It was strange. After months of waiting for my baby’s birth, labor took me by surprise. I wasn’t quite ready to move from being pregnant to being a mother. Not that I had any choice!

—Tammy, 23

**LEARNING OBJECTIVES**

- Discuss high-risk screening and intrapartal assessment of maternal physical and psychosociocultural factors.
- Summarize methods used to evaluate the progress of labor.
- Describe auscultation of fetal heart rate.
- Delineate the procedure for performing Leopold’s maneuvers and the information that can be obtained.
- Differentiate between baseline and periodic changes in fetal heart rate monitoring and describe the appearance and significance of each.
- Outline steps to be performed in the systematic evaluation of fetal heart rate tracings.
- Identify nonreassuring fetal heart rate patterns and appropriate nursing responses.
- Discuss nursing care of the family undergoing electronic fetal monitoring.
- Delineate the indications for fetal blood sampling and identify related pH values.
- Describe how fetal oxygen saturation (FSpO₂) monitoring uses pulse oximetry to monitor fetal oxygenation within the fetal blood to determine if hypoxia is occurring.

**MEDIA LINK**

**CD-ROM**
Skill 3-1: Performing an Intrapartal Vaginal Examination
Skill 3-3: Performing Leopold’s Maneuvers
Skill 3-4: Auscultation of Fetal Heart Rate
Skill 3-5: External Electronic Fetal Monitoring
Skill 3-6: Electronic Fetal Monitoring
Audio Glossary
NCLEX-RN® Review

**Companion Website**
Thinking Critically
NCLEX-RN® Review
MediaLink Applications:
  - Case Study: Maternal Assessment during Labor
  - Care Plan Activity: Client with Decelerations
The physiologic events during labor call for many adaptations by the mother and the fetus. Thus, frequent and accurate assessments are crucial. The woman’s partner or chosen support person is also an integral part of the childbirth experience. In nursing practice the traditional assessment techniques of observation, palpation, and auscultation are augmented by the judicious use of technology such as ultrasound and electronic monitoring. These tools may provide more detailed information for assessment. However, the technology only provides data; it is the nurse who monitors the mother and her baby.

**MATERNAL ASSESSMENT**

**HISTORY**

Obtain a brief oral history when the woman is admitted to the birthing area. Each agency has its own admission forms, but they usually include the following information:

- Woman’s name and age
- Last menstrual period (LMP) and estimated date of birth (EDB)
- Attending physician or certified nurse-midwife (CNM)
- Personal data: blood type; Rh factor; results of serology testing; prepregnant and present weight; allergies to medications, foods, or other substances; prescribed and over-the-counter medications taken during pregnancy; and history of drug and alcohol use and smoking during the pregnancy
- History of previous illness, such as tuberculosis, heart disease, diabetes, and so forth
- Problems in the prenatal period, such as elevated blood pressure, bleeding problems, recurrent urinary tract infections, other infections
- Pregnancy data: gravida, para, abortions, and perinatal deaths
- The method chosen for infant feeding
- Type of prenatal education classes (childbirth education classes)
- Woman’s preferences about labor and birth, such as no episiotomy, no analgesics or anesthetics, or the presence of the father or others at the birth
- Pediatrician or family practice physician
- Additional data: history of special tests such as nonstress test (NST), biophysical profile (BPP), or ultrasound; history of any preterm labor; onset of labor; amniotic fluid membrane status; and brief description of previous labor and birth
- Onset of labor
- Status of amniotic membranes (Are they intact or ruptured? If ruptured, time of rupture, color of fluid, and odor.)

The psychosocial history is a critical component of intrapartal nursing assessment. Because of the prevalence of domestic violence in society, the nurse needs to consider the possibility that the woman may have experienced abuse at some time in her life. The following screening questions should be asked universally when the woman is alone so that she can answer freely (American College of Obestetricians and Gynecologists [ACOG], 1999):

1. Has anyone close to you ever threatened to harm you?
2. Have you ever been hit, slapped, kicked, choked, or otherwise physically hurt by someone? If yes, by whom? Total number of times?
3. Has anyone, including your partner, ever forced you to have sex?
4. Are you afraid of your partner or anyone you mentioned?

**NURSING PRACTICE**

Many nurses have difficulty asking questions about domestic violence, sexual abuse, and drug or alcohol use during pregnancy. However, this information is necessary to provide the best nursing care possible. To create a relationship of trust in which the client feels safe answering uncomfortable questions, the following tips may be helpful:
- Explore your own beliefs and values.
- Use open-ended questions.
- Be receptive to the answers.
- Be accepting of others’ life experiences.

**THINKING CRITICALLY**

You are the birthing center nurse and you have reason to suspect that Lynn Ling, who has just been admitted in labor, may be in an abusive relationship. How could you set up an interview so that the partner would leave the room (and take any accompanying children) without feeling that you are possibly increasing the risk to the woman? What communication techniques would you use to encourage Lynn to reveal if her partner is abusive?

**INTRAPARTAL HIGH-RISK SCREENING**

Screening for intrapartal high-risk factors is an integral part of assessing the normal laboring woman. As the history is obtained, note the presence of any factors that may be associated with a high-risk condition. For example, the woman who reports a physical symptom such as intermittent bleeding needs further assessment to rule out abruptio placentae or placenta previa before the admission process continues. It is also important to recognize the implications of a high-risk condition for the laboring woman and her fetus. For example, if there is an abnormal fetal presentation, labor may be prolonged, prolapse of the umbilical cord is more likely, and the possibility of a cesarean birth is increased.

Although physical conditions are major factors that increase risk in the intrapartal period, sociocultural variables such as poverty, nutrition, the amount of prenatal care, cultural beliefs about pregnancy, and communication patterns may also precipitate a high-risk situation. In addition, women who suffer from post-traumatic stress disorder may be at increased risk for some pregnancy complications (Seng et al., 2001). Other risk factors include smoking, drug use, and consumption of alcohol during pregnancy (Davidson, 2002).

Begin gathering data about sociocultural factors as the woman enters the birthing area. Observe the communication patterns between the woman and her support person or people and their responses to admission questions and initial teaching. If the woman and those supporting her do not speak English and translators are not available among the birthing unit staff, the course of labor and the ability of caregivers to interact and provide support and education are affected. The couple must receive information in their primary language to make informed decisions. Communication may also be affected by cultural practices such as beliefs about when to speak, who should ask questions, or whether it is acceptable to let others know about discomfort.

Table 18–1 provides a partial list of intrapartal risk factors to keep in mind during the intrapartal assessment.

<table>
<thead>
<tr>
<th>TABLE 18–1</th>
<th>Intrapartal High-Risk Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor</strong></td>
<td><strong>Maternal Implications</strong></td>
</tr>
<tr>
<td>Abnormal presentation</td>
<td>↑ Incidence of cesarean birth</td>
</tr>
<tr>
<td></td>
<td>↑ Incidence of prolonged labor</td>
</tr>
<tr>
<td>Multiple gestation</td>
<td>↑ Uterine distention → ↑ risk of postpartum hemorrhage</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of cesarean birth</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of preterm labor</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydramnios</td>
<td>↑ Discomfort</td>
</tr>
<tr>
<td></td>
<td>↑ Dyspnea</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of preterm labor</td>
</tr>
<tr>
<td></td>
<td>Edema of lower extremities</td>
</tr>
</tbody>
</table>
### TABLE 18-1  *Intrapartal High-Risk Factors—continued*

