Fetal Assessment during Labor

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LEARNING OBJECTIVES
- Identify typical signs of nonreassuring fetal heart rate (FHR) patterns.
- Compare FHR monitoring done by intermittent auscultation (IA) with external and internal electronic methods.
- Explain the baseline FHR and evaluate periodic changes.
- Describe nursing measures that can be used to maintain FHR patterns within normal limits.
- Differentiate among the nursing interventions used for managing specific FHR patterns, including tachycardia and bradycardia; increased and decreased variability; and late and variable decelerations.
- Review the documentation of the monitoring process necessary during labor.

KEY TERMS AND DEFINITIONS
- acceleration: Increase in fetal heart rate (FHR); usually interpreted as a reassuring sign.
- amnioinfusion: Infusion of normal saline warmed to body temperature through an intrauterine catheter into the uterine cavity in an attempt to increase the fluid around the umbilical cord and prevent compression during uterine contractions.
- baseline fetal heart rate: Average FHR during a 10-minute period that excludes periodic and episodic changes and periods of marked variability.
- bradycardia: Baseline FHR below 110 beats per minute (beats/min).
- deceleration: Slowing of FHR attributed to a parasympathetic response and described in relation to uterine contractions. Types of decelerations include:
  - early deceleration: A visually apparent gradual decrease of FHR before the peak of a contraction and return to baseline as the contraction ends; caused by fetal head compression.
  - late deceleration: A visually apparent gradual decrease of FHR with the lowest point of the deceleration occurring after the peak of the contraction and returning to baseline after the contraction ends; caused by uteroplacental insufficiency.
- variable deceleration: A visually abrupt decrease in FHR below the baseline occurring any time during the uterine contracting phase and caused by compression of the umbilical cord.
- episodic changes: Changes from baseline patterns in the FHR that are not associated with uterine contractions.
- hypoxemia: Reduction in arterial P O2 resulting in metabolic acidosis by forcing anaerobic glycolysis, pulmonary vasoconstriction, and direct cellular damage.
- hypoxia: Insufficient availability of oxygen to meet the metabolic needs of body tissue.
- intermittent auscultation: Listening to fetal heart sounds at periodic intervals using nonelectronic or ultrasound devices placed on the maternal abdomen.
- nonreassuring FHR patterns: FHR patterns that indicate the fetus is not well oxygenated and requires intervention.
- periodic changes: Changes from baseline that occur with uterine contractions.
- tachycardia: Baseline FHR above 160 beats/min.
- tocolysis: Inhibition of uterine contractions through administration of medications; used as an adjunct to other interventions in the management of fetal compromise related to increased uterine activity.
- uteroplacental insufficiency: Decline in placental function (exchange of gases, nutrients, and wastes) leading to fetal hypoxia and acidosis; evidenced by late FHR decelerations in response to uterine contractions.
- Valsalva maneuver: Any forced expiratory effort against a closed airway, such as holding one’s breath and tightening the abdominal muscles (e.g., pushing during the second stage of labor).
- variability: Normal irregularity of fetal cardiac rhythm or fluctuations from the baseline FHR of two cycles or more.
The ability to assess the fetus by auscultation of the fetal heart was initially described more than 300 years ago. With the advent of the fetoscope and stethoscope after the turn of the twentieth century, the listener could hear clearly enough to count the fetal heart rate (FHR). When electronic FHR monitoring made its debut for clinical use in the early 1970s, it was anticipated that its use would effect a decrease in cerebral palsy and be more sensitive than stethoscopic auscultation in predicting and preventing fetal compromise (Simpson & Knox, 2000). Although neither of these possibilities has been realized, electronic fetal monitoring (EFM) is a useful tool for visualizing FHR patterns on a monitor screen or printed tracing.

Pregnant women should be informed about the equipment and procedures used and the risks, benefits, and limitations of intermittent auscultation (IA) and EFM. This chapter discusses the basis for fetal monitoring, the types of monitoring, and nursing assessment and management of nonreassuring fetal status.

Understanding fetal and uteroplacental circulation is important in understanding FHR and uterine activity (UA) monitoring (see Chapter 7).

Fetal Response
Because labor is a period of physiologic stress for the fetus, frequent monitoring of fetal status is part of the nursing care during labor. The fetal oxygen supply must be maintained during labor to prevent fetal compromise and to promote newborn health after birth. The fetal oxygen supply can decrease in a number of ways:

1. Reduction of blood flow through the maternal vessels as a result of maternal hypertension (chronic hypertension or gestational hypertension); hypotension (caused by supine maternal position, hemorrhage, or epidural analgesia or epidural); or hypovolemia (caused by hemorrhage)
2. Reduction of the oxygen content in the maternal blood as a result of hemorrhage or severe anemia
3. Alterations in fetal circulation, occurring with compression of the umbilical cord (transient, during uterine contractions [UCs]); or prolonged, resulting from cord prolapse; placental separation or complete abruption; or head compression (head compression causes increased intracranial pressure and vagal nerve stimulation with an accompanying decrease in the FHR)
4. Reduction in blood flow to the intervillous space in the placenta secondary to uterine hypertonus (generally caused by excessive exogenous oxytocin) or secondary to deterioration of the placental vasculature associated with maternal disorders such as hypertension or diabetes mellitus

Fetal well-being during labor can be measured by the response of the FHR to UCs. In general, reassuring FHR patterns are characterized by the following:

- A baseline FHR in the normal range of 110 to 160 beats per minute (beats/min) with no periodic changes and a moderate baseline variability (see later discussion p. 374)
- Accelerations with fetal movement

Uterine Activity
A normal UA pattern in labor is characterized by the following:

- Contractions occurring every 2 to 5 minutes and lasting less than 90 seconds
- Contractions moderate to strong in intensity, as detected by palpation, or intensity is less than 80 mm Hg, as measured by an intrauterine pressure catheter (IUPC)
- Thirty seconds or more elapsing between the end of one contraction and the beginning of the next contraction
- Between contractions, uterine relaxation should be detected by palpation or by an average intrauterine pressure of 20 mm Hg or less (Tucker, 2004).

Fetal Compromise
The goals of intrapartum FHR monitoring are to identify and differentiate the reassuring patterns from the nonreassuring patterns, which can be indicative of fetal compromise. Nursing care focuses on interventions promoting adequate fetal oxygenation and interventions for nonreassuring patterns if they occur.

Nonreassuring FHR patterns are those associated with fetal hypoxemia, which is a deficiency of oxygen in the
arterial blood. If uncorrected, hypoxemia can deteriorate to severe fetal hypoxia, which is an inadequate supply of oxygen at the cellular level. Nonreassuring FHR patterns include the following:

- Progressive increase or decrease in baseline rate
- Tachycardia of 160 beats/min or more
- Progressive decrease in baseline variability
- Severe variable decelerations (FHR less than 60 beats/min lasting longer than 30 to 60 seconds, with rising baseline, decreasing variability, or slow return to baseline)
- Late decelerations of any magnitude, especially those that are repetitive and uncorrectable
- Absent or undetected FHR variability
- Prolonged deceleration (greater than 60 to 90 seconds)
- Severe bradycardia (less than 70 beats/min)

The ideal method of fetal assessment during labor continues to be debated. Results from research studies indicate that both IA of the FHR and electronic FHR monitoring are associated with similar fetal outcomes in low risk intrapartum patients (Feinstein, Sprague, & Trepaznie, 2000; Thacker, Stroup, & Chang, 2001). Although IA is a high-touch, low-technology method of assessing fetal status during labor that places fewer restrictions on maternal activity, more than 80% of laboring women in the United States are monitored electronically for at least part of their labor (Albers, 2001). The lack of evidence on the efficacy of EFM should be a factor to consider in decision making about which method of fetal assessment is offered to low risk laboring women (Wood, 2003).

Intermittent Auscultation

Intermittent auscultation uses listening to fetal heart sounds at periodic intervals to assess the FHR. IA of the fetal heart can be performed with a Leff scope, a DeLee-Hillis fetoscope, or a Doppler ultrasound device. If a Leff scope is used, the domed side should be opened to the connective tubing to the earpieces. The domed side is then applied to the maternal abdomen. The fetoscope is applied to the listener’s forehead because bone conduction amplifies the fetal heart sounds for counting. The ultrasound device transmits ultrahigh frequency sound waves reflecting movement of the fetal heart and converts these sounds into an electronic signal that can be counted (Fig. 13-1).

One procedure for performing auscultation is as follows:

1. Perform Leopold maneuvers (see p. 412) by palpating the maternal abdomen to identify fetal presentation and position.
2. Place the listening device over the area of maximal intensity (see Fig. 14-6 on p. 413) and clarity of the fetal heart sounds to obtain the clearest and loudest sound, which is easiest to count. Apply ultrasound gel to Doppler ultrasound device if used.

3. Palpate the abdomen for the absence of UA to be able to count the FHR between contractions.
4. Count the maternal radial pulse while listening to the FHR to differentiate it from the fetal rate.
5. Count the FHR for 30 to 60 seconds between contractions to identify the baseline rate. This rate can be assessed only during the absence of UA.
6. Auscultate the FHR during a contraction and for 30 seconds after the end of the contraction to identify any increases or decreases in FHR in response to the contraction.

By using IA the nurse can assess the baseline FHR, rhythm, and increases and decreases from baseline (Feinstein, 2000). The method and frequency of fetal surveillance during labor will vary depending on maternal-fetal risk factors and the preference of the facility. In the absence of risk factors, one recommended practice is to auscultate the FHR as follows (American Academy of Pediatrics [AAP] & American College of Obstetricians and Gynecologists [ACOG], 2002; Association of Women’s Health, Obstetric and Neonatal Nurses, [AWHONN], 2003):

- **First stage**
  - Active phase: every 30 minutes
  - Second stage: Every 15 minutes
  - If risk factors are present, the FHR is auscultated as follows:
    - **First stage**
      - Active phase: every 15 minutes
    - **Second stage**
      - Every 5 minutes

There is no recommended practice for assessing the FHR in the latent phase of first-stage labor; however, AWHONN (2003) suggests that the FHR be assessed as frequently as maternal vital signs. The FHR also is assessed before and after amniorrhexis, rupture of membranes, and administration of medications and anesthesia, and more frequently when nonreassuring FHR patterns are heard (AWHONN, 2003; Tucker, 2004).
Evidence—Is there sufficient evidence to draw conclusions about what response you should give to Keri?

