Advanced Fetal Monitoring Application in Nursing Management of Labor

Shelora Mangan DNP, CNS, RNC-OB
Perinatal Clinical Nurse Specialist
Legacy Health

Fetal Heart Rate Monitoring

FTM is an indirect screening assessment of fetal oxygenation status rather than a reliable diagnostic tool and requires careful assessment of the complete picture as much as possible.

- Maternal factors (cardiac output, position, Hgb. Level, oxygen saturation) directly influence fetal oxygenation.
- Goal is to prevent fetal injury that might result from disrupted fetal oxygenation and perfusion during or prior to labor.

Documentation Guidelines

When EFM is used, the FHR findings are recorded electronically. Therefore documentation of the clinician’s interpretation of EFM findings may occur at intervals that are different from the assessment interval, as indicated by institutional policy and procedure. For example, it may be appropriate for a nurse who is at the bedside continuously assessing the FHR during the active pushing phase of the second stage of labor to document FHR interpretation in a summary note at intervals of 15 to 30 minutes or more.

- AWHONN Fetal Heart Monitoring Principles and Practices

AWHONN Position Statement 2015

- Documentation should occur concurrent with assessment when using intermittent auscultation, as there is no other record of FHM data in this situation. Documentation does not necessarily need to occur at the same intervals as assessment when using continuous EFM because FHM data are recorded in the tracing. For example, while evaluation of the FHR may be occurring every 15 minutes with EFM, a summary note including findings of fetal status may be documented in the medical record less frequently.

Choosing the Appropriate Monitoring Technique

- Choose method that will provide you with the information that you need to effectively and systematically assess your patient’s uterine activity & fetal heart rate, taking into account the patient’s risk factors, labor status & interventions.

- Auscultation, external FHR and uterine activity monitoring, internal fetal scalp electrode (FSE), intrauterine pressure catheter (IUPC), or Monica monitor.
The FHR should be monitored before and after administration of neuraxial analgesia for labor. Continuous electronic recording of FHR may not be necessary in every clinical setting and may not be possible during initiation of neuraxial anesthesia.

AWHONN: Nursing care of the woman receiving epidural analgesia/anesthesia in labor (2nd ed.)

Extrinsic Influences on FHR
- Placenta
- Maternal utero-placental circulation
- Fetal-placental circulation
- Placental transfer
- Maternal oxygen content
- Oxygen delivery (cardiac output & SaO2)
- Umbilical cord
- Amniotic fluid

Intrinsic Influences on FHR
- Fetal circulation
- Oxygen transport to fetal tissue
- Fetal cardioregulatory center
  - Parasympathetic nervous system
  - Sympathetic nervous system
    - Baroreceptors
    - Chemoreceptors
- Hormonal regulation
- Fetal state patterns

FHR Tracing Categories
- **Category I**: Strongly predictive of normal fetal acid-base status at time of tracing (Normal)
- **Category II**: Not necessarily predictive of abnormal fetal acid-base status due to lack of evidence at this time (Indeterminate)
- **Category III**: Predictive of abnormal fetal acid-base status at time of observation and require prompt evaluation/interventions (Abnormal)

**Category I**
- Includes all of the following:
  - Baseline rate: 110 – 160 bpm
  - Moderate baseline variability
  - Late or variable decels: absent
  - Early accels: absent or present
  - Accels: present or absent
Category II

- Include all tracings that are not included in Category I or Category III

Category III

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

Intermittent Auscultation Intervals

Intermittent auscultation (IA) is recognized as an appropriate method for fetal monitoring, particularly in the low risk patient.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Low-risk without oxytocin</th>
<th>Latent Phase (&lt; 4 cm)</th>
<th>Latent Phase (4-5 cm)</th>
<th>Active Phase (≥ 6 cm)</th>
<th>Second Stage (Passive Descent)</th>
<th>Second Stage (Active Pushing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every 15 minutes</td>
<td>At least hourly</td>
<td>Every 15 – 30 minutes</td>
<td>Every 15 – 30 minutes</td>
<td>Every 5 – 15 minutes</td>
<td>Every 5 – 15 minutes</td>
<td></td>
</tr>
<tr>
<td>Every 30 minutes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Every 15 minutes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Frequency of assessment at times will need to occur more often based on maternal-fetal clinical needs.