<table>
<thead>
<tr>
<th>Factor</th>
<th>Maternal Implications</th>
<th>Fetal-Neonatal Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oligohydramnios</td>
<td>Maternal fear of “dry birth”</td>
<td>↑ Incidence of congenital anomalies&lt;br&gt;↑ Incidence of renal lesions&lt;br&gt;↑ Risk of IUGR&lt;br&gt;↑ Risk of fetal acidosis&lt;br&gt;↑ Risk of cord compression&lt;br&gt;Postmaturity</td>
</tr>
<tr>
<td>Meconium staining of amniotic fluid</td>
<td>↑ Psychologic stress due to fear for baby</td>
<td>↑ Risk of fetal asphyxia&lt;br&gt;↑ Risk of meconium aspiration&lt;br&gt;↑ Risk of pneumonia due to aspiration of meconium</td>
</tr>
<tr>
<td>Premature rupture of membranes</td>
<td>↑ Risk of infection (chorioamnionitis)&lt;br&gt;↑ Risk of preterm labor&lt;br&gt;↑ Anxiety&lt;br&gt;Fear for the baby&lt;br&gt;Prolonged hospitalization&lt;br&gt;↑ Incidence of tocolytic therapy</td>
<td>↑ Perinatal morbidity&lt;br&gt;Prematurity&lt;br ↑ Birth weight&lt;br ↑ Risk of respiratory distress syndrome&lt;br&gt;Prolonged hospitalization</td>
</tr>
<tr>
<td>Induction of labor</td>
<td>↑ Risk of hypercontractility of uterus&lt;br&gt;↑ Risk of uterine rupture&lt;br&gt;Length of labor if cervix not ready&lt;br&gt;↑ Anxiety</td>
<td>Prematurity if gestational age not assessed correctly&lt;br&gt;Hypoxia if hyperstimulation occurs</td>
</tr>
<tr>
<td>Abruptio placentae/placenta previa</td>
<td>Hemorrhage&lt;br&gt;Uterine atony&lt;br&gt;↑ Incidence of cesarean birth</td>
<td>Fetal hypoxia/acidosis&lt;br&gt;Fetal exsanguination&lt;br&gt;↑ Perinatal mortality</td>
</tr>
<tr>
<td>Failure to progress in labor</td>
<td>Maternal exhaustion&lt;br&gt;↑ Incidence of augmentation of labor&lt;br&gt;↑ Incidence of cesarean birth</td>
<td>Fetal hypoxia/acidosis&lt;br&gt;Intracranial birth injury</td>
</tr>
<tr>
<td>Precipitous labor (&lt;3 hours)</td>
<td>Perineal, vaginal, cervical lacerations&lt;br&gt;↑ Risk of postpartum hemorrhage</td>
<td>Tentorial tears</td>
</tr>
<tr>
<td>Prolapse of umbilical cord</td>
<td>↑ Fear for baby&lt;br&gt;Cesarean birth</td>
<td>Acute fetal hypoxia/acidosis</td>
</tr>
<tr>
<td>Fetal heart aberrations</td>
<td>↑ Fear for baby&lt;br&gt;↑ Risk of cesarean birth, forceps, vacuum&lt;br&gt;Continuous electronic monitoring and intervention in labor</td>
<td>Tachycardia, chronic asphyxic insult, bradycardia, acute asphyxic insult&lt;br&gt;Chronic hypoxia&lt;br&gt;Congenital heart block</td>
</tr>
<tr>
<td>Uterine rupture</td>
<td>Hemorrhage&lt;br&gt;Cesarean birth for hysterectomy&lt;br&gt;↑ Risk of death</td>
<td>Fetal anoxia&lt;br&gt;Fetal hemorrhage&lt;br&gt;↑ Neonatal morbidity and mortality</td>
</tr>
<tr>
<td>Postdates (&gt;42 weeks)</td>
<td>↑ Anxiety&lt;br&gt;↑ Incidence of induction of labor&lt;br&gt;↑ Incidence of cesarean birth&lt;br&gt;↑ Use of technology to monitor fetus&lt;br&gt;↑ Risk of shoulder dystocia</td>
<td>Postmaturity syndrome&lt;br&gt;↑ Risk of fetal-neonatal morbidity and mortality&lt;br&gt;↑ Risk of antepartum fetal death&lt;br&gt;↑ Incidence or risk of large baby</td>
</tr>
<tr>
<td>Diabetes</td>
<td>↑ Risk of hydramnios&lt;br&gt;↑ Risk of hypoglycemia or hyperglycemia&lt;br&gt;↑ Risk of preeclampsia-eclampsia</td>
<td>↑ Risk of malpresentation&lt;br&gt;↑ Risk of macrosomia&lt;br&gt;↑ Risk of IUGR&lt;br&gt;↑ Risk of respiratory distress syndrome&lt;br&gt;↑ Risk of congenital anomalies</td>
</tr>
<tr>
<td>Preeclampsia-eclampsia</td>
<td>↑ Risk of seizures&lt;br&gt;↑ Risk of stroke&lt;br&gt;↑ Risk of HELLP</td>
<td>↑ Risk of small-for-gestational-age baby&lt;br&gt;↑ Risk of preterm birth&lt;br&gt;↑ Risk of mortality</td>
</tr>
<tr>
<td>AIDS/STI</td>
<td>↑ Risk of additional infections</td>
<td>↑ Risk of transplacental transmission</td>
</tr>
</tbody>
</table>
INTRAPARTAL PHYSICAL AND PSYCHOSOCIOCULTURAL ASSESSMENT

A physical examination is part of the admission procedure and part of the ongoing care of the woman. Although the intrapartal physical assessment is not as complete and thorough as the initial prenatal physical examination (see Chapter 10), it does involve assessment of some body systems and the actual labor process. See “Assessment Guide: Intrapartal—First Stage of Labor” for a framework to use when examining the laboring woman.

The physical assessment portion includes assessments performed immediately on admission as well as ongoing assessments. When labor is progressing very quickly, there may not be time for a complete nursing assessment. In that case the critical physical assessments include maternal vital signs, labor status, fetal status, and laboratory findings. The cultural assessment portion provides a starting point for this increasingly important aspect of assessment. Individualized nursing care can best be planned and implemented when the values and beliefs of the laboring woman are known and honored. It is sometimes challenging to achieve a balance between cultural awareness and the risk of stereotyping because cultural responses are influenced by so many factors. Nurses are most effective when they combine an awareness of the major cultural values and beliefs of a specific group with the recognition that individual differences have an impact. “Developing Cultural Competence” provides examples of selected beliefs of some Native American women.

DEVELOPING CULTURAL COMPETENCE

The following list provides a few examples of the beliefs and taboos of some Native American women related to childbirth (Cesario, 2001):

- If a pregnant woman eats the feet of animals, her infant will be born feet first.
- If a pregnant woman eats an animal’s tail, her infant will get stuck in the birth canal.
- Weaving or tying knots during pregnancy will cause umbilical cord complications.
- If the woman naps during labor it may cause a change in the desired sex of her infant.
- A lengthy labor may result if a woman is exposed to cold during pregnancy because cold causes the woman’s bag of waters to freeze, thereby holding the infant back.
- When the infant’s cord is being cut following birth, the mother should bite on a white pebble. This ensures that the infant’s teeth will be white and strong.

The final section of the assessment guide addresses psychosocial factors. The laboring woman’s psychosocial status is an important part of the total assessment. The woman has previous ideas, knowledge, and fears about childbearing. By assessing her psychosocial status, the nurse can meet the woman’s needs for information and support.

While performing the intrapartal assessment, it is crucial to follow the Centers for Disease Control and Prevention (CDC) guidelines to prevent exposure to body substances. Provide information about the precautions in a factual manner.

METHODS OF EVALUATING LABOR PROGRESS

The nurse assesses the woman’s contractions and cervical dilatation and effacement to evaluate labor progress.

Contraction Assessment

Uterine contractions may be assessed by palpation or continuous electronic monitoring.

Palpation. Assess contractions for frequency, duration, and intensity by placing one hand on the uterine fundus. It is important to keep the hand relatively still because excessive movement may stimulate contractions or cause discomfort. Determine the frequency of the contractions by noting the time from the beginning of one contraction to the beginning of the next. If contractions begin at 7:00, 7:04, and 7:08, for example, their frequency is every 4 minutes. To determine contraction duration, note the time when tensing of the fundus is first felt (beginning of contraction) and again as relaxation occurs (end of contraction). During the acme of the contraction, intensity can be evaluated by estimating the indentability of the fundus. Assess at least three successive contractions to provide enough data to determine the contraction pattern. See Table 18–2 for a review of characteristics in different phases of labor.

Electronic Monitoring of Contractions...

Electronic monitoring of uterine contractions provides continuous data. In many birth settings, electronic monitoring is routine for high-risk clients.
# ASSESSMENT GUIDE

## INTRAPARTAL—FIRST STAGE OF LABOR

### PHYSICAL ASSESSMENT/ NORMAL FINDINGS  

<table>
<thead>
<tr>
<th>Vital Signs</th>
<th>ALTERATIONS AND POSSIBLE CAUSES*</th>
<th>NURSING RESPONSES TO DATA†</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blood pressure (BP):</strong> <em>&lt;130 systolic and &lt;85 diastolic in adult 18 years of age or older or no more than 15-20 mm Hg rise in systolic pressure over baseline BP during early pregnancy</em></td>
<td>High BP (essential hypertension, preeclampsia, renal disease, apprehension or anxiety) Low BP (supine hypotension)</td>
<td>Evaluate history of preexisting disorders and check for presence of other signs of preeclampsia. Do not assess during contractions; implement measures to decrease anxiety and reassess. Turn woman on her side and recheck BP. Provide quiet environment. Have O₂ available. Evaluate cause, reassess to see if rate continues; report to physician. Assess between contractions; if marked tachypnea continues, assess for signs of respiratory disease. Encourage slow breaths if woman is hyperventilating. Apply O₂; notify physician Assess for other signs of infection or dehydration.</td>
</tr>
<tr>
<td><strong>Pulse:</strong> 60-90 beats per minute (bpm)</td>
<td>Increased pulse rate (excitement or anxiety, cardiac disorders, early shock)</td>
<td></td>
</tr>
<tr>
<td><strong>Respirations:</strong> 14–22/minute (or pulse rate divided by 4)</td>
<td>Marked tachypnea (respiratory disease), hyperventilation in transition phase Hyperventilation (anxiety)</td>
<td></td>
</tr>
<tr>
<td><strong>Temperature:</strong> 36.2–37.6°C (98–99.6°F)</td>
<td>&gt;90%, hypoxia, hypotension, hemorrhage Elevated temperature (infection, dehydration, prolonged rupture of membranes, epidural regional block)</td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>Weight gain &gt;35 lb (fluid retention, obesity, large infant, diabetes mellitus, preeclampsia), weight gain &lt;15 lb (SGA, substance abuse, psychosocial problems).</td>
<td>Assess for signs of edema. Evaluate pattern from prenatal record.</td>
</tr>
<tr>
<td>25–35 lb greater than prepregnant weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lungs</strong></td>
<td>Rales, rhonchi, friction rub (infection), pulmonary edema, asthma</td>
<td>Reassess; refer to physician.</td>
</tr>
<tr>
<td>Normal breath sounds, clear and equal</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fundus</strong></td>
<td>Uterine size not compatible with estimated date of birth (SGA, large for gestational age [LGA], hydramnios, multiple pregnancy, placental/fetal anomalies, malpresentation)</td>
<td>Reevaluate history regarding pregnancy dating. Refer to physician for additional assessment.</td>
</tr>
<tr>
<td>At 40 weeks' gestation located just below xiphoid process</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Edema</strong></td>
<td>Pitting edema of face, hands, legs, abdomen, sacral area (preeclampsia)</td>
<td>Check deep tendon reflexes for hyperactivity; check for clonus; refer to physician.</td>
</tr>
<tr>
<td>Slight amount of dependent edema</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hydration</strong></td>
<td>Poor skin turgor (dehydration)</td>
<td>Assess skin turgor; refer to physician for deviations.</td>
</tr>
<tr>
<td>Normal skin turgor, elastic</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Perineum</strong></td>
<td>Varicose veins of vulva, herpes lesions, genital warts</td>
<td>Exercise care while doing a perineal prep; note on client record need for follow-up in postpartal period; reassess after birth; refer to physician/CNM.</td>
</tr>
<tr>
<td>Tissues smooth, pink color (see Prenatal Initial Physical Assessment Guide, Chapter 10)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Possible causes of alterations are placed in parentheses. †This column provides guidelines for further assessment and initial nursing intervention.