What implications and priorities for responding to Keri's statement?

Are there alternative perspectives to your conclusion?

The purpose of electronic FHR monitoring is the ongoing assessment of fetal oxygenation. FHR tracings are analyzed to reproduce a continuous and precise record of the FHR tracing for subsequent presentation and review. The FHR is printed on specially formatted monitor paper. The standard paper speed is 3 cm/min. Once the area of maximal intensity of the FHR has been located, continuous EFM is provided as with continuous EFM. Labor flow records or computer charting systems that prompt notations of all assessments are useful for ensuring such comprehensive documentation.

Electronic Fetal Monitoring

When the FHR is auscultated and documented, it is inappropriate to use the descriptive terms associated with EFM (e.g., moderate variability, variable deceleration) because most of the terms are visual descriptions of the patterns produced on the monitor tracing. Terms that are numerically defined, however, such as bradycardia and tachycardia, can be used.

Every effort should be made to use the method of fetal assessment the woman desires, if possible. However, auscultation of the FHR is in accordance with the frequency guidelines just given may be difficult in today’s busy labor and birth units. When used as the primary method of fetal assessment, auscultation requires a 1:1 nurse-to-patient staffing ratio. If acuity and census change so that auscultation standards are no longer met, the nurse must inform the physician or nurse-midwife that continuous EFM will be used until staffing can be arranged to meet the standards.

The woman can become anxious if the examiner cannot readily count the fetal heartbeats. It often takes time for the inexperienced listener to locate the heartbeat and find the area of maximal intensity. To allay the mother’s concerns, she can be told that the nurse is “finding the spot where the sounds are loudest.” If it takes considerable time to locate the fetal heartbeats, the examiner can reassure the mother by offering her an opportunity to listen to them, too. If the examiner cannot locate the fetal heartbeat, assistance should be requested. In some cases ultrasound can be used to help locate the fetal heartbeat. Seeing the FHR on the ultrasound screen will be reassuring to the mother if there was initial difficulty in locating the best area for auscultation.

When using IA, UA is assessed by palpation. The examiner should keep his or her hand placed over the fundus before, during, and after contractions. The contraction intensity is usually described as mild, moderate, or strong. The contraction duration is measured in seconds, from the beginning to the end of the contraction. The frequency of contractions is measured in minutes, from the beginning of one contraction to the beginning of the next contraction. The examiner should keep his or her hand on the fundus after the contraction is over to evaluate uterine resting tone or relaxation between contractions. Resting tone between contractions is usually described as soft or relaxed (Goodwin, 2000).

Accurate and complete documentation of fetal status and UA is especially important when IA and palpation are being used because no paper tracing record of these assessments is provided as with continuous EFM. Labor flow records or computer charting systems that prompt notations of all assessments are useful for ensuring such comprehensive documentation.

Critical Thinking Exercise

Keri is 18 years old, gravida 1 at term, and has just been admitted to the Labor and Birth Unit. She is assessed to be at low risk for complications at this time. She is accompanied by her boyfriend and her mother. Keri seems anxious about being in labor, and she tells you that she wants to have her baby monitored on the fetal monitor machine because she thinks that will assure her of having a good outcome to both of her baby. How would you respond to Keri’s statement?

Evidence—Is there sufficient evidence to draw conclusions about what response you should give to Keri?

Assumptions—Describe an underlying assumption about the following issues related to continuous EFM in comparison to intermittent auscultation:

a. Low risk versus high risk pregnancies
b. Infant outcomes
c. Staffing (nurse/patient ratio)

3. What implications and priorities for responding to Keri can be drawn at this time?

4. Does the evidence objectively support your conclusion?

5. Are there alternative perspectives to your conclusion?

The two modes of electronic fetal monitoring include the external mode, which uses external transducers placed on the maternal abdomen to assess FHR and UA, and the internal mode, which uses a spiral electrode applied to the fetal presenting part to assess the FHR and an IUPC to assess UA and pressure. The differences between the external and internal modes of EFM are summarized in Table 13-1.

External monitoring

Separate transducers are used to monitor the FHR and UCs (Fig. 13-2). The ultrasound transducer works by reflecting high-frequency sound waves off a moving interface: in this case, the fetal heart and valves; therefore short-term variability and beat-to-beat changes in the FHR cannot be assessed accurately by this method. It is sometimes difficult to reproduce a continuous and precise record of the FHR because of artifacts introduced by fetal and maternal movement. The FHR is printed on specially formatted monitor paper. The standard paper speed is 3 cm/min. Once the area of maximal intensity of the FHR has been located, conductive gel is applied to the surface of the ultrasound transducer, and the transducer is then positioned over this area. The tocotransducer (tocodynamometer) measures UA transabdominally. The device is placed over the fundus above the umbilicus. UCs or fetal movements depress a pressure-sensitive surface on the side next to the abdomen. The tocotransducer can measure and record the frequency, regularity, and approximate duration of UCs but not their intensity. This method is especially valuable for measuring UA during the first stage of labor in women with intact membranes or for antepartum testing. Because the tocotransducer of most electronic fetal monitors is designed for assessing UA in the term pregnancy, it may not be sensitive enough to detect preterm...
When monitoring the woman in preterm labor, remember that the fundus may be located below the level of the umbilicus. The nurse may need to rely on the woman to indicate when UA is occurring and to use palpation as an additional way of assessing contraction frequency.

The external transducer is easily applied by the nurse, but it must be repositioned as the woman or fetus changes position (see Fig. 13-2, B). The woman is asked to assume a semi-sitting or a lateral position. The equipment is removed periodically to wash the applicator sites and to give back rubs. Use of an external transducer confines the woman to bed. Portable telemetry monitors allow observation of the FHR and UC patterns by means of centrally located electronic display stations. These portable units permit the

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**TABLE 13-1**

<table>
<thead>
<tr>
<th>EXTERNAL MODE</th>
<th>INTERNAL MODE</th>
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<tbody>
<tr>
<td><strong>FETAL HEART RATE</strong></td>
<td>Spiral electrode: This electrode converts the fetal electrocardiogram (ECG) as obtained from the presenting part to the fetal heart rate (FHR) via a cardiotachometer. This method can be used only when membranes are ruptured and the cervix is sufficiently dilated during the intrapartum period. Electrode penetrates into fetal presenting part by 1.5 mm and must be attached securely to ensure a good signal.</td>
</tr>
<tr>
<td><strong>UTERINE ACTIVITY</strong></td>
<td>Intrauterine pressure catheter (IUPC): This instrument monitors the frequency, duration, and intensity of contractions. The two types of IUPCs are a fluid-filled system and a solid catheter. Both measure intrauterine pressure at the catheter tip and convert the pressure into millimeters of mercury on the uterine activity panel of the strip chart. Both can be used only when membranes are ruptured and the cervix is sufficiently dilated during the intrapartum period.</td>
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</table>

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woman to walk around during electronic monitoring. Other monitoring equipment can be used when the woman is submerged in water (see Fig. 12-4, C).

**Internal monitoring**

The technique of continuous internal monitoring allows an accurate appraisal of fetal well-being during labor (Fig. 13-3). For this type of monitoring, the membranes must be ruptured, the cervix sufficiently dilated (2-3 cm), and the presenting part low enough to allow placement of the electrode. A small spiral electrode attached to the presenting part shows a continuous FHR on the fetal monitor strip.

Internal monitoring of the FHR may be implemented without internal monitoring of UA. For UA to be monitored, a solid or fluid-filled IUPC is introduced into the uterine cavity. A solid catheter has a pressure-sensitive tip that measures changes in intrauterine pressure. A catheter filled with sterile water also can be used. As the catheter is compressed during a contraction, pressure is placed on the pressure transducer or strain gauge; this pressure is then converted into a pressure reading in millimeters of mercury. The average pressure during a contraction ranges from 50 to 85 mm Hg. The IUPC can measure the frequency, duration, and intensity of UCs.

The FHR and UA are displayed on the monitor paper, with the FHR in the upper section and UA in the lower section. Fig. 13-4 contrasts the internal and external modes of electronic monitoring. Note that each small square represents 10 seconds; each larger box of six squares equals 1 minute (when paper is moving through the monitor at 3 cm/min).
Fetal Heart Rate Patterns

Baseline Fetal Heart Rate

The intrinsic rhythmicity of the fetal heart, the central nervous system (CNS), and the fetal autonomic nervous system control the FHR. An increase in sympathetic response results in acceleration of the FHR, whereas an augmentation in parasympathetic response produces a slowing of the FHR. Usually a balanced increase of sympathetic and parasympathetic responses occurs during contractions, with no observable change in the baseline FHR.

Baseline fetal heart rate is the average rate during a 10-minute segment that excludes periodic or episodic changes, periods of marked variability, and segments of the baseline that differ by more than 25 beats/min (National Institute of Child Health and Human Development [NICHD], 1997). The normal range at term is 110 to 160 beats/min.

