of the catheter
3. Connect the catheter and infuse the solution as outlined below
   a. Obtain 1000 cc bag of Normal Saline and IV pump tubing
   b. Flush IV tubing with the saline
   c. Connect the tubing to the IUPC and begin the infusion using an infusion pump
   d. If using for meconium dilution give 500 cc bolus over 30 minutes and maintain infusion at 100-150 cc/hr
   e. If using for relief of variable decelerations bolus with solution until variables
are relieved but do not exceed 600 cc in the first hour, maintenance infusion should not exceed 180 cc/hr

f. Assess uterine tone being alert for increasing tone which may indicate overdistension of the uterus. Turn off infusion if this occurs and notify provider

g. Assess for fluid return, if no fluid is leaking be alert for increased tone. Turn off infusion if increased tone is noted and notify provider

Montevideo Units (MVU)

These are a quantitative measurement of the uterine contraction intensity over a 10 minute period. The procedure for calculating MVU is as follows

1. Identify a 10 minute period on the fetal monitor tracing. When using this information to titrate oxytocin dosage, use the most recent 10 minute segment
2. Subtract the uterine resting tone from the peak pressure of the contraction. (do this for every contraction in the 10 minute segment)
3. Add together the numbers obtained for each contraction in the 10 minute segment
4. The number obtained from the addition of the contractions is the total MVU for that segment

Example
In your 10 minute segment there are three contractions
The peak of the contractions in this ten minute segment are 70, 80 and 75 mmHg
The resting tone is 10
70 – 10 = 60
80 – 10 = 70
75 – 10 = 65

60+70+65 = 195 mmHg, thus your MVU for this ten minute segment would be 195 with a resting tone of 10 mmHg