(continued)
### ASSESSMENT GUIDE—continued

#### INTRAPARTAL—FIRST STAGE OF LABOR

<table>
<thead>
<tr>
<th>PHYSICAL ASSESSMENT/ NORMAL FINDINGS</th>
<th>ALTERATIONS AND POSSIBLE CAUSES*</th>
<th>NURSING RESPONSES TO DATA†</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perineum</strong> (continued)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear mucus; may be blood tinged with earthy or human odor</td>
<td>Profuse, purulent, foul-smelling drainage</td>
<td>Suspected gonorrhea or chorioamnionitis; report to physician/CNM; initiate care to newborn's eyes; notify neonatal nursing staff and pediatrician. Assess BP and pulse, pallor, diaphoresis; report any marked changes. (Note: Gaping of vagina or anus and bulging of perineum are signs that suggest the onset of the second stage of labor.) Follow universal precautions.</td>
</tr>
<tr>
<td>Presence of small amount of bloody show that gradually increases with further cervical dilatation</td>
<td>Hemorrhage</td>
<td></td>
</tr>
</tbody>
</table>

#### Labor Status

- **Uterine contractions**: regular pattern
- **Cervical dilatation**: progressive cervical dilatation from size of fingertip to 10 cm (see Skill 3–1 in the Clinical Skills Manual, as well as the CD-ROM that accompanies this text) [SKILLS](#)
- **Cervical effacement**: progressive thinning of cervix (see Skill 3–1) [SKILLS](#)
- **Fetal descent**: progressive descent of fetal presenting part from station 25 to 14 (see Skill 3–1) [SKILLS](#)
- **Membranes**: may rupture before or during labor

**Findings on Nitrazine test tape:**
- Membranes probably intact
  - Yellow  pH 5.0
  - Olive  pH 5.5
  - Olive green  pH 6.0
- Membranes probably ruptured
  - Blue-green  pH 6.5
  - Blue-gray  pH 7.0
  - Deep blue  pH 7.5

- **Failure to establish a regular pattern, prolonged latent phase**
- **Failure to efface (rigidity of cervix, failure of presenting part to engage); cervical edema (pushing effort by woman before cervix is fully dilated and effaced, trapped cervix)**
- **Failure of descent (abnormal fetal position or presentation, macrosomic fetus, inadequate pelvic measurement)**
- **Rupture of membranes more than 12–24 hours before initiation of labor**
- **False-positive results may be obtained if large amount of bloody show is present, previous vaginal examination has been done using lubricant, or tape is touched by nurse's fingers.**

*Possible causes of alterations are placed in parentheses.

†This column provides guidelines for further assessment and initial nursing intervention.

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*Note: Gaping of vagina or anus and bulging of perineum are signs that suggest the onset of the second stage of labor.*

Follow universal precautions.
### Intrapartal Nursing Assessment

#### Assessment Guide—continued

#### Intrapartal—First Stage of Labor

<table>
<thead>
<tr>
<th>Physical Assessment/Normal Findings</th>
<th>Alterations and Possible Causes*</th>
<th>Nursing Responses to Data†</th>
</tr>
</thead>
</table>

**Labor Status (continued)**

| Amniotic fluid clear, with earthy or human odor, no foul-smelling odor | Greenish amniotic fluid (fetal stress) Bloody fluid (abruptio placentae) Strong or foul odor (amnionitis) | Assess FHR; do vaginal exam to evaluate for prolapsed cord; apply fetal monitor for continuous data; report to physician/CNM. Take woman's temperature and report to physician/CNM. |

**Fetal Status**

- **FHR:** 110–160 bpm
- **Presentation:**
  - Cephalic, 97%
  - Breech, 3%
- **Position:** left occiput anterior (LOA) most common
- **Activity:** fetal movement

| <110 or >160 bpm (nonreassuring fetal status); abnormal patterns on fetal monitor: decreased variability, late decelerations, variable decelerations, absence of accelerations with fetal movement | Face, brow, breech, or shoulder presentation Persistent occipital posterior (OP) position; transverse arrest Hyperactivity (may precede fetal hypoxia) Complete lack of movement (fetal distress or fetal demise) | Initiate interventions based on particular FHR pattern. Report to physician/CNM; after presentation is confirmed as face, brow, breech, or shoulder, woman may be prepared for cesarean birth. Carefully monitor maternal and fetal status. Reposition mother to sidelying or hands and knees to promote rotation of fetal head. Carefully evaluate FHR; apply fetal monitor. Carefully evaluate FHR; apply fetal monitor. Report to physician or CNM. |

**Laboratory Evaluation**

- **Hematologic tests**
  - Hemoglobin: 12–16 g/dL
  - Complete blood count (CBC):
    - Hematocrit: 38%–47%
    - Red blood cell count (RBC): 4.2–5.4 million/mm³
    - White blood cell count (WBC): 4,500–11,000/mm³, although leukocytosis to 20,000/mm³ is not unusual
    - Platelets: 150,000–400,000/mm³
  - Serologic testing
    - Serologic test for syphilis (STS) or Venereal Disease Research Laboratory (VDRL) test: nonreactive
    - Rh factor
- **Urinalysis**
  - Glucose: negative
  - Ketones: negative

| <11 g/dL (anemia, hemorrhage) | Presence of infection or blood dyscrasias, loss of blood (hemorrhage, disseminated intravascular coagulation [DIC]) | Evaluate woman for problems due to decreased oxygen-carrying capacity caused by lowered hemoglobin. Evaluate for other signs of infection or for petechiae, bruising, or unusual bleeding. For reactive test, notify newborn nursery and pediatrician. Assess prenatal record for titer levels during pregnancy. Obtain cord blood for direct Coombs' at birth. Assess blood glucose level; test urine for ketones; ketonuria and glycosuria require further assessment of blood sugar levels.¹ |

*Possible causes of alterations are placed in parentheses. †This column provides guidelines for further assessment and initial nursing intervention. ¹Glycosuria should not be discounted. The presence of glycosuria necessitates follow-up.
### ASSESSMENT GUIDE—continued

#### INTRAPARTAL—FIRST STAGE OF LABOR

<table>
<thead>
<tr>
<th>PHYSICAL ASSESSMENT/ NORMAL FINDINGS</th>
<th>ALTERATIONS AND POSSIBLE CAUSES*</th>
<th>NURSING RESPONSES TO DATA†</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Laboratory Evaluation (continued)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proteins: negative</td>
<td>Proteinuria (urine specimen contaminated with vaginal secretions, fever, kidney disease); proteinuria of 2+ or greater found in uncontaminated urine may be a sign of ensuing preeclampsia</td>
<td>Instruct woman in collection technique; incidence of contamination from vaginal discharge is common. Report any increase in proteinuria to physician/CNM.</td>
</tr>
<tr>
<td>Red blood cells: negative</td>
<td>Blood in urine (calculi, cystitis, glomerulonephritis, neoplasm)</td>
<td>Assess collection technique (may be bloody show).</td>
</tr>
<tr>
<td>White blood cells: negative</td>
<td>Presence of white blood cells (infection in genitourinary tract)</td>
<td>Assess for signs of urinary tract infection.</td>
</tr>
<tr>
<td>Casts: none</td>
<td>Presence of casts (nephrotic syndrome)</td>
<td></td>
</tr>
</tbody>
</table>

#### CULTURAL ASSESSMENT§

Cultural influences determine customs and practices regarding intrapartal care

Ask the following questions: Who would you like to remain with you during your labor and birth?

What would you like to wear during labor?

What activity would you like during labor?

What position would you like for the birth?

Is there anything special you would like?