Variability of the FHR can be described as irregular fluctuations in the baseline FHR of two cycles per minute or greater (NICHD, 1997). It is a characteristic of baseline FHR and does not include accelerations or decelerations of the FHR. Variability has been described as short term (beat to beat) or long term (rhythmic waves or cycles from baseline). The current definition for research does not distinguish between short-term and long-term variability because in actual practice they are viewed together (NICHD, 1997); however, this definition does identify four ranges of variability as seen in Fig. 13-5. These are based on visualization of the amplitude of the FHR in the peak-to-trough segment in beats per minute and include the following:

- Absent or undetected variability
- Minimal variability (greater than undetected but not more than 5 beats/min)
- Moderate variability (6 to 25 beats/min)
- Marked variability (greater than 25 beats/min)

In many facilities, short-term and long-term variability continue to be used to describe the FHR fluctuations. Short-term variability is commonly described as either absent or present while long-term variability may be described using the above categories (Tucker, 2004). Absence of or undetected variability is considered non-reassuring. Diminished variability can result from fetal hypoxemia and acidosis, as well as from certain drugs that depress the CNS, including analgesics, narcotics (meperidine [Demerol]), barbiturates (secobarbital [Seconal] and pentobarbital [Nembutal]), tranquilizers (diazepam [Valium]), ataractics (promethazine [Phenergan]), and general anesthetics. In addition, a temporary decrease in variability can occur when the fetus is in a sleep state. These sleep states do not usually last longer than 30 minutes. Table 13-2 contrasts key differences between increased and decreased variability.

A sinusoidal pattern—a regular smooth, undulating wave-like pattern—is not included in the current research definition of FHR variability. This uncommon pattern occurs when fetal hypoxia results from Rh incompatibility or fetal anemia (Fig. 13-6).

Tachycardia is a baseline FHR greater than 160 beats/min for a duration of 10 minutes or longer. It can be considered an early sign of fetal hypoxemia, especially when associated with late decelerations and minimal or absent variability. Fetal tachycardia can result from maternal or fetal infection, such as prolonged rupture of membranes with amnionitis; from maternal hyperthyroidism or fetal anemia; or in response to drugs such as atropine, hydroxyzine (Vistaril), terbutaline, or illicit drugs such as cocaine or methamphetamine.

Bradycardia is a baseline FHR less than 110 beats/min for a duration of 10 minutes or longer. (Bradycardia should be distinguished from prolonged deceleration patterns, which are periodic changes described later in this chapter.)
It can be considered a later sign of fetal hypoxia and is known to occur before fetal death. Bradycardia can result from placental transfer of drugs such as anesthetics, prolonged compression of the umbilical cord, maternal hypothermia, and maternal hypotension. Maternal supine hypotension syndrome, caused by the weight and pressure of the gravid uterus on the inferior vena cava, decreases the return of blood flow to the maternal heart, which then reduces maternal cardiac output and blood pressure. These responses in the mother subsequently result in a decrease in the FHR and fetal bradycardia. Table 13-3 contrasts tachycardia with bradycardia.

### TABLE 13-2

**Increased and Decreased Variability**

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>INCREASED VARIABILITY</th>
<th>DECREASED VARIABILITY</th>
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<tbody>
<tr>
<td>Early mild hypoxemia</td>
<td>Hypoxia or acidosis</td>
<td>CNS depressants</td>
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<tr>
<td>Fetal stimulation by the following:</td>
<td>Analgesics or narcotics</td>
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<tr>
<td>Uterine palpation</td>
<td>Meperidine (Demerol)</td>
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<tr>
<td>Uterine contractions</td>
<td>Alphaphrodine (Nisentil)</td>
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<tr>
<td>Fetal activity</td>
<td>Morphine</td>
<td></td>
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<tr>
<td>Maternal activity</td>
<td>Pentozacine (Tahlin)</td>
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<tr>
<td>Drugs:</td>
<td>Barbiturates</td>
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<tr>
<td>Illicit drugs (e.g., cocaine and methamphetamines)</td>
<td>Secobarbital (Seconal)</td>
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<tr>
<td>Sympathomimetic (e.g., terbutaline and asthma drugs)</td>
<td>Pentobarbital (Nembutal)</td>
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<td></td>
<td>Amobarbital (Amytal)</td>
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<td></td>
<td>Tranquilizers</td>
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<td></td>
<td>Diazepam (Valium)</td>
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<td></td>
<td>Ataractics</td>
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<td></td>
<td>Promethazine (Phenergan)</td>
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<td></td>
<td>Propiomazine (Largan)</td>
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<td>Hydroxyzine (Vistaril)</td>
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<td>Promazine (Spargine)</td>
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<td></td>
<td>Parasympathomimetics</td>
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<td></td>
<td>Atropine</td>
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<td></td>
<td>General anesthetics</td>
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<td></td>
<td>Prematurility: &lt;24 wk</td>
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<td></td>
<td>Fetal sleep cycles</td>
<td></td>
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<td></td>
<td>Congenital abnormalities</td>
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<td></td>
<td>Fetal cardiac dysrhythmias</td>
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</table>

**CLINICAL SIGNIFICANCE**

Significance of marked variability not known; increased variability from a previous average variability is earliest FHR sign of mild hypoxemia

Benign when associated with periodic fetal sleep states, which last 20 to 30 min; if caused by drugs, variability usually increases as drugs are excreted

Decreased variability is not reassuring and is considered a sign of fetal stress unless it has an identifiable temporary (e.g., fetal sleep) or correctable cause

Decreased variability associated with uncorrectable late decelerations indicates presence of fetal acidosis and can result in low Apgar scores

**NURSING INTERVENTION**

Priority depends on cause: Observe FHR tracing carefully for any nonreassuring patterns, including decreasing variability and late decelerations; if using external mode of monitoring, consider using internal mode (spiral electrode) for a more accurate tracing. Intervention usually not required unless nonreassuring FHR pattern develops

Dependent on cause; intervention not warranted if associated with fetal sleep states or temporarily associated with CNS depressants; consider performing external stimulation or scalp stimulation during a vaginal examination to elicit an acceleration of FHR or return to moderate variability; consider application of spiral electrode; assist health care provider with fetal oxygen saturation monitoring if ordered; prepare for birth if so indicated by the primary health care provider

Changes in Fetal Heart Rate

Changes in FHR from the baseline are categorized as periodic or episodic. Periodic changes are those that occur with UCs. Episodic changes are those that are not associated with UCs. These patterns include accelerations and decelerations (NICHD, 1997).

Accelerations

Acceleration of the FHR is defined as a visually apparent abrupt increase in FHR above the baseline rate. The increase is 15 beats/min or greater and lasts 15 seconds or more, with the return to baseline less than 2 minutes from the beginning of the acceleration. In preterm gestations the definition of an acceleration is a peak of 10 beats/min or more above baseline for at least 10 seconds. Acceleration of the FHR for more than 10 minutes is considered a change in baseline rate.

Accelerations can be periodic or episodic. Periodic acceleration is not a sign of fetal compromise if FHR remains >80 beats/min; acceleration caused by hypoxia is a nonreassuring sign when associated with loss of variability and late decelerations.

Bradycardia with moderate variability and absence of periodic changes is not a sign of fetal compromise if FHR remains >80 beats/min; bradycardia caused by hypoxia is a nonreassuring sign when associated with loss of variability and late decelerations.

TABLE 13-3

<table>
<thead>
<tr>
<th>TACHYCARDIA</th>
<th>BRADYCARDIA</th>
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<tbody>
<tr>
<td><strong>DEFINITION</strong></td>
<td>FHR &gt; 160 beats/min lasting &gt; 10 min</td>
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<tr>
<td><strong>CAUSE</strong></td>
<td>Late fetal hypoxemia or hypoxia</td>
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<tr>
<td>Early fetal hypoxemia</td>
<td>Maternal hypotension</td>
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<tr>
<td>Maternal fever</td>
<td>Fetal congenital heart block</td>
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<tr>
<td>Parasympathomimetic drugs (atropine, hydroxyzine)</td>
<td>Fetal heart failure</td>
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<tr>
<td>β-Sympathomimetic drugs (isradine, issoxprine)</td>
<td>Fetal heart failure</td>
</tr>
<tr>
<td>Intraamniotic infection</td>
<td>Fetal heart failure</td>
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<tr>
<td>Maternal hyperthyroidism</td>
<td>Fetal heart failure</td>
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<tr>
<td>Fetal anemia</td>
<td>Fetal heart failure</td>
</tr>
<tr>
<td>Fetal cardiac dysrhythmias</td>
<td>Fetal heart failure</td>
</tr>
<tr>
<td>Illicit drugs (cocaine, methamphetamines)</td>
<td>Fetal heart failure</td>
</tr>
<tr>
<td><strong>CLINICAL SIGNIFICANCE</strong></td>
<td>Persistent tachycardia in absence of periodic changes does not appear serious in terms of neonatal outcome (especially true if tachycardia is associated with maternal fever); tachycardia is a nonreassuring sign when associated with late decelerations, severe variable decelerations, or absence of variability.</td>
</tr>
<tr>
<td><strong>NURSING INTERVENTION</strong></td>
<td>Priority dependent on cause:</td>
</tr>
<tr>
<td>—reduce maternal fever with antipyretics as ordered, hydration, and cooling measures</td>
<td>—reduce maternal fever with antipyretics as ordered, hydration, and cooling measures</td>
</tr>
<tr>
<td>—oxygen at 8-10 L/min by face mask may be of some value</td>
<td>—intervention not warranted in fetus with heart block diagnosed by ECG</td>
</tr>
<tr>
<td>—carry out health care provider’s orders based on alleviating cause (e.g., assist with fetal pulse oximetry if performed to collect more data about cause)</td>
<td>—scaph stimulation may be performed to determine whether the fetus has the ability to compensate physiologically for stress (FHR will accelerate)</td>
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<tr>
<td></td>
<td>—all interventions to improve fetal oxygenation (i.e., lateral maternal positioning, hydration, correction of maternal hypotension, maternal oxygenation and discontinuing oxytocin) may be implemented</td>
</tr>
<tr>
<td></td>
<td>—carry out health care provider’s orders based on alleviating cause</td>
</tr>
</tbody>
</table>


ECG, Electrocardiography; FHR, fetal heart rate.
EVIDENCE-BASED PRACTICE

Routine Doppler Ultrasound

BACKGROUND

• Prenatal diagnosticians have used a noninvasive technique called Doppler ultrasound since 1977 to visualize the movement of blood in a vessel by detecting the change of frequency of reflected sound. With Doppler ultrasound the movement of blood in the umbilical artery and the uteroplacental circulation gives information about the quality of perfusion to the fetus. This can screen women with high risk pregnancies for conditions leading to intrauterine growth restriction and gestational hypertension disorders. There is evidence that Doppler ultrasound is a better indicator of fetal well-being than the biophysical profile or electronic fetal monitoring.