What Can Be Assessed?

- FHR baseline rate (between palpated contractions & when fetus is not moving)
- Rhythm (regular or irregular)
- Increases & decreases from the baseline
- Spontaneous accelerations
- Abrupt or gradual decreases from the baseline

What Cannot Be Assessed

- FHR baseline variability
- FHR deceleration patterns
### Category I Characteristics with Auscultation
- Baseline rate of 110 – 160 bpm
- Regular rhythm
- Presence or absence of increases from the baseline
- Absence of decrease from baseline

### Indeterminate FHR Pattern
- Baseline rate < 110 or > 160 bpm
- Persistent tachycardia for > 3 contractions or > 10-15 minutes
- Irregular rhythm
- FHR during & 30 seconds following a contraction
- Gradual or abrupt decrease in FHR

### Intervention/Management
- Increase frequency of auscultation
- Assess potential cause
- Intervene to promote: improved uterine blood flow, improved umbilical blood flow, improved oxygenation, & decreased uterine activity
- Interventions include: Maternal position change, IV hydration, decrease maternal anxiety, comfort measures, labor support

### If FHR Pattern Persists:
- Continue interventions
- Apply EFM to clarify pattern, assess variability & further assess fetal status
- Notify provider

### Continuous Electronic Fetal Monitoring
- Variability & type of decelerations can be assessed
- Allows ongoing assessment of FHR and uterine activity
- FHR recorded for assessment & permanent record
- Relatively consistent recordings possible when correct method is chosen

### Continuous Monitoring Assessment Intervals (AWHONN 2015)

<table>
<thead>
<tr>
<th>Phase</th>
<th>Assessment Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-risk</td>
<td></td>
</tr>
<tr>
<td>No oxytocin</td>
<td>At least hourly</td>
</tr>
<tr>
<td>With oxytocin or risk factors</td>
<td>Every 15 minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase</th>
<th>Assessment Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latent Phase (4 cm)</td>
<td>Every 30 minutes</td>
</tr>
<tr>
<td>Active Phase (5-6 cm)</td>
<td>Every 15 minutes</td>
</tr>
<tr>
<td>Second Stage (Passive)</td>
<td>Every 15 minutes</td>
</tr>
<tr>
<td>Active Phase (Pushing)</td>
<td>Every 5 minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase</th>
<th>Assessment Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latent Phase (4 cm)</td>
<td>Every 30 minutes</td>
</tr>
<tr>
<td>Active Phase (5-6 cm)</td>
<td>Every 15 minutes</td>
</tr>
<tr>
<td>Second Stage (Passive)</td>
<td>Every 15 minutes</td>
</tr>
<tr>
<td>Active Phase (Pushing)</td>
<td>Every 5 minutes</td>
</tr>
</tbody>
</table>
External Doppler Ultrasound

- Transducer detects ultrasound wave bounced back from fetal heart & counts FHR by measuring the change in US wave frequency that occurs when waveform is reflected off the moving heart.
- Monitor counts time interval between each beat, calculates a rate based on that interval, & plots it on the tracing.
- Monitor recounts rate every one to two beats.

Fetal Scalp Electrode

- Most accurate method to assess FHR.
- The three leads of the electrode detect the PQRST complex.
- Filter removes all but R wave.
- Monitor calculates time elapsed between each R wave & converts that time into beats per minute & records on tracing.
- Variability is slightly, but not significantly, more accurate than with doppler US.

External TOCO

- Tokos is childbirth in Greek.
- TOCO detects pressure changes in the maternal abdomen from uterine contractions.
- Intensity & resting tone cannot be determined by tocodynamometer & must be palpated.
- Duration & frequency are relatively accurate with TOCO.