**Variations to Consider**

- Individual preferences may vary.
  - She may prefer only her partner/significant other to remain or may also want family and/or friends.
  - She may be more comfortable in her own clothes.
  - She may want to ambulate most of the time, stand in the shower, sit in the Jacuzzi (see “Complementary Care: Hydrotherapy” in Chapter 17), sit in a chair or on a stool, remain on the bed, and so forth.
  - She may feel more comfortable in lithotomy with stirrups and her upper body elevated, or side-lying or sitting in birthing bed, or standing, or squatting, or on hands and knees.

**Nursing Responses to Data†**

- Provide support for her wishes by encouraging desired people to stay. Provide information to others (with the woman’s permission) who are not in the room.
- Support her wishes; provide encouragement and complete assessments in a manner so her activity and positional wishes are disturbed as little as possible.
- Support the woman’s wishes; provide any supplies and equipment needed to support her in her chosen birthing position. Provide information to the coach regarding any changes that may be needed based on the chosen position.
- Support requests and communicate requests to any other nursing or medical personnel (so requests can continue to be supported and not questioned). If another nurse or physician does not honor the request, act as advocate for the woman by continuing to support her unless her desire is truly unsafe.

- Instruct woman in collection technique; incidence of contamination from vaginal discharge is common.
- Assess collection technique (may be bloody show).

§These are only a few suggestions. We do not mean to imply that this is a comprehensive cultural assessment; rather, it is a tool to encourage cultural sensitivity.

†Possible causes of alterations are placed in parentheses.

This column provides guidelines for further assessment and initial nursing intervention.
### ASSESSMENT GUIDE—continued

#### INTRAPARTAL-FIRST STAGE OF LABOR

<table>
<thead>
<tr>
<th>CULTURAL ASSESSMENT§</th>
<th>VARIATIONS TO CONSIDER</th>
<th>NURSING RESPONSES TO DATA †</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask the woman if she would like fluids and ask what temperature she prefers.</td>
<td>She may prefer clear fluids other than water (tea, clear juice). She may prefer iced, room-temperature, or warmed fluids. Some women do not seem to mind being exposed during an exam or procedure; others feel acute discomfort.</td>
<td>Provide fluids as desired. Maintain privacy and respect the woman’s sense of privacy. If the woman is unable to provide specific information, the nurse may draw from general information regarding cultural variation: a Southeast Asian woman may not want any family member in the room during exams or procedures. Her partner may not be involved with coaching activities during labor or birth. Saudi women may need to remain covered during the labor and birth and avoid exposure of any body part. The husband may need to be in the room but remain behind a curtain or screen so he does not view his wife at this time.</td>
</tr>
<tr>
<td>Obtain the woman’s response when privacy is difficult to maintain and her body is exposed.</td>
<td>If the woman is to breastfeed, ask if she would like to feed her baby immediately after birth. She may want to feed her baby right away or may want to wait a little while.</td>
<td>Add to present information base. Support breathing and relaxation techniques that client is using; provide information if needed.</td>
</tr>
<tr>
<td>If the woman is to breastfeed, ask if she would like to feed her baby immediately after birth.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Preparation for Childbirth

- **Woman has some information regarding process of normal labor and birth.**
- **Woman has breathing and/or relaxation techniques to use during labor.**
- **Some women do not have any information regarding childbirth.**
- **Some women do not have any method of relaxation or breathing to use, and some do not desire them.**

#### Response to Labor

- **Latent phase:** relaxed, excited, anxious for labor to be well established
- **Active phase:** becomes more intense, begins to tire
- **Transitional phase:** feels tired, may feel unable to cope, needs frequent coaching to maintain breathing patterns
- **Coping mechanisms:** ability to cope with labor through utilization of support system, breathing, relaxation techniques

#### Anxiety

- **Some anxiety and apprehension is within normal limits**
- **May show anxiety through rapid breathing, nervous tremors, frowning, grimacing, clinching of teeth, thrashing movements, crying, increased pulse and blood pressure.**

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§These are only a few suggestions. We do not mean to imply that this is a comprehensive cultural assessment; rather, it is a tool to encourage cultural sensitivity.

†This column provides guidelines for further assessment and initial nursing intervention.
and women having oxytocin-induced labor; other facilities monitor all laboring women.

Electronic monitoring may be done externally with a device placed against the maternal abdomen, or internally with an intrauterine pressure catheter. When monitoring by external means, the portion of the monitoring equipment called a tocodynamometer, or “toco,” is positioned against the fundus of the uterus and held in place with an elastic belt (Figure 18–1). The toco contains a flexible disk that responds to pressure. When the uterus contracts,
COMPLEMENTARY CARE

AROMATHERAPY IN CHILDBIRTH

Aromatherapy is the use of aromas for physical, mental, and emotional healing. The primary sources of healing aromas are essential oils distilled from herbs and flowers. Essential oils are volatile, which means that their molecules quickly evaporate into the environment. When you inhale an essential oil molecule, its active components react with the olfactory membrane in your nose, which is directly linked to the limbic system and hypothalamus in the brain. These two areas play a crucial role in regulating your emotions, mind, and body (Gottlieb, 2003).

Essential oils can also be applied directly to the skin. Because the oil is not only inhaled but also absorbed into the bloodstream, the effect can be doubled (Gottlieb, 2003). Essential oils are quite potent and can irritate the skin, so they should be diluted with a carrier oil such as sesame or sweet almond oil before being used on the skin. The fragrance of the essential oil in the carrier oil does not have to be intense to be effective. In fact, the more intense the odor, the less pleasant it becomes.

For a few days before the expected due date and during labor, jasmine or lavender oil can be massaged into the abdomen and lower back using long, smooth movement and fairly firm pressure. The woman may find small circular movements of the lower back to be soothing. Both jasmine and lavender strengthen contractions and provide some analgesia.

If the woman complains of feeling hot during labor, a few drops of lavender can be added to cool water, which is then used to sponge her face and body.

Women should not use essential oils during the first 3 months of pregnancy, since many oils contain thujone, a chemical that has been shown to have an abortive effect (Gottlieb, 2003).

The fundus tightens and the change in pressure against the toco is amplified and transmitted to the electronic fetal monitor. The monitor displays the uterine contraction as a pattern on graph paper.

External monitoring provides a continuous recording of the frequency and duration of uterine contractions and is noninvasive. However, it does not accurately record the intensity of the uterine contraction, and it is difficult to obtain an accurate fetal heart rate (FHR) in some women, such as those who are very obese, those who have hydramnios (an abnormally large amount of amniotic fluid), or those whose fetus is very active. In addition the belt may

EVIDENCE-BASED NURSING

FETAL HEART RATE ASSESSMENTS

Regardless of method, monitoring should allow for early recognition and intervention in fetal heart rate patterns that indicate potential fetal stress. These include late decelerations, variable decelerations, prolonged deceleration, severe tachycardia or bradycardia, or a sinusoidal pattern. When a nonreassuring fetal heart rate pattern is detected, remedial techniques such as changes in maternal position, IV fluid bolus, oxygen administration, and discontinuing oxytocics may help the fetus revert to a normal heart rate pattern. If the nonreassuring fetal heart rate pattern continues, clinically appropriate interventions should be instituted, including continuous electronic fetal monitoring. Persistent nonreassuring tracings indicate the need for immediate birth. It is the responsibility of every member of the healthcare team to evaluate risk during labor and intervene appropriately. Electronic fetal monitoring is not a substitute for well-trained nurses and appropriate obstetric staffing.

Critical Thinking

What maternal signs and symptoms might indicate a need for immediate auscultation of fetal heart rate? If a nonreassuring heart rate pattern is detected, what will be your assessments and interventions?

Reference

To gauge cervical dilatation, the nurse places the index and middle fingers against the cervix and determines the size of the opening. Before labor begins, the cervix is long (approximately 2.5 cm), the sides feel thick, and the cervical canal is closed, so an examining finger cannot be inserted. During labor the cervix begins to dilate, and the size of the opening progresses from 1 cm to 10 cm in diameter.

**FIGURE 18-2**

To gauge cervical dilatation, the nurse places the index and middle fingers against the cervix and determines the size of the opening. Before labor begins, the cervix is long (approximately 2.5 cm), the sides feel thick, and the cervical canal is closed, so an examining finger cannot be inserted. During labor the cervix begins to dilate, and the size of the opening progresses from 1 cm to 10 cm in diameter.

bother the woman if it requires frequent readjustment when she changes position.

Internal intrauterine monitoring provides the same data and also provides accurate measurement of uterine contraction intensity (the strength of the contraction and the actual pressure within the uterus). After membranes have ruptured, the certified nurse-midwife or physician inserts the intraterine pressure catheter into the uterine cavity and connects it by a cable to the electronic fetal monitor. A small micropressure device located in the tip of the catheter measures the pressure within the uterus in the resting state and during each contraction. Internal electronic monitoring is used when it is imperative to have accurate intraterine pressure readings to evaluate the stress on the uterus.

In addition it is important to evaluate the woman’s labor status by palpating the intensity and resting tone of the uterine fundus during contractions.