• Use of screening tests in pregnancy should be preceded by questions about the proven clinical effectiveness of testing: sensitivity (ability to detect a problem), specificity (ability to rule out the problem for truly normal subjects), risks of the testing procedure, and what treatments are reasonably available for those with abnormal results. Testing can produce anxiety, inappropriate intervention, and iatrogenic (caused by the caregiver) morbidity and mortality. Questions have been raised in the past about the safety of repeated fetal ultrasound examination in general. Although the procedure is of unquestionable value in high risk pregnancies, these questions regarding the routine use of Doppler ultrasound in low risk pregnancies should be answered, and the answers should be backed up by supportive evidence from randomized, controlled trials.

OBJECTIVES

• The authors of the review sought to assess the safety and efficacy of Doppler ultrasound in low risk pregnancies. The intervention was the use of Doppler ultrasound in low risk women with low risk pregnancies. Maternal outcomes included fetal monitoring, kick counts, biophysical profile, ultrasound, operative delivery, and psychologic effects. Perinatal outcomes included birth weight, gestational age at birth, preterm birth, respiratory status, Apgar score, admission to special care nursery, morbidity, neural development at 2 years, and perinatal death.

METHODS

Search Strategy

• The authors searched the Cochrane database. Search keywords were not noted.

• Five trials, including 14,338 women, were selected from France, the United Kingdom, and Australia, dated 1992 to 1997.

Statistical Analyses

• Statistical analyses included pooling similar data for metaanalysis and analyzing differences between the Doppler group and controls for each outcome studied. The reviewers accepted results outside the 95% confidence interval as significant.

FINDINGS

• No differences between the two groups were found in antenatal admissions or obstetric interventions. One trial found increased perinatal mortality rate in the Doppler group, but when these data were added to the pooled data, the overall difference was not significant. One trial found that the Doppler group was more likely to have repeat tests. No trials evaluated the ability of second-trimester Doppler ultrasound to predict preeclampsia, intrauterine growth restriction, or adverse pregnancy outcome. No data were found on acute neonatal problems, long-term neurologic development, or maternal psychologic factors. One trial found that there was an increase in birth weight below the 10th percentile in women who had intensive repeated fetal ultrasound and Doppler ultrasound examinations, when compared with women who had only selected Doppler tests.

LIMITATIONS

• Interventions varied among trials: some evaluated umbilical artery Doppler alone; others evaluated both umbilical artery and uteroplacental blood flow. One trial compared patients who underwent repeated ultrasound examination plus Doppler with patients who underwent Doppler ultrasound examination only if indicated. Some studies did not allow controls to receive the intervention, and some did allow it. Parameters of measurement differed for the Doppler ultrasound examination. One trial had differing protocols for high risk and low risk women. The homogeneity of the protocols limits generalizability. Many women dropped out of some studies. No trials included management protocols for abnormal results.

CONCLUSIONS

• There is no supportive evidence that routine use of Doppler ultrasound in low risk pregnancy is beneficial to mother or baby. The study showing the intrauterine growth restriction (birth weight less than 10th percentile) suggests that repeated ultrasound examinations may be harmful to the fetus. Doppler ultrasound remains a valuable tool when indicated for high risk pregnancies.

IMPLICATIONS FOR PRACTICE

• Nurses can question the practice of routine Doppler ultrasound in low risk pregnancy. They can educate patients about the risks and benefits of these routines. As patients become more knowledgeable, they can discuss with their primary health care provider the indications for the test.

IMPLICATIONS FOR FURTHER RESEARCH

• Large trials are needed to determine Doppler ultrasound’s ability to predict preeclampsia, intrauterine growth restriction, and other adverse outcomes in low risk pregnancies. Outcomes should include maternal psychologic effects, neonatal morbidity, and long-term neurologic development of the baby. Of particular interest is resolving the issue of the safety of ultrasound.

Decelerations

A deceleration (caused by dominance of parasympathetic response) may be benign or nonreassuring. Three types of decelerations are encountered during labor: early, late, and variable. FHR decelerations are described by their visual relation to the onset and end of a contraction and by their shape.

**Early decelerations.** Early deceleration of the FHR is a visually apparent gradual decrease and return to baseline FHR in response to a contraction phase. It is a normal and benign finding (NICHD, 1997). The deceleration generally starts before the peak of the UCT and returns to the baseline at the same time as the UCT returns to its baseline. Early decelerations may also occur during UCTs, during vaginal examinations, as a result of fundal pressure, and during placement of the internal mode of fetal monitoring. When present, they usually occur during the first stage of labor when the cervix is dilated 4 to 7 cm. Early decelerations sometimes are seen during the second stage when the woman is pushing.

Because early decelerations are considered to be benign, interventions are not necessary. It is valuable to identify early decelerations so that they can be distinguished from late or variable decelerations, which can be nonreassuring and for which interventions are appropriate. The different characteristics of accelerations of the FHR and early decelerations are contrasted in Table 13-4.

**Late decelerations.** Late deceleration of the FHR is a visually apparent gradual decrease in and return to baseline FHR associated with UCTs (NICHD, 1997). The deceleration begins after the contraction has started, and the lowest point of the deceleration occurs after the peak of the contraction. The deceleration usually does not return to baseline until after the contraction is over (Fig. 13-8, B).

**Uteroplacental insufficiency** causes late decelerations. Persistent and repetitive late decelerations usually indicate the presence of fetal hypoxemia stemming from insufficient placental perfusion. They can be associated with fetal hypoxemia progressing to hypoxia and acidemia progressing to acidosis. They should be considered an ominous sign when they are uncorrectable, especially if they are associated with decreased variability and tachycardia. Late decelerations caused by the maternal supine hypotension syndrome are usually correctable when the woman turns on her side to displace the weight of the gravid uterus off the vena cava. Such lateral positioning allows better return of maternal blood flow to the heart, which in turn increases cardiac output and blood pressure.

Late decelerations caused by uteroplacental insufficiency can result from uterine hyperstimulation with oxytocin, gestational hypertension, postdate or postterm pregnancy, amnionitis, small-for-gestational-age (SGA) fetus, maternal diabetes, placenta previa, abruptio placentae, conduction anesthesics (producing maternal hypotension), maternal cardiac disease, and maternal anemia. The clinical significance and nursing interventions are described in Table 13-5.

**Variable decelerations.** Variable deceleration is defined as a visual abrupt decrease in FHR below the baseline. The decrease is 15 beats/min or more, lasts at least 15 seconds, and returns to baseline in less than 2 minutes from the time of onset (NICHD, 1997). Variable decelerations occur any time during the uterine contraction phase and are caused by compression of the umbilical cord. Table 13-5 contrasts late deceleration with variable deceleration.

The pattern of variable decelerations differs from those of early and late decelerations, which closely approximate the shape of the corresponding UCT. Instead, variable decelerations often have a U or V shape, characterized by a rapid descent to and ascent from the nadir (or depth) of the deceleration (Fig. 13-8, C). Some variable decelerations are preceded and followed by brief accelerations of the FHR, known as “shouldering,” which is an appropriate compensatory response to compression of the umbilical cord.

Variable decelerations may be related to partial, brief compression of the cord. If encountered in the first stage of labor, they usually can be resolved by changing the mother’s position, such as from one side to the other. Oxygen administration by face mask to the mother is sometimes helpful. Variable decelerations are most commonly found during the second stage of labor as a result of umbilical cord compression during fetal descent (Freeman, Garite, & Nageotte, 2003). If repetitive variable decelerations occur during the second stage, it is important to discourage the woman from pushing with every contraction.
CHAPTER 13
Fetal Assessment during Labor

### TABLE 13-4

**Accelerations and Early Decelerations**

<table>
<thead>
<tr>
<th>ACCELERATION</th>
<th>EARLY DECELERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Transitory increase of fetal heart rate (FHR) above baseline (see Fig. 13-7)</td>
</tr>
<tr>
<td>Shape</td>
<td>May resemble shape of uterine contraction or be spikelike</td>
</tr>
<tr>
<td>Onset</td>
<td>Onset to peak (30 sec; often precedes or occurs simultaneously with uterine contraction)</td>
</tr>
<tr>
<td>Recovery</td>
<td>Less than 2 min from onset</td>
</tr>
<tr>
<td>Amplitude</td>
<td>Usually 15 beats/min above baseline</td>
</tr>
<tr>
<td>Baseline</td>
<td>Usually associated with average baseline variability</td>
</tr>
<tr>
<td>Occurrence</td>
<td>Variable; may be repetitive with each contraction</td>
</tr>
<tr>
<td>Cause</td>
<td>Spontaneous fetal movement</td>
</tr>
<tr>
<td>Clinical significance</td>
<td>Acceleration with fetal movement signifies fetal well-being, representing fetal alertness or arousal states</td>
</tr>
<tr>
<td>Nursing intervention</td>
<td>None required</td>
</tr>
<tr>
<td></td>
<td>Repetitious (occurs with each contraction); usually occurs between 4- and 7-cm dilation and in second stage of labor</td>
</tr>
<tr>
<td></td>
<td>Head compression resulting from the following:</td>
</tr>
<tr>
<td></td>
<td>— Uterine contractions</td>
</tr>
<tr>
<td></td>
<td>— Vaginal examination</td>
</tr>
<tr>
<td></td>
<td>— Fundal pressure</td>
</tr>
<tr>
<td></td>
<td>— Placement of internal mode of monitoring</td>
</tr>
<tr>
<td></td>
<td>Reassuring pattern not associated with fetal hypoxemia, acidemia, or low Apgar scores</td>
</tr>
</tbody>
</table>