IUPC

- Most accurate method of determining uterine activity.
- Directly measures actual strength of the contraction and resting tone measured in mmHg pressure within the amniotic fluid.
- Document Montevideo units with each assessment.

Electronic Monitor Record

- “The record of both the FHR and uterine activity should be of adequate quality for visual interpretation.”

Adequate?
NICHD Terminology

- Baseline rate
- Baseline variability
  - Absent
  - Minimal
  - Moderate
  - Marked
- Accelerations
- Decelerations
  - Early
  - Late
  - Variable
  - Prolonged

Assessment requires a qualitative and quantitative description of:

- Uterine contractions
- Baseline fetal heart rate
- Baseline fetal heart rate variability
- Presence of accelerations
- Presence of periodic or episodic decelerations
- Changes or trends of FHR patterns over time

Normal Baseline

Fetal Tachycardia

Baseline > 160 bpm lasting for ten or more minutes

Bradycardia

Variability

Believed to be a significant indicator of fetal well being

- Sensitive to hypoxia and acidosis
  - Absent (undetectable)
  - Minimal (≤ 5 bpm)
  - Moderate (6-25 bpm)
  - Marked (>25 bpm)
**Absent Variability**
Undetectable variation from baseline

**Minimal Variability**
- Hypoxia/acidosis
- Drug effects
- Fetal sleeping
- Congenital anomalies
- Extreme prematurity
- Fetal tachycardia
- Other cardiac dysrhythmias

**Minimal Variability**
> undetectable and < 5 bpm

**Moderate Variability**
6 to 25 bpm

**Marked Variability**
- Increased fetal movement
- Hypoxia
- Vaginal exam/Fetal stimulation
- Second stage/Pushing
Accelerations

At \( \geq \) 32 weeks, accels peak 15 or more bpm above the baseline, with a duration of 15 or more seconds but less than 2 minutes.
- Before 32 weeks, an accel has an acme of 10 bpm or more above baseline with a duration of 10 or more seconds but less than 2 min.
- A prolonged accel lasts \( \geq \) 2 min. but \(<\) 10 min.
- Accels > 10 minutes are a baseline change.

Moderate Variability & Accels

- Moderate variability is thought to reliably predicts the absence of metabolic acidemia at the time it is observed.
- Presence of accels reliably predict the absence of metabolic acidemia at the time they are observed.
- However, the absence of both does not reliably predict the presence of metabolic acidemia.

Early Decelerations

- Gradual decrease of FHR with the onset to nadir of deceleration \( \geq \) 30 seconds.
- Nadir of deceleration occurs with the peak of the contraction.
- Mechanism of an early deceleration:
  - Pressure on the fetal fontanel
  - Increased intracranial pressure
  - Alteration in cerebral blood flow
  - Central vagal stimulation

Variable Deceleration

- Abrupt decrease in FHR
- "Deceleration of FHR from baseline to nadir occurs in \(<\) 30 seconds".
- Decrease of FHR below baseline is \( \geq \) 15 bpm.
- Duration is \( \geq \) 15 seconds and \(<\) 2 min. from onset to return to baseline.
Mechanism of a Variable Deceleration

- Contraction begins
- Umbilical vein is compressed
- Blood flow to fetus decreases
- Fetal BP decreases
- Chemoreceptors and baroreceptors are stimulated (sympathetic nervous system)

FHR increases to increase cardiac output and BP
- Contraction peaks
- Umbilical compression increases
- Arterial blood flow occludes
- Fetal BP falls
- Baroreceptors are triggered
- Vagus nerve is stimulated (parasympathetic system)
- FHR decreases

Mechanism of a Variable Deceleration

- Contraction subsides
- Arteries open
- Fetal blood pressure begins to fall
- Fetus compensates by ↑ HR via the baroreceptors, chemoreceptors and the sympathetic nervous system

Nuchal Cord

True Knot in Cord

Nuchal and Body Cord
Variable Decelerations – Interventions?