**Cervical Assessment**

Cervical dilatation and effacement are evaluated directly by vaginal examination (see Skill 3–1 in the Clinical Skills Manual as well as the CD-ROM that accompanies this
Intrapartal Nursing Assessment

**FETAL ASSESSMENT**

**Fetal Position and Presentation**

Fetal position and presentation are determined by inspecting the woman’s abdomen, palpating it, performing a vaginal examination, and auscultating FHR. Ultrasound may also be used.

**Inspection**

Observe the woman’s abdomen for size and shape. Assess the lie of the fetus by noting whether the uterus projects up and down (longitudinal lie) or left to right (transverse lie).

**Palpation: Leopold’s Maneuvers**

Leopold’s maneuvers are a systematic way to evaluate the maternal abdomen. Frequent practice increases the examiner’s skill in determining fetal position by palpation. Leopold’s maneuvers may be difficult to perform on an obese woman or on a woman who has excessive amniotic fluid (hydramnios). Before performing Leopold’s maneuvers, have the woman (1) empty her bladder and (2) lie on her back with her feet on the bed and her knees bent. See Figures 18–2, 18–3, and 18–4.

**Auscultation of Fetal Heart Rate**

The handheld Doppler ultrasound or the fetoscope is used to auscultate the FHR between, during, and immediately after uterine contractions. Instead of listening haphazardly over the woman’s abdomen for the FHR, it is useful to perform Leopold’s maneuvers first. Leopold’s maneuvers not only indicate the probable location of the FHR but also help determine the presence of multiple fetuses, fetal lie, and fetal presentation. The FHR is heard most clearly at the fetal back (Figure 18–6). Thus, in a cephalic presentation, the FHR is best heard in the lower quadrant of the maternal abdomen. In a breech presentation, it is heard at...
or above the level of the maternal umbilicus. In a transverse lie, FHR may be heard best just above or just below the umbilicus. As the presenting part descends and rotates through the pelvic structure during labor, the location of the FHR tends to descend and move toward the midline. After the FHR is located, it is usually counted for 30 seconds and multiplied by 2 to obtain the number of beats per minute (bpm). Check the woman’s pulse against the fetal sounds. If the rates are the same, readjust the Doppler or fetoscope. Occasionally listen for a full minute, through and just after a contraction, to detect any abnormal heart rate, especially if the FHR is over 160 bpm (tachycardia), under 110 bpm (bradycardia), or irregular. If the FHR is irregular or has changed markedly from the last assessment, listen for a full minute through and immediately after a contraction (see Skill 3–4 in the *Clinical Skills Manual* as well as the CD-ROM that accompanies this text and Table 18–3 for guidelines on how often to auscultate the FHR).

Intermittent auscultation has been found to be as effective as the electronic method for fetal surveillance. A growing number of healthcare professionals, doctors and nurses alike, are beginning to question the widespread use of the electronic method, finding it time-consuming and confusing for both the mother and the nurse.
ELECTRONIC MONITORING OF FETAL HEART RATE

Electronic fetal monitoring produces a continuous tracing of the FHR, which allows visual assessment of many characteristics of the FHR (see Skill 3–6 in the Clinical Skills Manual as well as the CD-ROM that accompanies this text). Skills

Indications for Electronic Monitoring

If one or more of the following factors are present, the FHR and contractions are monitored by electronic fetal monitoring:

- Previous history of a stillborn (fetus dies in the uterus) at 38 or more weeks’ gestation
- Presence of a complication of pregnancy (e.g., preeclampsia-eclampsia, placenta previa, abruptio placentae, multiple gestation, prolonged or premature rupture of membranes)
- Induction of labor (labor that is begun as a result of some type of intervention such as an intravenous infusion of oxytocin [Pitocin])
- Preterm labor (gestation less than 37 completed weeks)
- Decreased fetal movement
- Nonreassuring fetal status
- Meconium staining of amniotic fluid (meconium has been released into the amniotic fluid by the fetus, which may indicate a problem)
- Trial of labor following a previous cesarean birth (Bujold & Gauthier, 2002)

LOCATION OF FHR IN RELATION TO THE MORE COMMONLY SEEN FETAL POSITIONS

- LSA
- LOP
- RSA
- LOA
- ROP
- ROA

FIGURE 18–6

Location of FHR in relation to the more commonly seen fetal positions.

TABLE 18–3 Frequency of Auscultation: Assessment and Documentation

<table>
<thead>
<tr>
<th>Low-Risk Women</th>
<th>High-Risk Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>First stage of labor:</td>
<td>First stage of labor:</td>
</tr>
<tr>
<td>q1 hr in latent phase</td>
<td>q30 min in latent phase</td>
</tr>
<tr>
<td>q30 min in active phase</td>
<td>q15 min in active phase</td>
</tr>
<tr>
<td>Second stage of labor:</td>
<td>Second stage of labor:</td>
</tr>
<tr>
<td>q15 min</td>
<td>q5 min</td>
</tr>
</tbody>
</table>

Labor Events

Assess FHR prior to:
- Initiation of labor-enhancing procedures (e.g., artificial rupture of membranes)
- Periods of ambulation
- Administration of medications
- Administration or initiation of analgesia or anesthesia

Assess FHR following:
- Rupture of membranes
- Recognition of abnormal uterine activity patterns, such as increased basal tone or tachysystole
- Evaluation of oxytocin (maintenance, increase, or decrease of dosage)
- Administration of medications (at time of peak action)
- Expulsion of enema
- Urinary catheterization
- Vaginal examination
- Periods of ambulation
- Evaluation of analgesia and/or anesthesia (maintenance, increase, or decrease of dosage)

Electronic fetal monitoring by external technique. The tocodynamometer ("toco") is placed over the uterine fundus. The toco provides information that can be used to monitor uterine contractions. The ultrasound device is placed over the area of the fetal back. This device transmits information about the FHR. Information from both the toco and the ultrasound device is transmitted to the electronic fetal monitor. The FHR is displayed in a digital display (as a blinking light), on the special monitor paper, and audibly (by adjusting a button on the monitor). The uterine contractions are displayed on the special monitor paper as well.

**Methods of Electronic Monitoring of FHR**

External monitoring of the fetus is usually accomplished by ultrasound. A transducer, which emits continuous sound waves, is placed on the maternal abdomen. When the transducer is placed correctly, the sound waves bounce off the fetal heart and are picked up by the electronic monitor. The actual moment-by-moment FHR is displayed graphically on a screen (Figure 18–7). In some instances the monitor may track the maternal heart rate instead of the fetal heart rate. Avoid this error by comparing the maternal pulse to the FHR.

Recent advances in technology have led to the development of new ambulatory methods of external monitoring. Using a telemetry system, a small, battery-operated transducer transmits signals to a receiver connected to the monitor. This system, held in place with a shoulder strap, allows the woman to ambulate, helping her to feel more comfortable and less confined during labor. In contrast the system depicted in Figure 18–7 requires the woman to remain close to the electrical power source for the monitor.

Internal monitoring requires an internal spiral electrode. To place the spiral electrode on the fetal occiput, the amniotic membranes must be ruptured, the cervix must be dilated at least 2 cm, the presenting part must be down against the cervix, and the presenting part must be known (that is, the examiner must be able to detect the actual part of the fetus that is down against the cervix). If all these factors are present, the labor and birth nurse, the physician, or the certified nurse-midwife inserts a sterile internal spiral electrode into the vagina and places it against the fetal presenting part. The spiral electrode is rotated clockwise until it is attached to the presenting part. Wires that extend from the spiral electrode are attached to a leg plate (which is placed on the woman’s thigh) and then attached to the electronic fetal monitor. This method of monitoring the FHR provides more accurate continuous data than external monitoring, because the signal is clearer and movement of the fetus or the woman does not interrupt it (Figure 18–8). The FHR tracing at the top of Figure 18–9 was obtained by internal monitoring with a spiral electrode; the uterine contraction tracing at the bottom of the figure was obtained by external monitoring with a toco.
Baseline Fetal Heart Rate

The baseline rate refers to the average FHR observed during a 10-minute period of monitoring. Normal FHR (baseline rate) ranges from 110 to 160 bpm. There are two abnormal variations of the baseline rate—those above 160 bpm (tachycardia) and those below 110 bpm (bradycardia). Another change affecting the baseline is called variability, a change in FHR over a few seconds to a few minutes.

Fetal tachycardia is a sustained rate of 161 bpm or above. Marked tachycardia is 180 bpm or above. Causes of tachycardia include the following (Menihan & Zottoli, 2001):

- Early fetal hypoxia, which leads to stimulation of the sympathetic system as the fetus compensates for reduced blood flow
- Maternal fever, which accelerates the metabolism of the fetus
- Maternal dehydration
- Beta-sympathomimetic drugs such as ritodrine, terbutaline, atropine, and isoxxsuprine, which have a cardiac stimulant effect
- Amnionitis (fetal tachycardia may be the first sign of developing intrauterine infection)
- Maternal hyperthyroidism (thyroid-stimulating hormones may cross the placenta and stimulate FHR)
- Fetal anemia (the heart rate is increased to improve tissue perfusion)

Tachycardia is considered an ominous sign if it is accompanied by late decelerations, severe variable decelerations, or decreased variability. If tachycardia is associated with
Beginning of contraction
End of contraction
No FHR slowing with contractions

Normal FHR pattern obtained by internal monitoring. Note normal FHR, 140 to 158 bpm, presence of long- and short-term variability, and absence of deceleration with adequate contractions. The bottom portion depicts uterine contractions obtained by external monitoring. Each dark vertical line marks 1 minute, and each small rectangle represents 10 seconds. The contraction frequency is about every 2 1/2 minutes, and the duration of the contractions is 50 to 60 seconds. Arrows on the bottom of tracing indicate beginnings of uterine contractions.