### TABLE 13-5

**Late Decelerations and Variable Decelerations**

<table>
<thead>
<tr>
<th>LATE DECELERATION</th>
<th>VARIABLE DECELERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Transitory gradual decrease in fetal heart rate (FHR) below baseline rate in contracting phase (see Fig. 13-8, B)</td>
</tr>
<tr>
<td>Shape</td>
<td>Uniform; mirror image of uterine contraction; may be deep or shallow</td>
</tr>
<tr>
<td>Onset</td>
<td>Late in contraction phase; after peak of contraction; nadir of deceleration occurs after peak of contraction</td>
</tr>
<tr>
<td>Recovery</td>
<td>Well after end of contraction</td>
</tr>
<tr>
<td></td>
<td>Abrupt decrease in FHR that is variable in duration, intensity, and timing related to onset of contractions (see Fig. 13-8, C)</td>
</tr>
<tr>
<td></td>
<td>Variable; characterized by sudden decrease in FHR in V, U, or W shape</td>
</tr>
<tr>
<td></td>
<td>Onset of deceleration to the beginning of nadir; 30 sec; decrease in FHR baseline is ≥15 beats/min, lasting ≥15 sec; variable times in contracting phase; often preceded by transitory acceleration</td>
</tr>
<tr>
<td></td>
<td>Return to baseline is rapid and &lt; 2 min from onset, sometimes with transitory acceleration or deceleration immediately before and after deceleration (shouldeing or “overshoot”); slow return to baseline with severe variable decelerations</td>
</tr>
</tbody>
</table>

### TABLE 13-5
Late Decelerations and Variable Decelerations—cont’d

<table>
<thead>
<tr>
<th>Deceleration</th>
<th>LATE DECELERATION</th>
<th>VARIABLE DECELERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>Usually proportional to amplitude of contraction; rarely decelerates to &lt; 100 beats/min; however, shallow late decelerations have the same significance</td>
<td>Mild: decelerates to any level, &lt; 30 sec with abrupt return to baseline. Moderate: decelerates to &lt; 70 beats/min for 30 to 60 sec or &lt; 70 to 80 bpm for 60 sec. Severe: decelerates to &lt; 70 beats/min for &gt; 60 sec, with slow return to baseline.</td>
</tr>
<tr>
<td>Occurrence</td>
<td>Often associated with loss of variability and increasing baseline rate</td>
<td>Mild variables usually associated with average baseline variability; moderate and severe variables often associated with decreasing variability and increasing baseline rate</td>
</tr>
<tr>
<td>Cause</td>
<td>Occurs with each contraction; may be observed at any time during labor. Uteroplacental insufficiency caused by the following: Uterine hyperactivity or hypertonicity — Maternal supine hypotension — Epidural or spinal anesthesia — Placenta previa — Abruptio placenta — Hypertensive disorders — Postmaturity — Intrauterine growth restriction — Diabetes mellitus — Intraamniotic infection</td>
<td>Variable; commonly observed late in labor with fetal descent and pushing. Unbilical cord compression caused by the following: Maternal position with cord between fetus and maternal pelvis Cord around fetal neck, arm, leg, or other body part Short cord Knot in cord Prolapsed cord</td>
</tr>
<tr>
<td>Clinical significance</td>
<td>Nonreassuring pattern associated with fetal hypoxemia, acidemia, and low Apgar scores; considered ominous if persistent and uncorrected, especially when associated with fetal tachycardia and loss of variability</td>
<td>Variable decelerations occur in ~50% of all labors and usually are transient and correctable. Nonreassuring variable decelerations last &lt; 60 sec and have an abrupt return to the FHR baseline; normal baseline rate continues; variability does not decrease. Nonreassuring variable decelerations decrease to &lt; 70 beats/min for ≤ 60 sec and have a prolonged return to baseline; baseline rate increases; variability is absent. Nonreassuring variable decelerations are associated with fetal acidemia, hypoxemia, and low Apgar scores; severe variable decelerations with average baseline variability just before birth are usually well tolerated.</td>
</tr>
<tr>
<td>Nursing interventions</td>
<td>The usual priority is: — Change maternal position (lateral) — Correct maternal hypotension by elevating legs — Increase rate of maintenance IV solution. — Palpate uterus to assess for hyperstimulation — Discontinue oxytocin if infusing — Administer oxygen at 8-10 L/min with tight face mask — Consider internal monitoring for a more accurate fetal and uterine assessment — Fetal scalp or acoustic stimulation — Assist with fetal oxygen saturation monitoring if ordered — Assist with birth (cesarean or vaginal assisted) if pattern cannot be corrected</td>
<td>The usual priority is: — Change maternal position (side to side, knee chest) — If decelerations are severe, proceed with following measures: a. Discontinue oxytocin if infusing b. Administer oxygen at 8-10 L/min with tight face mask c. Assist with vaginal or speculum examination to assess for cord prolapse d. Assist with amnioinfusion if ordered e. Assist with fetal oxygen saturation monitoring if ordered f. Assist with birth (vaginal assisted or cesarean) if pattern cannot be corrected</td>
</tr>
</tbody>
</table>


IC: Intravenous.
so that the fetus has time to recover. Variable decelerations are associated with neonatal depression only when cord compression is severe or prolonged (i.e., tight nuchal cord, short cord, knot in cord, prolapsed cord). Further descriptions of the types of variable decelerations, the clinical significance, and nursing interventions are given in Table 13-5.

**Prolonged decelerations.** A prolonged deceleration is a visually apparent decrease in FHR below the baseline 15 beats/min or more and lasting more than 2 minutes but less than 10 minutes. A deceleration lasting more than 10 minutes is considered a baseline change (NICHD, 1997). Generally the benign causes are pelvic examination, application of a spiral electrode, rapid fetal descent, and sustained maternal Valsalva maneuver. Other, less benign, causes are progressive severe variable decelerations, sudden umbilical cord prolapse, hypotension produced by spinal or epidural analgesia or anesthesia, paracervical anesthesia, tachyonic contraction, and maternal hypoxia, which may occur during a seizure. When the deceleration lasts longer than 1 to 2 minutes, a loss of variability with rebound tachycardia usually occurs. Occasionally a period of late decelerations follows. Prolonged decelerations usually are isolated events that end spontaneously. However, when a prolonged deceleration is seen late in the course of severe variable decelerations or during a prolonged series of late decelerations, the prolonged deceleration may occur just before fetal death.

**NURSE ALERT** Nurses should notify the physician or nurse-midwife immediately and initiate appropriate treatment for nonreassuring patterns when they see a prolonged deceleration.

**CARE MANAGEMENT**

The care given to women being monitored by EFM or auscultation is the same as that given to the woman having a low risk labor. Care of the woman being monitored by internal methods may vary. FHR pattern recognition and intervention may require a nurse to have additional education and clinical experience.

**Assessment and Nursing Diagnoses**

The assessment of the woman includes the maternal temperature, pulse, respiratory rate, blood pressure, position, comfort, voiding pattern, status of membranes, UC pattern, cervical effacement and dilation, and emotional status. The fetal assessment includes the fetal presentation, fetal position, FHR, and identification of both reassuring and nonreassuring FHR patterns. A checklist may be used by the nurse to assess the FHR (Box 13-1). All of the assessment information must be documented in the woman’s medical record.

---

**BOX 13-1**

**Checklist for Fetal Heart Rate and Uterine Activity Assessment (Revised)**

<table>
<thead>
<tr>
<th>Patient’s name</th>
<th>Date/time</th>
</tr>
</thead>
</table>

1. What is the baseline fetal heart rate (FHR)?
   - Beats/min
   - Check one of the following as observed on the monitor strip:
     - Average baseline FHR (110 to 160 beats/min)
     - Tachycardia (>160 beats/min)
     - Bradycardia (<110 beats/min)

2. What is the baseline variability?
   - Absence of variability
   - Minimal variability (barely detectable up to 5 beats/min)
   - Moderate variability (6 to 25 beats/min)
   - Marked variability (>25 beats/min)

3. Are there any periodic or episodic changes in FHR?
   - Accelerations with fetal movement
   - Repetitive accelerations with each contraction
   - Early decelerations (head compression)
   - Late decelerations (uteroplacental insufficiency)
   - Variable decelerations (cord compression)
     - Reassuring (<30 to 45 seconds, abrupt return to baseline, normal baseline, moderate variability)
     - Nonreassuring (>60 seconds, slow return to baseline, increasing baseline rate, absence of variability)
     - Prolonged deceleration (>2 minutes to 10 minutes)

4. What is the uterine activity/contraction pattern?
   - Frequency (beginning to beginning of UC)
   - Duration (beginning to end of UC)
   - Abdominal palpation method
   - Strength (mild, moderate, strong)
   - Resting time (from end of one contraction to beginning of next one)
   - Internal monitoring (IUPC)
     - Intensity (mm Hg pressure)
     - Resting tone (mm Hg pressure)

**COMMENTS:**

**PANEL NUMBER:**

**WHAT CAN BE OR SHOULD HAVE BEEN DONE?:**

Nursing diagnoses for the woman who is being monitored electronically for fetal status are based on assessment findings. Possible diagnoses include the following:

• Decreased maternal cardiac output related to
  – supine hypotension secondary to maternal position

• Anxiety related to
  – lack of knowledge concerning fetal monitoring during labor
  – restriction of mobility or movement during EFM

• Impaired fetal gas exchange related to
  – umbilical cord compression
  – placental insufficiency

Expected Outcomes of Care

The primary goals of nursing care are to have a healthy fetal and maternal outcome. The interventions implemented to achieve these outcomes are determined by knowledge of fetal status and by standards for care. The planning process includes accommodating the wishes of the woman and family, answering questions, and explaining nursing interventions. Expected outcomes for the pregnant woman and family and the fetus include the following:

• The pregnant woman and family will verbalize their understanding of the need for monitoring.
• The pregnant woman and family will recognize and avoid situations that compromise maternal and fetal circulation.
• The fetus will not have any hypoxemic, hypoxic, or anoxic episodes.
• Should fetal compromise occur, it will be identified promptly, and appropriate nursing interventions such as intrauterine resuscitation will be initiated and the physician or nurse-midwife notified.