Gradual decrease in FHR

“Deceleration of FHR from baseline to nadir occurs in ≥30 seconds”

Associated with a contraction

Nadir occurs after the contraction peak

Late Decelerations

Mechanism of a Late Deceleration

- Decreased utero-placental oxygen transfer to the fetus
- Chemoreceptor stimulus & catecholamines are released
- Blood vessels constrict and direct more blood flow to the brain, heart and adrenal glands
- Contraction diminishes, O2 delivery resumes to the fetus, and deceleration returns to baseline

Uteroplacental Insufficiency: Maternal Factors

- Hypotension
  - Supine positioning
  - Regional analgesia
  - Maternal trauma or hemorrhage
- Hypertension
  - Chronic hypertension
  - Hypertensive disorders of pregnancy
  - Cocaine or methamphetamines
  - Vasoconstriction (endogenous or exogenous)

Maternal Factors

- Placental changes
  - Premature aging of the placenta
  - Infarctions
  - Location
  - Size or abnormal formation
- Postmaturity
  - Decreased maternal Hcb or O2 saturation
  - Severe anemia
  - Cardiopulmonary disease
  - Hyper/hypoventilation

Tachysystole

- Cervical ripening agents
- Oxytocin administration
- Spontaneous

Other high-risk conditions

- Preexisting chronic disease
- Smoking
- Poor nutrition
- Multiple gestation
Late Decelerations

- Interventions?

Late Decelerations with Acidemia

- Recurrent decreases in utero-placental perfusion may challenge fetal reserve
- Reflected in the evolution of decreasing variability over time
- Fetal hypoxemia progresses to hypoxia
- Late decels may then be caused by direct myocardial depression
- Usually accompanied by absent variability

Late Decelerations with Minimal Variability and Tachycardia (Category II)

Late Decels with Absent Variability (Category III)

Recurrent Decelerations

- Decelerations are defined as recurrent if they occur with > 50% of uterine contractions within a 20 minute period.
- Eg. - recurrent late decelerations would be late decels that occur with 50% of contractions in a 20 min. segment of fetal monitoring
Recurrent Variable Decelerations

- If moderate variability is present, the fetus is likely to be adequately oxygenated at that time.
- Variable decels reflect a physiologic response to intermittent cord occlusion
- If baseline is within normal limits, moderate variability is present, & there is adequate recovery time BTW contractions, fetus is compensating well.
- Appropriate interventions include: maternal position change, amnioinfusion, decreasing or discontinuing oxytocin, & modified pushing.

Algorithm for the Management of Category II FHR Tracings

Significant decel. are defined as any of the following:
- Variable decels lasting longer than 60 seconds and reaching a nadir more than 60 bpm below baseline
- Variable decels lasting longer than 60 seconds and reaching a nadir less than 60 bpm regardless of baseline
- Any late decel. of any depth
- Any prolonged decel. discontinues use of algorithm until decel. is resolved

Algorithm for Management of Category II FHR Tracings

Recurrent Variable Decelerations

A visually apparent decrease in the FHR below the baseline calculated from the most recently determined portion of the baseline ≥ 15 bpm, lasting ≥ 2 min but < 10 min. from onset to return to baseline.
Fetal scalp stimulation is typically used in the presence of minimal to absent variability with no fetal accelerations. Performed during segments of baseline, not during decelerations. Acceleration 15 by 15 reflects a pH of 7.2 or greater. Absence of accelerative response is an indeterminate finding.