Maternal fever, treatment may include antipyretics, antibiotics, or both.

**Fetal bradycardia** is a rate less than 110 bpm during a 10-minute period or longer. Causes of fetal bradycardia include the following (Menihan & Zottoli, 2001):

- Late (profound) fetal hypoxia (depression of myocardial activity)
- Maternal hypotension, which results in decreased blood flow to the fetus
- Prolonged umbilical cord compression; fetal baroreceptors are activated by cord compression and this produces vagal stimulation, which results in decreased FHR
- Fetal arrhythmia, which is associated with complete heart block in the fetus
- Uterine hyperstimulation
- Abruptio placenta
- Uterine rupture
- Vagal stimulation in the second stage (since this does not involve hypoxia, the fetus can recover)

Bradycardia may be a benign or an ominous sign. If average long-term variability exists, the bradycardia is considered benign. When bradycardia is accompanied by decreased long-term variability and late decelerations, it is considered a sign of nonreassuring fetal status (Menihan & Zottoli, 2001).

**Variability**

**Baseline variability** is a measure of the interplay (the push-pull effect) between the sympathetic and parasympathetic nervous systems. There are two types of fetal heart variability. **Short-term variability (STV)** is the beat-to-beat change in FHR. It represents fluctuations of the baseline. STV can only be measured via internal (scalp electrode) means and is classified as either present or absent. **Long-term variability (LTV)** is the waviness or rhythmic fluctuations (called cycles) of the FHR tracing, which occur three to five times per minute (Figure 18–10).

Fetal heart rate variability is defined as follows (Garite, 2002):

- **Absent**: amplitude undetectable
- **Minimal**: amplitude greater than undetectable, and 5 bpm or less
- **Moderate**: amplitude 6 to 25 bpm
- **Marked**: amplitude greater than 25 bpm
The most important aspect of LTV is that even in the presence of abnormal or questionable FHR patterns, if the variability is normal, the fetus is not suffering from cerebral asphyxia.

Causes of decreased variability include the following (Menihan & Zottoli, 2001):

- Hypoxia and acidosis (decreased blood flow to the fetus)
- Administration of drugs such as meperidine hydrochloride (Demerol), diazepam (Valium), or hydroxyzine (Vistaril), which depress the fetal central nervous system
- Fetal sleep cycle (during fetal sleep, LTV is decreased; fetal sleep cycles usually last for 20 to 30 minutes)
- Fetus of less than 32 weeks’ gestation (fetal neurologic control of heart rate is immature)
- Fetal anomalies affecting the heart, central nervous system, or autonomic nervous system
- Previous neurologic insult
- Tachycardia

Causes of increased variability include the following (Menihan & Zottoli, 2001):

- Early mild hypoxia (variability increases as a result of compensatory mechanism)
- Fetal stimulation or activity (stimulation of autonomic nervous system because of abdominal palpation, maternal vaginal examination, application of spiral electrode on fetal head, or acoustic stimulation)

- Alteration in placental blood flow

If it does not appear to be associated with a fetal sleep cycle or the administration of drugs, absent variability is a warning sign of nonreassuring fetal status. It is especially ominous if absent or minimal variability is accompanied by late decelerations, explained shortly.

External electronic fetal monitoring is not an adequate method to assess STV. If decreased variability is noted on monitoring, application of a spiral electrode should be considered to obtain more accurate information.

**Accelerations**

Accelerations are transient increases in the FHR normally caused by fetal movement. When the fetus moves, the heart rate increases, just as the heart rates of adults increase during exercise. Often, accelerations accompany uterine contractions, usually due to fetal movement in response to the pressure of the contractions. Accelerations of this type are thought to be a sign of fetal well-being and adequate oxygen reserve. The accelerations with fetal movement form the basis for nonstress tests (see Chapter 16.

**Decelerations**

Decelerations are periodic decreases in FHR from the normal baseline. They are categorized as early, late, and variable...
Early deceleration
- Head compression (HC)
- Uniform shape
- Early onset
- Waveform consistently uniform inversely mirrors contraction

Late deceleration
- Uteroplacental insufficiency (UPI)
- Uniform shape
- Late onset
- Waveform uniform; shape reflects contraction

Variable deceleration
- Umbilical cord compression (CC)
- Variable shape
- Variable onset
- Waveform variable, generally sharp drops and returns

<table>
<thead>
<tr>
<th>FHR pattern</th>
<th>Shape</th>
<th>Onset</th>
<th>Lowest level</th>
<th>Range</th>
<th>Ensemble</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early onset</td>
<td>Uniform shape</td>
<td>Just prior to or early in contraction</td>
<td>Consistently at or before midpoint of contraction</td>
<td>Usually within normal range of 120–160 beats/min</td>
<td>Can be single or repetitive</td>
</tr>
<tr>
<td>Late onset</td>
<td>Uniform shape</td>
<td>Late in contraction</td>
<td>Consistently after the midpoint of the contraction</td>
<td>Usually within normal range of 120–130 beats/min</td>
<td>Occasional, consistent, gradually increase—repetitive</td>
</tr>
<tr>
<td>Variable onset</td>
<td>Variable shape</td>
<td>Variable onset</td>
<td>Variable onset</td>
<td>Variable—single or repetitive</td>
<td></td>
</tr>
</tbody>
</table>

Types and characteristics of early, late, and variable decelerations.

<table>
<thead>
<tr>
<th>Types of Deceleration</th>
<th>Onset</th>
<th>Lowest Level</th>
<th>Range</th>
<th>Ensemble</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early</td>
<td>Before</td>
<td>Before</td>
<td>Normal</td>
<td>Single or Repetitive</td>
</tr>
<tr>
<td>Late</td>
<td>After</td>
<td>After</td>
<td>Normal</td>
<td>Single or Repetitive</td>
</tr>
<tr>
<td>Variable</td>
<td>Any</td>
<td>Midpoint</td>
<td>Variable</td>
<td>Single or Repetitive</td>
</tr>
</tbody>
</table>

Care Plan Activity: Client with Decelerations

According to the time of their occurrence in the contraction cycle and their waveform (Figure 18–11), when the fetal head is compressed, cerebral blood flow is decreased, which leads to central vagal stimulation and results in early deceleration. The onset of early deceleration occurs before the onset of the uterine contraction. This type of deceleration is of uniform shape, is usually considered benign, and does not require intervention.

Late deceleration is caused by uteroplacental insufficiency resulting from decreased blood flow and oxygen transfer to the fetus through the intervillous spaces during uterine contractions. The onset of the deceleration occurs after the onset of a uterine contraction and is of a uniform shape that tends to reflect associated uterine contractions. The late deceleration pattern is considered a nonreassuring sign but does not necessarily require immediate childbirth.

Variable decelerations occur if the umbilical cord becomes compressed, thus reducing blood flow between the placenta and fetus. The resulting increase in peripheral resistance in the fetal circulation causes fetal hypertension. The fetal hypertension stimulates the baroreceptors in the aortic arch and carotid sinuses, which slow the FHR. The onset of variable decelerations varies in timing with the onset of the contraction, and the decelerations are variable in shape. This pattern requires further assessment. Nursing interventions for late and variable decelerations in FHR are presented in Table 18–4.
Intrapartal Nursing Assessment