Plan of Care and Interventions

It is the responsibility of the nurse providing care to women in labor to assess FHR patterns, implement independent nursing interventions, document observations and actions according to the established standard of care, and report nonreassuring patterns to the primary care provider (e.g., physician, certified nurse-midwife). See Box 13-3 for a sample protocol for FHR monitoring by IA and EFM during labor.

Although the use of EFM can be reassuring to many parents, it can be a source of anxiety to some. Therefore the nurse must be particularly sensitive to and respond appropriately to the emotional, informational, and comfort needs of the woman in labor and those of her family (Fig. 13-9 and Box 13-4).

Electronic fetal monitoring pattern recognition

Nurses must evaluate many factors to determine whether an FHR pattern is reassuring or nonreassuring. A complete description of FHR tracings includes both qualitative and quantitative descriptions of baseline rate and variability, presence of accelerations, periodic or episodic decelerations, and changes in the FHR pattern over time (NICHD, 1997). Nurses evaluate these factors based on other obstetric
complications, progress in labor, and analgesia or anesthesia. They also must consider the estimated time interval until birth. Interventions are therefore based on clinical judgment of a complex, integrated process (Haggerty & Nuttall, 2000).

Fetal Monitoring Standards

Nurses who care for women during childbirth are legally responsible for correctly interpreting FHR patterns, initiating appropriate nursing interventions based on those patterns, and documenting the outcomes of those interventions. Perinatal nurses are responsible for the timely notification of the physician or nurse-midwife in the event of nonreassuring FHR patterns. Perinatal nurses also are responsible for initiating the institutional chain of command should differences in opinion arise among health care providers concerning the interpretation of the FHR pattern and the intervention required.

LEGAL TIP 8 Fetal Monitoring Standards

Nurses who care for women during childbirth are legally responsible for correctly interpreting FHR patterns, initiating appropriate nursing interventions based on those patterns, and documenting the outcomes of those interventions. Perinatal nurses are responsible for the timely notification of the physician or nurse-midwife in the event of nonreassuring FHR patterns. Perinatal

Protocol for Fetal Heart Rate Monitoring

MATERNAL AND FETAL ASSESSMENTS

- Obtain a 20-min strip of electronic fetal monitoring (EFM) for all patients admitted to labor unit.
- Low Risk Patient
  - Auscultate or assess tracing every 30 min in active phase of first stage of labor.
  - Auscultate or assess tracing every 15 min in second stage.
- High Risk Patient
  - Auscultate or assess tracing every 15 min in active phase and every 5 min in second stage.

Auscultation: All Patients

- Count baseline fetal heart rate (FHR) between contractions.
- Assess FHR during the contraction and for 30 sec after the contraction.
- Note increases or decreases of FHR.
- Interpret FHR data, nursing interventions, and patient responses.
- Notify primary health care provider.

EFM: All Patients

- Assess and interpret baseline FHR, variability of FHR, and presence or absence of decelerations and accelerations.

Assessments for All Patients

- Assess uterine activity for frequency and duration, the intensity of contractions, and uterine resting tone.
- Assess FHR immediately after rupture of membranes, vaginal examinations, and any invasive procedure.

MATERNAL CARE

- Assist woman to a comfortable position other than supine.
- Change maternal position at least every 2 hr.

EXTERNAL MONITORING

Ultrasound Transducer

Function

- Monitors FHR with high-frequency sound waves.

Nursing Care

- Tap transducer before use to ensure sound transmission.
- Apply ultrasound transmission gel to transducer, clean abdomen and transducer, and reapply gel every 2h and as needed.
- Massage reddened skin areas gently and reposition belt or adhesive device every 2h and as needed.
- Auscultate FHR with stethoscope or fetoscope if in doubt as to validity of tracing.
- Position and reposition transducer prn to ensure receipt of clear, interpretable FHR data.

Tocotransducer

Function

- Monitors uterine activity via a pressure-sensing device placed on the maternal abdomen.

Nursing Care

- Position and reposition every 2h and as needed on the fundus, where there is the least maternal tissue.
- Keep abdominal strap snug but comfortable for the laboring woman.
- Adjust knob between contractions to print between 10 and 20 mm Hg on the monitor strip paper.
- Palpate fundus every 30 to 60 min to assess strength of contraction; only frequency and duration of contractions can be assessed with tocotransducer.
- Do not determine woman’s need for analgesia based on uterine activity displayed on monitor strip.
- Gently massage reddened areas under transducer and belt hourly and as needed.

INTERNAL MONITORING

Spiral Electrode

Function

- Obtains fetal electrocardiogram (ECG) from presenting part and converts it into FHR.

Nursing Care

- Ensure that the connector to the scalp electrode is appropriately attached to leg plate.
- Reapply electrode paste to leg plate if needed.
- Observe FHR tracing on monitor strip for variability.

The term intrauterine resuscitation is sometimes used to refer to those interventions initiated when a nonreassuring FHR pattern is noted; they are directed primarily toward improving uterine and interstitial space blood flow and secondarily toward increasing maternal oxygenation and cardiac output (Purcell, 2002). The following preventive interventions are described in this chapter: avoiding the supine position and encouraging maternal position changes; encouraging
spontaneous short bursts of pushing in response to involuntary bearing-down urges; and encouraging pushing with mouth open and glottis open with vocalizing. Previously it was thought that the left lateral maternal position preferentially promoted maternal cardiac output, thereby enhancing blood flow to the fetus. However, it is now known that either the right or left lateral maternal position effectively enhances uteroplacental blood flow. The key issue is to avoid positioning the laboring woman on her back to reduce the risk of supine hypotension, which leads to decreased placental perfusion.

Compression of the umbilical cord vessels results in variable decelerations. Asphyxiation is an intervention that can help relieve such pressure on a nonprolapsed umbilical cord. If maternal hypotension caused by acute hemorrhage (hypovolemia) occurs, the rapid infusion of blood volume expanders may be ordered. Until the infusion is established, the nurse can elevate the woman’s legs. Blood pooled in the legs, especially as a result of sympathetic blockade (e.g., epidural anesthesia), will then drain quickly into the central venous circulation, and this will augment the effective intravascular volume (Parilla, 2002).

**Protocol for Fetal Heart Rate Monitoring—cont’d**

- Turn electrode counterclockwise to remove; never pull straight out from presenting part.
- Administer perineal care after the woman voids during labor and prn.

**Intrauterine Catheter**

**Function**
- Catheter (solid or fluid filled) that monitors intraamniotic pressure internally.

**Nursing Care**
- Ensure that the length line on catheter is visible at introitus.
- For closed-system catheters, set baseline rate between uterine contractions when uterus is relaxed.
- Flush open-system catheter with sterile water before insertion and prn.
- For open-system catheters, turn stopcock off to woman, then with pressure valve of strain gauge released, flush strain gauge, remove syringe, and set stylus to 0 lines of chart paper; test further according to manufacturer’s instructions every 3-4h and as needed.
- Check proper functioning by tapping catheter, asking woman to cough, or applying fundal pressure; observe appropriate inflection on strip chart.
- Keep catheter or cable secured to woman's leg to prevent dislodgment.

**REPORTABLE CONDITIONS**
- Presence of nonreassuring patterns:
  - Severe variable decelerations
  - Late decelerations
  - Absence of variability
  - Prolonged deceleration
  - Severe bradycardia
  - Worsening of any pattern
  - Presence of identifiable fetal dysrhythmias
  - Difficulty in obtaining adequate FHR tracing or inadequate audible FHR

**EMERGENCY MEASURES**
- Implement the following measures immediately in the event of nonreassuring patterns. The priority will depend on the type of nonreassuring FHR pattern is present (refer to Tables 13-2, 13-3, and 13-5):
  - Reposition patient in lateral position to increase uteroplacental perfusion or relieve cord compression.
  - Administer oxygen at 8-10 L/min or per hospital protocol by face mask.
  - Discontinue oxytocin if infusing.
  - Correct maternal hypovolemia by increasing intravenous (IV) rate per protocol or as ordered.
  - Assess for bleeding or other cause of pattern change, such as maternal hypotension.
  - Notify primary health care provider.
  - Assist with other methods of assessment such as fetal oxygen saturation monitoring or interventions such as amniocentesis.
  - Anticipate emergency preparation for surgical intervention if nonreassuring pattern continues despite interventions.

**DOCUMENTATION**

**Patient Record: Auscultation**
- FHR baseline, rate and rhythm, increases or decreases

**Patient Record: EFM**
- Method of monitoring, change in method, and adjustments to equipment
- FHR range, variability, presence of decelerations or accelerations
- Uterine activity as determined by palpation or by external or internal monitoring
- Interpretation of FHR data, nursing interventions, and patient responses
- Notification of primary health care provider

**Monitor Strip**
- Patient identification data
- Assessments, procedures, and interventions (medications, etc.)
- Notification of primary health care provider
- Significant occurrences (sterile vaginal examination, rupture of membranes, etc.)
- Adjustments of the monitor equipment

**BOX 13-3**

*If computer charting system is used, follow institutional policies and system guidelines and protocols.
Oxytocin always should be infused via a piggyback connection near the indwelling needle. If FHR patterns change for any reason, oxytocin stimulation of the uterine muscle must be discontinued. This consists of turning off the intravenous (IV) line from the piggyback (containing oxytocin) and opening the primary infusion line.