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

Has a visually apparent smooth, sine-wave-like undulating pattern in the FHR baseline that persists for ≥ 20 minutes.
Potential Causes of Sinusoidal Pattern

- Rh isoimmunization
- Severe fetal anemia
- Abruptio placentae
- Severe fetal acidosis
- Fetal-maternal hemorrhage

Fetal Arrhythmias/Dysrhythmias

- Arrhythmic or dysrhythmic patterns usually result from a malfunction in the mechanism that creates the normal electrical impulse formation/conduction in the heart
- May include: conduction system defects, cardiac structural disease, maternal collagen disease, infections (ie - CMV)
- Most convert to normal sinus rhythm following delivery

Incidence

- Approximately 2-14% of pregnancies exhibit fetal dysrhythmic patterns
- Of those, approx. 90% are benign
- 10% are potentially life threatening, resulting from cardiac structural or conduction defects or underlying maternal or fetal disease
- Fetal hypoxia can also result in abnormal FHR patterns

Fetal hypoxia can also result in abnormal FHR patterns
Avoiding Maternal/Fetal Heart Rate Confusion

- Confirm maternal pulse during auscultation
- Avoid maternal tachycardia
- Avoid uterine tachysystole
- Maintain pulse ox during 2nd stage
- Move quickly to FSE whenever suspicion of maternal/fetal heart rate confusion is present

FSE Applied

Uterine Activity Assessment

- Evaluated by direct palpation and application of EFM toco transducer or IUPC
- External toco transducer detects abdominal wall changes during contractions and uterine relaxation
- IUPC measures intra-amniotic pressure in mmhg
- Quantified as the number of contractions in a ten minute window averaged over 30 minutes

Assessment of Contractions

- **Frequency** - measured from beginning of one contraction to beginning of next contraction and described in minutes
- **Duration** - length of contraction and described in seconds
- **Intensity** - refers to strength of contraction (mild, moderate or strong)
- **Resting tone** - assessed between contractions (soft, firm, rigid)
- **Relaxation time** between contractions

Uterine Activity Terminology

- **Normal** - < 5 contractions in 10 minutes, averaged over a 30 minute window
- **Tachysystole** - > 5 contractions in 10 minutes, averaged over a 30 minute window
Impact of Tachysystole on Fetal Oxygenation

- Two minutes is required between contractions for complete recovery of fetal oxygenation (Johnson et al., 1994)
- There’s an inverse relationship between the number of contractions and fetal pH (Bakker et al., 2007)
- Fetal SaO2 persistently declines with persistent contractions of five or more in ten minutes (Simpson & Johnson, 2008)

Less Than Five Contractions?

- No progressive desaturation was seen with persistent contraction frequencies of less than five in ten minutes (Simpson & James, 2008, Peebles et al., 1994)
- When five or more contractions were present for the last hour of first stage, the incidence of neonatal acidemia was significantly higher (Bakker et al., 2007).

Fetal Response to Tachysystole

Normal Uterine Activity

Tachysystole
Coupling or Tripling of Contractions

- Refers to a pattern of two or three contractions with little or no interval followed by a regular interval of approx. 2 to 5 minutes.
- May be indicative of dysfunctional labor process and/or saturation or down-regulation of oxytocin receptor sites.
- Recommended intervention: maternal repositioning, 500 ml fluid bolus, DC oxytocin if applicable, & rest for 30 to 60 minutes before resuming.

Promoting Fetal Well-Being

- Promoting fetal oxygenation:
  - Adequate maternal cardiac output, blood pressure, Hgb level, & oxygen saturation
  - Adequate blood flow to uterus & placenta
  - Adequate placental function
  - Normal uterine activity
  - Uninterrupted umbilical blood flow to fetus
- Support maternal coping
- Facilitate labor progress

Nursing Interventions to Maximize Fetal Oxygenation

- Maternal position change
- Hydration (IV Fluid Bolus)
- Oxygen administration
- Medication:
  - Oxytocin
  - Terbutaline
  - Analgesia
- Anxiety reduction
- Decrease maternal temperature

Placental Circulation

- Fetal Hgb conc. is higher than adult
- Fetal oxygen tension is less than maternal oxygen tension
- The fetus’s oxygen binds more easily to the hemoglobin (greater O2 affinity)
- This raises the O2 saturation and O2 carrying capacity of fetal blood