**TABLE 18-4 Guidelines for Management of Variable, Late, and Prolonged Deceleration Patterns**

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Nursing Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable decelerations</td>
<td>Report findings to physician or CNM and document in chart. Provide explanation to woman and partner. Change maternal position to one in which FHR pattern is most improved. Discontinue oxytocin if it is being administered and other interventions are unsuccessful. Perform vaginal examination to assess for prolapsed cord or change in labor progress. Monitor FHR continuously to assess current status and for further changes in FHR pattern.</td>
</tr>
<tr>
<td>Severe and uncorrectable</td>
<td>Give oxygen if indicated. Report findings to physician or CNM and document in chart. Provide explanation to woman and partner. Prepare for probable cesarean birth. Follow interventions listed above. Prepare for vaginal birth unless baseline variability is decreasing or FHR is progressively rising—then cesarean, forceps, or vacuum birth is indicated. Assist physician with fetal scalp sampling if ordered. Prepare for cesarean birth if scalp pH shows acidosis or downward trend.</td>
</tr>
<tr>
<td>Late decelerations</td>
<td>Give oxygen if indicated. Report findings to physician or CNM and document in chart. Provide explanation to woman and partner. Monitor for further FHR changes. Maintain maternal position on left side. Maintain good hydration with IV fluids (normal saline or lactated Ringer’s). Discontinue oxytocin if it is being administered and late decelerations persist despite other interventions. Administer oxygen by face mask at 7 to 10 L/min. Monitor maternal blood pressure and pulse for signs of hypotension; possibly increase flow rate of IV fluids to treat hypotension. Follow physician’s orders for treatment for hypotension if present. Increase IV fluids to maintain volume and hydration (normal saline or lactated Ringer’s). Assess labor progress (dilatation and station). Assist physician with fetal blood sampling; if pH stays above 7.25, physician will continue monitoring and resample; if pH shows downward trend (between 7.25 and 7.2) or is below 7.2, prepare for birth by most expeditious means.</td>
</tr>
<tr>
<td>Late decelerations with tachycardia or decreasing variability</td>
<td>Report findings to physician or CNM and document in chart. Maintain maternal position on left side. Administer oxygen by face mask at 7 to 10 L/min. Discontinue oxytocin if it is being administered. Assess maternal blood pressure and pulse. Increase IV fluids (normal saline or lactated Ringer’s). Assess labor progress (dilatation and station). Prepare for immediate cesarean birth. Explain plan of treatment to woman and partner. Assist physician with fetal blood sampling (if ordered).</td>
</tr>
<tr>
<td>Prolonged decelerations</td>
<td>Perform vaginal examination to rule out prolapsed cord or to determine progress in labor status. Change maternal position as needed to try to alleviate decelerations. Discontinue oxytocin if it is being administered. Notify physician or CNM of findings and initial interventions and document in chart. Provide explanation to woman and partner. Increase IV fluids (normal saline or lactated Ringer’s). Administer tocolytic if hypertonus noted and ordered by physician or CNM. Anticipate normal FHR recovery following deceleration if FHR previously normal. Anticipate intervention if FHR previously abnormal or deceleration lasts &gt; 3 minutes.</td>
</tr>
</tbody>
</table>
A sinusoidal pattern appears similar to a waveform. The characteristics of this pattern include absence of variability and the presence of a smooth, wavelike shape. Typically there are no periods during which the heart rate appears normal (Menihan & Zottoli, 2001). This pattern is associated with Rh alloimmunization, fetal anemia, severe fetal hypoxia, or a chronic fetal bleed. It may also occur with the administration of medications such as meperidine (Demerol) or butorphanol tartrate (Stadol). When it appears in association with medication, the pattern is usually temporary and is commonly referred to as pseudosinusoidal (Menihan & Zottoli, 2001).

**NURSING PRACTICE**

The presence of repetitive early decelerations may be a sign of advanced dilatation or the beginning of the second stage of labor. If the monitoring strip shows recurring early decelerations, ask the laboring woman if she is experiencing any pressure. Pressure that occurs only with the contractions typically indicates advanced dilatation. Intense pressure that does not change or ease up when the contractions cease may indicate the beginning of the second stage. A vaginal examination may be performed to establish the dilatation.

### Psychologic Reactions to Electronic Monitoring

Responses to electronic fetal monitoring can be varied and complex. Many women have little knowledge of monitoring unless they have attended a prenatal class that dealt with this subject. Some women react to electronic monitoring positively, viewing it as a reassurance that “the baby is OK.” They may also feel that the monitor helps identify problems that develop in labor. Other women may have ambivalent or even negative feelings about the monitor. They may think that the monitor is interfering with a natural process, and they do not want the intrusion. Some women may find that the equipment, wires, and sounds increase their anxiety. The discomfort of lying in one position and fear of injury to the baby are other objections.

### Nursing Responsibilities

A key strength of technology is its ability to explain and possibly predict health patterns or problems. However, this advantage has the potential to dehumanize the nurse-client relationship. Therefore, it is important to recognize that every encounter with the childbearing family offers an opportunity to provide education and empowerment to the laboring woman and her partner. Helping to provide information when needed, answering questions, and encouraging the woman to make decisions establishes a trusting nurse-client relationship.

Technology has been advancing at a rapid rate in the labor and birthing arena, and each new development challenges nurses to understand, include, and balance technology with holistic nursing practice. Before using the electronic fetal monitor, explain the reason for its use and the information that it can provide. After applying the monitor, record basic information on the monitor strip. Newer fetal monitors have an attached keyboard that records typed entries directly onto the monitor strip. In facilities that have not yet begun using the keyboards, record data in ink directly on the monitor strip. These data should include the date, client’s name, physician or certified nurse-midwife’s name, hospital identification number, age, gravida, para, estimated date of birth, membrane status, and maternal vital signs. As the monitor strip runs and care is provided, occurrences during labor should be recorded not only in the medical record but also on the monitor strip. This information helps the healthcare team assess current status and evaluate the tracing.

Note the following information on the tracing (American Academy of Pediatrics [AAP] & ACOG, 2002):

- Vaginal examination (dilatation, effacement, station, position)
- Amniotomy or spontaneous rupture of membranes, color and amount of amniotic fluid, presence of any odor
- Maternal vital signs
- Maternal position in bed and changes of position
- Application of spiral electrode or intrauterine pressure catheter
- Medications given
- Oxygen administration
- Maternal behaviors (emesis, coughing, hiccups)
- Fetal scalp stimulation or fetal scalp blood sampling
- Vomiting
- Pushing
- Administration of anesthesia blocks

If the monitor does not automatically add the time on the strip at specific intervals, include the time when recording any information on the strip. If more than one nurse is adding information to the monitor strip, it is essential to initial each note. The tracing is considered a legal part of the woman’s medical record and is submissible as evidence in court.

The laboring woman needs to feel that what is happening to her is the central focus. Acknowledge this need by always speaking to and looking at the woman when entering the room, before looking at the monitor.

### Evaluation of FHR Tracings

It is important to use a systematic approach in evaluating FHR tracings. Evaluation of the electronic monitor tracing begins by looking at the uterine contraction pattern:
Determine the uterine resting tone.
Assess the contractions: What is the frequency? What is the duration? What is the intensity (if internal monitoring)?

The next step is to evaluate the FHR tracing:
Determine the baseline: Is the baseline within the normal range? Is there evidence of tachycardia? Is there evidence of bradycardia?
Determine if a sinusoidal pattern is present.
Determine if there are periodic changes: Are accelerations present? Do they meet the criteria for a reactive nonstress test? Are decelerations present? Are they uniform in shape? If so, determine if they are early or late decelerations. Are they nonuniform in shape? If so, determine whether they are variable decelerations.

After evaluating the FHR tracing for the factors just listed, classify the tracing as reassuring (normal) or nonreassuring (worrisome). Reassuring patterns contain normal parameters and do not require additional treatment or intervention.

Characteristics of reassuring FHR patterns include the following:
- Baseline rate is 110 to 160 bpm.
- STV is present.
- LTV ranges from three to five cycles per minute.
- Periodic patterns consist of accelerations with fetal movement, and early decelerations may be present.

Nonreassuring patterns may indicate that the fetus is becoming stressed and intervention is needed. Characteristics of nonreassuring patterns include the following:
- Severe variable decelerations (FHR drops below 70 bpm for longer than 30 to 45 seconds and is accompanied by rising baseline or decreasing variability or slow return to baseline)
- Late decelerations of any magnitude
- Absence of variability (no STV or LTV present)
- Prolonged deceleration (a deceleration that lasts 60 to 90 seconds or more)
- Severe (marked) bradycardia (FHR baseline of 70 bpm or less)

Nonreassuring patterns may require continuous monitoring and more involved treatment and intervention (see Table 18–4).

It is vital to provide information to the laboring woman about the FHR pattern and the interventions, if necessary, that will help her fetus. Most women are aware that something is happening. Sharing information with them provides reassurance that a potential or actual problem is identified and that they are active participants in the interventions. Occasionally a problem arises that requires immediate intervention. In that case it may be helpful to say something like, “It is important for you to turn on your left side right now because the baby is having a little difficulty. I’ll explain what is happening in just a few moments.” This type of response lets the woman know that although an action needs to be accomplished rapidly, information will soon be provided. In the haste to act quickly, nurses and other caregivers must not forget that it is the woman’s body and her baby.

**SCALP STIMULATION TEST**

When there is a question about fetal status, a scalp stimulation test can be used before the more invasive fetal blood sampling. In this test the examiner applies pressure to the fetal scalp by gently stroking or massaging it for 15 seconds while doing a vaginal examination. The fetus who is not in any stress or distress responds with an acceleration of the FHR of at least 15 bpm for at least 15 seconds (Varney, Kriebs, & Gegor, 2004).

Fetal vibroacoustic stimulation using a handheld artificial larnyx applied to the maternal abdomen may also be used to assess fetal status. As with scalp stimulation, fetal heart rate accelerations in response are a sign of fetal well-being (Varney et al., 2004).

**FETAL SCALP BLOOD SAMPLING**

When nonreassuring or confusing FHR patterns are noted, additional information about the acid–base status of the fetus is needed. This information may be obtained by **fetal blood sampling**. The physician or CNM usually draws the blood sample from the fetal scalp but may obtain it from the fetal buttocks if the fetus is in the breech position (Cunningham et al., 2005).

Before fetal blood can be sampled, the membranes must be ruptured, the cervix must be dilated at least 2 to 3 cm, and the presenting part must not be above – 2 station. Sampling is not done when FHR patterns are ominous. It is contraindicated in acute emergencies and in cases of vaginal bleeding. In these instances, birth by the most expeditious means is indicated.

Normal fetal pH values during labor are above 7.25; 7.2 to 7.25 is considered borderline, warranting further sampling. Values below 7.2 are nonreassuring and necessitate birth without delay (Cunningham et al., 2005).