Nurses must assign priorities to interventions to maximize the efficacy of the intrauterine resuscitation. The first priority is to open the maternal and fetal vascular systems, the second priority is to increase blood volume, and the third priority is to optimize oxygenation of the circulating blood volume. For example, to relieve an acute FHR deceleration, the nurse can do the following:

- Assist the woman to the side-lying position if she is not already in a lateral position.
- Increase the maternal blood volume by increasing the rate of the primary IV infusion or by raising the woman’s legs.
- Provide oxygen by face mask.

Some interventions are specific to the FHR pattern. Nursing interventions appropriate for the management of tachycardia and bradycardia are given in Table 13-2, and those appropriate for the management of increased or decreased variability are given in Table 13-3. No specific nursing interventions are required for the management of FHR acceleration or early deceleration (see Table 13-4). However, late and some types of variable FHR decelerations require aggressive intervention (see Table 13-5). The primary health care provider decides whether medical intervention should be instituted, what intervention is indicated, or whether immediate vaginal or cesarean birth should be performed.

**Other methods of assessment and intervention**

Other methods of assessment and intervention are designed to be used in conjunction with EFM in an effort to identify and intervene in the presence of a nonreassuring FHR. These methods include FHR response to stimulation, fetal oxygen saturation monitoring, fetal blood sampling, amnioinfusion, and tocolysis. Umbilical cord acid-base determination is an assessment technique that is a useful adjunct to the Apgar score in assessing the immediate condition of the newborn.

**Patient and Family Teaching When Electronic Fetal Monitor Is Used**

The following guidelines relate to patient teaching and the functioning of the monitor.

- Explain the purpose of monitoring.
- Explain each procedure.
- Provide rationale for maternal position other than supine.
- Explain that fetal status can be continuously assessed by electronic fetal monitoring (EFM), even during contractions.
- Explain that the lower tracing on the monitor strip paper shows uterine activity; the upper tracing shows the fetal heart rate (FHR).
- Reassure woman and partner that prepared childbirth techniques can be implemented without difficulty.
- Explain that, during external monitoring, effleurage can be performed on sides of abdomen or upper portion of thighs.
- Explain that breathing patterns based on the time and intensity of contractions can be enhanced by the observation of uterine activity on the monitor strip paper, which shows the onset of contractions.
- Note peak of contraction; knowing that contraction will not get stronger and is half over is usually helpful.
- Note diminishing intensity.
- Coordinate with appropriate breathing and relaxation techniques.
- Reassure woman and partner that the use of internal monitoring does not restrict movement, although she is confined to bed.
- Explain that use of external monitoring usually requires the woman’s cooperation during positioning and movement.
- Reassure woman and partner that use of monitoring does not imply fetal jeopardy.
- Reassure her that the equipment is removed periodically to permit the applicator sites to be washed and other care to be given.

*Portable telemetry monitors allow the FHR and uterine contraction patterns to be observed on centrally located display stations. These portable units permit ambulation during electronic monitoring.*
Fetal oxygen saturation monitoring. Continuous monitoring of fetal oxygen saturation (FSpO₂) or fetal pulse oximetry (FPO) is a method of fetal assessment that was approved for clinical use by the Food and Drug Administration in May 2000 (Porter, 2000). FPO works in a way similar to the pulse oximetry used in children and adults. A specially designed sensor is inserted next to the fetal scalp or temple area to assess oxygen saturation. The sensor is then connected to a monitor, and the data are displayed on the UA panel of the fetal monitor tracing. The normal range of oxygen saturation in the adult is 95% to 100%. The normal range for the healthy fetus is 30% to 70% (Simpson & Porter, 2001), with the cutoff value for the critical threshold of FSpO₂ at 30% (Garite et al., 2000). FPO may be used if certain criteria are met, including a single fetus with at least 36 weeks of gestation in a vertex presentation with a nonreassuring FHR pattern. The membranes should be ruptured, the cervix dilated at least 2 cm, and the fetal station at least -2 or less (Garite et al., 2000). The value of FSpO₂ monitoring is that in the event of nonreassuring FHR patterns, it could support the decision about whether labor should continue or whether to intervene with an expeditious assisted vaginal or cesarean birth of the fetus (Simpson, 2003).

When the use of FPO becomes more widely practiced, the labor nurse’s role will expand to include this type of monitoring in practice (Porter, 2000). Simpson and Porter (2001) suggested that nurses will be involved in identifying potential candidates for monitoring, inserting the sensor (according to state nurse practice acts and institutional policies), interpreting data, documenting findings, and communicating with the primary health care provider.

Fetal scalp blood sampling. Sampling of the fetal scalp blood was designed to assess the fetal pH, PO₂, and PCO₂. The procedure is performed by obtaining a sample of fetal scalp blood through the dilated cervix after the membranes have ruptured. The scalp is swabbed with a disinfecting solution before making the puncture, and the sample is then collected. However, the blood gas values vary so rapidly with transient circulatory changes that fetal blood sampling is seldom performed in the United States (Gilstrap, 2004). When used, it is usually in tertiary centers with the capability for repetitive sampling and rapid report of results. The circulatory changes that cause the variability and thus undermine the utility of this procedure are maternal acidosis or alkalosis, caput succedaneum, the stage of labor, and the time relation of scalp sampling to UCs.

Amnioinfusion. Amnioinfusion is used during labor either to supplement the amount of amniotic fluid to reduce the severity of variable decelerations caused by cord compression or to dilute meconium-stained amniotic fluid with saline or lactated Ringer’s solution (Hofmeyr, 2002; Parer & Nagotte, 2004). The procedure to supplement amniotic fluid is indicated for patients with oligohydramnios, secondary to uteroplacental insufficiency, premature rupture of membranes, or postmaturity, who are at risk for variable decelerations because of umbilical cord compression. Oligohydramnios is an abnormally small amount of amniotic fluid or the absence of amniotic fluid. Without the buffer of amniotic fluid, the umbilical cord can easily become compressed during contractions or fetal movement, diminishing the flow of blood between the fetus and placenta, as evidenced by variable decelerations. Amnioinfusion replaces the “cushion” for the cord and relieves both the frequency and intensity of variable decelerations.

Ammoinfusion also is indicated in the presence of moderate to thick meconium to dilute and flush out the meconium with the intent of avoiding meconium- aspiration syndrome in the neonate (Hofmeyr, 2002). Risks of amnioinfusion are overdistention of the uterine cavity and increased uterine tone. Techniques of amnioinfusion treatment vary, but usually fluid is administered through an IUPC. The woman’s membranes must be ruptured for the IUPC placement. The fluid is administered by attaching plastic (IV) tubing to a liter of normal saline or lactated Ringer’s solution through a port in the IUPC. Double-lumen IUPCs are preferred because the IUPC can be monitored without stopping the procedure. The fluid is usually warmed with a blood warmer before administration for the preterm or SGA fetus (Gorgensen, 2004). The flow rate can be by bolus or continuous flow or by a combination of these two methods.

Intensity and frequency of UCs should be continually assessed during the procedure. The recorded uterine resting tone during amnioinfusion will appear higher than normal because of resistance to outflow and turbulence at the end of the catheter. The true resting tone can be checked by discontinuing the amnioinfusion when using a single-lumen IUPC (Tucker, 2004).

Tocolytic therapy. Tocolysis (relaxation of the uterus) can be achieved through the administration of drugs that inhibit UCs. This therapy can be used as an adjunct to other interventions in the management of fetal stress when the fetus is exhibiting nonreassuring patterns associated with increased UA. Tocolysis improves blood flow through the placenta by inhibiting UCs. Tocolysis may be considered by the primary health care provider and implemented when other interventions to reduce UA, such as maternal positioning change and discontinuance of an oxytocin infusion, have no effect on diminishing the UCs. A tocolytic drug such as magnesium sulfate or terbutaline can be administered intravenously to decrease UA (Tucker, 2004). If the FHR pattern improves, the woman may be allowed to continue labor; if there is no improvement, immediate cesarean birth may be needed.

Umbilical cord acid-base determination. In assessing the immediate condition of the newborn after birth, a sample of cord blood is a useful adjunct to the Apgar
score. The procedure is generally done by withdrawing blood from the umbilical artery and having the blood tested for pH, PCO2, and PO2. Umbilical cord gas measurements reflect the acid-base status of the newborn at birth, a measurement not reflected in the Apgar score (Gilstrap, 2004). If acidosis is present (e.g., pH 7.10 to 7.18) the type of acidosis is determined (respiratory, metabolic, or mixed) by analyzing the blood gas values (Table 13-6).

### Types of Acidosis

<table>
<thead>
<tr>
<th>pH</th>
<th>PCO2 (mm Hg)</th>
<th>HCO3 (mEq/L)</th>
<th>Base</th>
</tr>
</thead>
<tbody>
<tr>
<td>↓ (&lt;7.1)</td>
<td>↑ (&gt;60)</td>
<td>Normal</td>
<td>↑ (&gt;12)</td>
</tr>
<tr>
<td>↑ (&lt;7.1)</td>
<td>&lt;60)</td>
<td>↓ (&lt;16)</td>
<td>↓ (&lt;12)</td>
</tr>
</tbody>
</table>


*Arterial values.

### Patient and family teaching

Part of the nurse’s role includes acting as a partner with the woman to achieve a high-quality birthing experience. In addition to teaching and supporting the woman and her family with understanding of the laboring and birth process, breathing techniques, use of equipment, and pain management techniques, the nurse can assist with two factors that have an effect on fetal status: pushing and positioning. The nurse should provide information and support to the woman with regard to these two factors.