Compensatory Responses to Hypoxemia

- Periodic or absent accelerations
- Variable decelerations with normal features
- Decreased variability
- Change in baseline with normal features
- Late decelerations with some variability
**Fetal Compensation to ↓ O2**

- Fetus attempts to decrease O2 needs
- Decreased movement
- Decreased heart rate
- Redistribution of blood to vital organs (↑ 2-3 X to heart, brain, adrenal glands)
- Decrease peripheral blood flow & blood to gut, kidneys, muscles

**When Decreased O2 Persists**

- Anerobic metabolism
- ↑ CO2
- Respiratory acidosis
- ↑ Lactic acid
- ↓ O2
- ↓ Bicarb
- Metabolic acidosis
- Tissue damage and death

---

**Maternal Oxygen Administration**

- Evidence reflects that fetal oxygen levels increase with admin. of 8-10 L oxygen via non-rebreather face mask
- Fetuses with lower oxygen saturations appear to benefit most
- Fetal FSpO2 levels higher than those preceding O2 admin. persist for 30 minutes following O2 discontinuation
- The potential long term effects on mother and fetus are unknown, therefore use judiciously
- Do not need O2 in presence of moderate variability

**Why a Non-Rebreather Mask?**

- At 8 to 10 L O2 administration:
  - Non-rebreather mask delivers approx. 80 to 100% O2
  - Facemask delivers 27 to 40% O2
  - Nasal cannula delivers 31%

---

**Perinatal Asphyxia**

- Can occur within ten minutes after onset of prolonged decelerations resulting from uterine rupture
- Significant neonatal morbidity reported when time between onset of prolonged decelerations and birth is ≥ 18 minutes
- Significant risk of neurological damage, death & death within one year of life for infants partially or completely extruded

**Ruptured Uterus**

- Can occur within ten minutes after onset of prolonged decelerations resulting from uterine rupture
- Significant neonatal morbidity reported when time between onset of prolonged decelerations and birth is ≥ 18 minutes
- Significant risk of neurological damage, death & death within one year of life for infants partially or completely extruded
Supporting Physiologic Labor & Decreasing the Risk of Primary Cesarean Delivery

- Offer VBAC
- Limit elective delivery to 41 completed weeks gestation
- No cervical ripening for elective deliveries
- Admit low-risk patients when in active labor
- Administer oxytocin using a physiological & pharmacologically based protocol
- Discontinue oxytocin once active labor achieved
- Appropriate management of second stage
- Provide labor support (doulas)

Bishop’s Score

- Unfavorable cervix = Bishop’s Score ≤ 6
- Recommend cervical ripening agents for medically indicated inductions
- Favorable cervix = Bishop’s Score ≥ 7 (multip) or ≥ 8 (primip)

Current Definition Recommendations

- Failed Induction of Labor:
  - Failure to generate regular (eg. – every 3 min) contractions and cervical change after at least 24 hours of oxytocin administration, with AROM if feasible
  - If membranes are intact, and mother and fetus are stable, consider discharge to home.

Definition: First Stage Arrest

- 6 cm dilation with membrane rupture and no cervical change for:
  - 4 hours or more of adequate contractions (eg. – greater than 200 Montevideo units) or
  - 6 hours or more if contractions inadequate
Second Stage Arrest

- No progress (descent or rotation) for:
  - 4 h or more in nulliparous women with an epidural
  - 3 h or more in nulliparous women without an epidural
  - 3 h or more in multiparous women with an epidural
  - 2 h or more in multiparous women without an epidural

Endogenous Oxytocin

- Endogenous oxytocin is synthesized by the hypothalamus, transported to the posterior lobe of the pituitary gland & released into maternal circulation.
- Oxytocin is released in response to breast and/or lower genital tract stimulation and also cervical and vaginal stretching.