The more information that is available from FHR monitoring, the less need there is for fetal blood sampling. This adjunctive procedure is indicated only when FHR patterns are not interpretable, are worsening, or are suggestive of high risk. Fetal blood sampling may prevent unnecessary cesarean birth.
Since many expectant parents are anxious about potential injury to the fetus during fetal blood sampling, reassure the mother that the site used to obtain the blood sample is very small and care is given to avoid the fontanelles. Advise the parents that fetal blood sampling is often used in lieu of a cesarean birth since it can accurately determine the fetal status. After the birth, show the parents the site to decrease fear and anxiety.

**Fetal Oxygen Saturation (FSpO₂) Monitoring**

Fetal arterial oxygen saturation (FSpO₂) is a direct method used to determine fetal oxygenation levels. An intrauterine device is placed adjacent to the fetal cheek or temple, maintaining constant contact with the fetal skin. Using pulse oximetry, the monitor displays fetal oxygenation saturation as a percentage of oxygen within the fetal blood. Levels of 40% to 70% are considered reassuring. Levels less than 30% indicate hypoxia and require immediate birth. Levels between 30% and 40% indicate mild acidosis and require continuous monitoring and assessment (Menihan & Zottoli, 2001).

FSpO₂ monitoring can be used when the fetus is in a vertex presentation, the membranes are ruptured, the cervix is at least 2 cm dilated, the station is — 1 or lower, and the pregnancy is at least 36 weeks gestation age or more (Menihan & Zottoli, 2001). Use of FSpO₂ monitoring allows labor to continue despite a nonreassuring tracing if fetal oxygen levels are within normal range.

**Cord Blood Analysis at Birth**

In cases where significant abnormal FHR patterns have been noted, meconium-stained amniotic fluid is present, or the infant is depressed at birth, umbilical cord blood may be analyzed immediately following the birth to determine if acidosis is present. AAP and ACOG (2002) recommend performing cord blood analysis in cases in which the Apgar score is below 7 at 5 minutes of age.

The cord is clamped before the infant takes the first breath. A small amount of blood is aspirated with a syringe from one of the umbilical arteries. If the cord blood will not be analyzed immediately, a heparinized syringe should be used. Normal fetal blood pH should be above 7.25 (AAP & ACOG, 2002). Lower levels indicate acidosis and hypoxia. Many practitioners obtain cord blood analysis to minimize medicolegal exposure.

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**Critical Concept Review**

**LEARNING OBJECTIVES**

Discuss high-risk screening and intrapartal assessment of maternal physical and psychosociocultural factors.

Summarize methods used to evaluate the progress of labor.

**CONCEPTS**

1. High-risk screening is completed to determine if there are any factors present that may be associated with a high-risk condition.
   2. Maternal physical factors include:
      - Vital signs.
      - Labor status.
      - Fetal status.
      - Laboratory findings.
   3. Cultural assessment:
      - Individual beliefs and preferences.
   4. Psychosocial factors:
      - Childbearing fears.
      - Childbearing knowledge and fantasies.
      - Previous history of psychological disorders.

   Progress of labor is evaluated by:
   1. Assessment of strength and frequency of contractions:
      - Hand palpation.
      - Electronic monitoring.
      - External and internal pressure catheters.
   2. Cervical assessment:
      - Evaluated directly by vaginal examination.
### LEARNING OBJECTIVES

<table>
<thead>
<tr>
<th>Describe auscultation of fetal heart rate.</th>
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<tbody>
<tr>
<td>Delineate the procedure for performing Leopold’s maneuvers and the information that can be obtained.</td>
</tr>
<tr>
<td>Differentiate between baseline and periodic changes in fetal heart rate monitoring and describe the appearance and significance of each.</td>
</tr>
<tr>
<td>Outline steps to be performed in the systematic evaluation of fetal heart rate tracings.</td>
</tr>
<tr>
<td>Identify nonreassuring fetal heart rate patterns and appropriate nursing responses.</td>
</tr>
<tr>
<td>Discuss nursing care of the family undergoing electronic fetal monitoring.</td>
</tr>
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</table>

### CONCEPTS

1. Location of fetal heart rate:
   - Heard best at the fetal back.
2. Assessment may be intermittent:
   - Handheld Doppler ultrasound auscultates the FHR between, during, and after a contraction.
   - Fetoscope may be used.
3. Most assessment is continuous:
   - External.
   - Internal scalp electrode.

Leopold’s maneuvers evaluate the position, presentation and lie of the fetus by palpation of the woman’s abdomen:
1. Woman empties her bladder and lies on her back with her knees flexed.
2. The practitioner palpates the abdomen gently but deeply using the palms of the hands.
3. One hand is held steady while the other explores one side of the abdomen, then the action of the hands is switched.

Baseline fetal heart rate:
1. Average FHR observed during a 10-minute period of monitoring.
2. Should be between 110–160 bpm.
3. Baseline changes of the FHR include tachycardia, bradycardia, and variability.

Periodic changes:
1. Accelerations:
   - Usually caused by fetal movement.
   - Reassuring sign of fetal well-being when it occurs during a contraction.
2. Decelerations:
   - Early deceleration occurs before a contraction and usually requires no intervention.
   - Later deceleration occurs during and after a contraction and indicates insufficient blood flow to the fetus. It is a nonreassuring sign.
   - Variable decelerations occur due to umbilical cord compression and require further assessment.
   - Sinusoidal pattern appears when there are no periods of normal fetal heart rate. It is associated with Rh problems, fetal anemia, severe fetal hypoxia, or a chronic fetal bleed.

Outline steps to be performed in the systematic evaluation of fetal heart rate tracings:
1. Evaluate the uterine contraction pattern.
2. Determine the baseline FHR.
3. Determine FHR variability.
4. Determine if a sinusoidal pattern is present.
5. Determine if there are periodic changes.

Identify nonreassuring fetal heart rate patterns and appropriate nursing responses:
1. Severe variable decelerations.
2. Late decelerations of any magnitude.
3. Absence of variability.
4. Prolonged deceleration.

Nursing responses include:
1. Notify the physician or CNM.
2. Administer maternal oxygen.
3. Turn mother to the left side.
4. Discontinue oxytocin if being administered.
5. Monitor FHR continuously.
6. Provide explanation to the mother and partner.

Discuss nursing care of the family undergoing electronic fetal monitoring:
1. Explain the use of EFM.
2. Look at mother prior to looking at monitor.
3. Record pertinent data on monitor strip.

(continued)
LEARNING OBJECTIVES

Delineate the indications for fetal blood sampling and identify related pH values.

Describe how fetal oxygen saturation (FSpO2) monitoring uses pulse oximetry to monitor fetal oxygenation within the fetal blood to determine if hypoxia is occurring.

CONCEPTS

Fetal blood is sampled when:
1. Nonreassuring or confusing FHR are noted.
2. Acid-base information is needed.
Related pH values:
1. Values greater than 7.25 are normal.
2. Values of 7.2–7.25 are borderline and require further assessment.
3. Values less than 7.2 necessitate birth without delay.

A fetal oxygen saturation (FSpO2) monitor is placed adjacent to the fetal cheek or temple and must be in constant contact with the fetal skin.
1. Monitoring FSpO2 allows labor to continue despite a nonreassuring FHR tracing.
2. Levels of 40–70% are considered reassuring.
3. Levels less than 30% indicate hypoxia and require immediate birth.
4. Levels between 30% and 40% indicate mild acidosis and require continuous monitoring and assessment.

CRITICAL THINKING IN ACTION

View the Critical Thinking in Action video in Chapter 18 of the CD-ROM. Then, answer the questions that follow.

Cindy Bell, a 20-year-old gravida 2, para 1 at 40 weeks’ gestation, presents to you in the birthing unit with contractions every 5 to 7 minutes. She is accompanied by her husband. Spontaneous rupture of membranes occurred 2 hours prior to admission. Cindy tells you that the fluid was colorless and clear. You orient Cindy and her family to the birthing room and perform a physical assessment, documenting the following data: vital signs are normal. A vaginal exam demonstrates the cervix is 75% effaced, 4 cm dilated with a vertex at — 1 station in the LOP position. You place Cindy on an external fetal monitor. The fetal heart rate baseline is 140–147 with accelerations to 156; no decelerations are noted. Contractions are 5–6 minutes apart, moderate intensity and lasting 40 to 50 seconds. Cindy states she would like to stay out of bed as long as possible because lying down seems to make the contractions more painful, especially in her back.

1. Discuss the benefits of ambulation in labor.
2. Cindy would like her daughter to be present for the baby’s birth. What would you discuss with her about the impact of having a young sibling present during labor and birth?
3. What fetal heart rate assessment will best ensure fetal well-being during the period Cindy is ambulating?
4. When a nonreassuring fetal heart pattern is detected, what remedial nursing intervention is carried out?
5. What are indications for continuous fetal monitoring in labor?

MEDIA LINK

■ NCLEX-RN® Review, case studies, and other interactive resources for this chapter can be found on the Companion Website at http://www.prenhall.com/london. Click on “Chapter 18” to select the activities for this chapter.

■ For animations, more NCLEX-RN® Review questions, and an audio glossary, access the accompanying CD-ROM in this textbook.
REFERENCES