### Maternal positioning

Maternal supine hypotensive syndrome is caused by the weight and pressure of the gravid uterus on the inferior vena cava when the woman is in a supine position. This decreases venous return to the woman’s heart and cardiac output and subsequently reduces her blood pressure. The low maternal blood pressure decreases intervillous space blood flow during UCs and results in fetal hypoxemia. This is reflected on the fetal monitor as a nonreassuring FHR pattern, usually late decelerations. The nurse should solicit the woman’s cooperation in avoiding the supine position. The woman should be encouraged to maintain a side-lying position or semi-Fowler’s position with a lateral tilt to the uterus.

### Discouraging the Valsalva maneuver

The Valsalva maneuver can be described as the process of making a forceful bearing-down attempt while holding one’s breath with a closed glottis and tightening the abdominal muscles. This process stimulates the parasympathetic division of the autonomic nervous system, producing a vagal response, and results in the decrease of the maternal heart rate and blood pressure. Prolonged pushing in this manner can decrease placental blood flow, alter maternal and fetal oxygenation, decrease the fetal pH and PO2, increase the fetal PCO2, and increase the likelihood of fetal hypoxemia, as reflected in FHR pattern changes.

During the second stage of labor, when the woman needs to push, an alternative to breath holding with a closed glottis is to perform the open-mouth and open-glottis breathing-pushing technique. The nurse should instruct the woman to keep her mouth and glottis open and to let air escape from the lungs during the pushing process. This may result in an audible grunting sound and will prevent the Valsalva maneuver. Some providers of care prefer the laborsaving process or delayed pushing, which is to refrain from pushing in the early second stage of labor. The natural forces of labor contractions are used to move the fetus down the birth canal, and then focused pushing is used for a short period to expel the fetus from the birth canal.

### Documentation

Clear and complete documentation on the woman’s monitor strip is started before the initiation of monitoring and consists of identifying information plus other relevant data. This documentation is continued and updated according to institutional protocol as monitoring progresses. In some institutions, observations noted and interventions implemented are recorded on the monitor strip to produce a comprehensive document that chronicles the course of labor and the care rendered. In other institutions this documentation is confined to the labor flow record or computer chart. Advocates of documenting on both the medical record and the EFM strip cite the advantages of this approach the ease of writing directly on the strip and the medical record. The use of a computer-based documentation system and the improved accuracy in documenting critical events and the interventions implemented. Others believe that charting on the EFM strip constitutes duplicate documentation of the same information noted in the medical record, and thus it is unnecessary additional paperwork for the nurse.

One way of documenting that frequent maternal-fetal assessments have been done at the bedside is to initial the EFM strip or to depress the “mark” button during these assessments. Data-entry devices are now available with some EFM systems; assessments are keyed in and subsequently printed on the strip. A disadvantage of documenting on both the EFM strip and the medical record is that frequently the times noted for events and interventions on the EFM strip do not correlate with what is later documented in the medical record. These inaccuracies can lead those involved in the retrospective review process carried out during litigation to infer that documentation errors have occurred. Therefore if
institutional policy mandates documentation on both the monitor strip and the medical record, it is critically important for the nurse to make sure the times and notations of events and interventions recorded in each place agree. No one method of documentation is right; rather, the nurse must be aware of and follow individual institutional policies, as well as participate in formulating such policies (McCartney, 2002). Many of the aspects of care and events that can be documented on the patient’s medical record or the monitor strip are listed in Box 13-5.

Evaluation
Evaluation is a continuous process. The nurse can assume that care was effective when the outcomes for care have been achieved (see Plan of Care).

Electronic Fetal Monitoring during Labor

<table>
<thead>
<tr>
<th>Nursing Diagnosis</th>
<th>Maternal anxiety related to lack of knowledge about use of electronic monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Outcomes</td>
<td>The patient will exhibit increased understanding about fetal monitoring and signs of reduced anxiety (i.e., absence of physical indicators, absence of perceived threat, and absence of feelings of dread).</td>
</tr>
<tr>
<td>Nursing Interventions/Rationales</td>
<td></td>
</tr>
</tbody>
</table>
  - Explain and demonstrate to woman and labor support partner how the electronic monitor (internal or external) works in assessing FHR and in detecting and assessing quality of uterine contractions to remove fear of unknown and ensure that woman can move with the monitor. |
  - When making adjustment to the monitor, explain to the couple what is being done and why, to promote understanding and allay anxiety. |
  - Explain that although a side-lying position or semi-Fowler’s position provides for optimal monitoring, position changes decrease discomfort; therefore encourage frequent changes in position (other than supine) and explain any monitoring adjustments that are being made as a result to reduce discomfort and allay anxiety. |

<table>
<thead>
<tr>
<th>Nursing Diagnosis</th>
<th>Risk for fetal injury related to inaccurate placement of transducers or electrocardiography, misinterpretation of results, or failure to use other assessment techniques to monitor fetal well-being</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Outcomes</td>
<td>Fetal well-being is adequately assessed, and any fetal compromise is identified immediately.</td>
</tr>
<tr>
<td>Nursing Interventions/Rationales</td>
<td></td>
</tr>
</tbody>
</table>
  - Carefully follow guidelines and checklist for application and initiation of monitoring to ensure proper placement of monitoring devices and production of accurate output from monitoring devices. |
  - Check placement throughout monitoring process to ensure that devices remain correctly placed. |
  - Regularly assess and record results of electronic EFM (FHR and variability, decelerations, accelerations, uterine activity, contractions, uterine resting tone) to provide consistent and timely evaluation of fetal well-being and progress of labor. |
  - Auscultate FHR and palpate contractions on a regular basis to provide a cross-check on the EFM output and ensure fetal well-being. |

<table>
<thead>
<tr>
<th>Nursing Diagnosis</th>
<th>Risk for maternal injury related to incorrect placement of external or internal monitors or misinterpretation of contraction pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Outcome</td>
<td>Maternal well-being is assessed continuously, and any alterations are identified promptly.</td>
</tr>
<tr>
<td>Nursing Interventions/Rationales</td>
<td></td>
</tr>
</tbody>
</table>
  - Palpate uterine contractions to correlate data with electronic monitoring results. |
  - Periodically recheck placement to verify that all monitoring devices are accurately placed. |
  - Assess uterine activity, contraction pattern, and baseline to provide ongoing evaluation and basis for further interventions. |
  - Use correct aseptic technique for insertion of internal monitors to prevent infection. |
  - Monitor maternal temperature, as well as color, odor, and amount of amniotic fluid, to determine indicators of infection. |

<table>
<thead>
<tr>
<th>Nursing Diagnosis</th>
<th>Risk for impaired physical mobility related to restriction of movement with monitoring devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Outcome</td>
<td>Woman will be able to change positions and ambulate at intervals.</td>
</tr>
<tr>
<td>Nursing Interventions/Rationales</td>
<td></td>
</tr>
</tbody>
</table>
  - Discontinue continuous EFM at intervals to change position and increase mobility. |
  - Encourage woman to change position and reposition monitor as needed to decrease complications of immobility. |
  - Place external monitor manually at intervals to collect data while woman is out of bed. |

EFM, Electronic fetal monitoring; FHR, fetal heart rate.
UNIT FOUR

CHILDBIRTH

Prepare the class using an ethical decision model such as described in the Wood article in your reference list.

Summarize the topics you will include and identify the evidence on which these topics are based.

Suggest questions that the women can ask their health care providers about fetal monitoring choices.

**You have been asked to give a class on fetal assessment during labor to couples attending childbirth classes at the local clinic. The class is a mix of low and high risk patients. The objective of the class is to provide them with information for making an informed decision about the choice between intermittent auscultation and electronic fetal monitoring.**

- Fetal well-being during labor is gauged by the response of the FHR to UCs.
- FHR characteristics include the baseline FHR and periodic changes in the FHR.
- The monitoring of fetal well-being includes FHR assessment, watching for meconium-stained amniotic fluid, and assessment of maternal vital signs and UA.
- It is the responsibility of the nurse to assess FHR patterns, implement independent nursing interventions, and report nonreassuring patterns to the physician or nurse-midwife.
- AWHONN and ACOG have established and published health care provider standards and guidelines for fetal heart monitoring.
- The emotional, informational, and comfort needs of the woman and her family must be addressed when the mother and her fetus are being monitored.
- Documentation is initiated and updated according to institutional protocol.

**Key Points**

- Fetal well-being during labor is gauged by the response of the FHR to UCs.
- FHR characteristics include the baseline FHR and periodic changes in the FHR.
- The monitoring of fetal well-being includes FHR assessment, watching for meconium-stained amniotic fluid, and assessment of maternal vital signs and UA.
- It is the responsibility of the nurse to assess FHR patterns, implement independent nursing interventions, and report nonreassuring patterns to the physician or nurse-midwife.
- AWHONN and ACOG have established and published health care provider standards and guidelines for fetal heart monitoring.
- The emotional, informational, and comfort needs of the woman and her family must be addressed when the mother and her fetus are being monitored.
- Documentation is initiated and updated according to institutional protocol.

**Answer Guidelines to Critical Thinking Exercise**

**Fetal Monitoring**

1. There is not enough evidence that says there are significant differences in infant outcomes between infants of low risk mothers who had EFM and infants of those who had IA of the FHR. There is some evidence that there is an increase in operative births when EFM is used (Alonen, 2001; Thacker, Stroup, & Chang, 2001).
2. IA is as effective in low risk and high risk women as continuous monitoring. The monitoring guidelines are different. In low risk women in active labor IA is done every
The priority for the nurse is to respond to Keri’s concern about fetal monitoring methods. If IA is a choice (hospital policy, health care provider approval), Keri should be given information about its effectiveness in low risk women and about its advantages and limitations. Keri also needs to know the difference between external and internal EFM and why each may be used in labor situations and the advantages and limitations. Keri’s support persons should be included in the discussion. The doctor or nurse-midwife is informed of Keri’s request and what information she has received from the nurse. A decision for using EFM or IA is then made between Keri and her primary health care provider.

References


Buchanan, UK: John Wiley & Sons.