Spontaneous Labor

- During first stage, maternal conc. of oxytocin are approx. that achieved with an infusion of 2-4 μg/min exogenous oxytocin.
- It is believed the fetus secretes a level of oxytocin equivalent to 3 μg/min infusion.
- Combined effects of maternal/fetal contributions to maternal plasma oxytocin concentration are equivalent to 5-7 μg/min exogenous oxytocin.

Exogenous Oxytocin

- The half life is generally agreed to be between 10 and 15 minutes.
- Three to four half lives are needed to achieve a steady-state plasma concentration.
- Uterine response usually occurs within 3 to 5 minutes after oxytocin infusion is begun.
- Contractions increase in frequency & intensity, followed by a stable phase.
- Any further increase in oxytocin will not lead to normal changes in uterine contractions.

Abnormal Uterine Activity

- Instead, abnormal uterine activity patterns such as frequent low intensity contractions, coupling or tripling of contractions, or uterine tachysystole may be produced with further increases in oxytocin rate.
- Reducing the rate or discontinuing the oxytocin for a rest period of 30-60 minutes (accompanied by an IV fluid bolus) will often allow uterine activity to return to normal.

Recommended Oxytocin Dosage and rate Increase Intervals

- Based on physiologic & pharmokinetic principles:
  - Begin at 0.5-1 μg/min.
  - Increase at incremental doses of 1-2 μg/min every 30-60 minutes.
  - Shorter interval are more likely to be associated with tachysystole and non-reassuring fetal status.
Recommended Oxytocin Dosage and Rate Increase Intervals

- Titrating the dosage to fetal response and uterine activity and labor progress
- Avoid uterine tachysystole and treat (decrease or discontinue oxytocin) in a timely manner if it does occur
- If labor is progressing at 1 cm/hr cervical dilation, there is no need to increase oxytocin dosage rate

Practice Guideline for Oxytocin Induced Tachysystole

- In the presence of a concerning FHR:
  - Discontinue oxytocin
  - Maternal repositioning
  - IV fluid bolus of LR
  - Consider O2 per face mask at 8-10 L/min
  - If no response, consider sq terbutaline per physician order

Practice Guideline for Resuming Oxytocin

- If oxytocin has been discontinued less than 30 minutes, infusion may be restarted at no more than half of the previous infusion rate.
- If oxytocin has been discontinued for more than 30 minutes, resume oxytocin infusion at the initial rate.

Interventions for Tachysystole

Simpson & James (2008)

- Oxytocin discontinuation: Resolution = 14.2 minutes
- Oxytocin discontinuation plus a 500 ml IV fluid bolus = 9.8 minutes
- Oxytocin discontinuation plus a 500 ml IV fluid bolus plus maternal position change to lateral = 6.1 minutes

Second Stage Management

- Encourage women to try different positions throughout second stage
- With an epidural, assist woman to turn side to side every 30 min to one hour
- Suggested positions include semi-recumbent, side-lying, squatting, standing & upright kneeling
- The mother should be encouraged to lean forward to maintain a pelvic tilt (not with an epidural)

- Encourage spontaneous bearing down
- Consider fetal station & position in addition to dilation to determine pushing readiness
- Discourage prolonged maternal breath holding (no more than 6-8 seconds)
- No more than 3 pushing efforts/contraction
- Support rather than direct the woman’s involuntary pushing efforts
- Validate normalcy of sensations & sounds
Laboring Down with Epidural Analgesia

- A lateral position facilitates fetal descent until the head is low enough to stimulate the Ferguson reflex.
- Laboring down increases the rate of spontaneous vaginal delivery & decreases the rate of FHR decelerations and operative deliveries with epidural analgesia.
- Evidence suggests it is safe to allow a primip to wait two-three hours and a multip one-two hours after complete dilation or until the urge to push occurs prior to pushing.

Asynclitic Presentation

Due to a relaxed lower uterine segment with a labor epidural, the fetal head may deflect laterally with the sagittal suture deflected anteriorly toward the symphysis or posteriorly toward the sacrum.

Thank you. Questions?