We knew everything was going OK and that I was making progress, but it was so good to hear our nurse check me to see if I was dilating. It was not very uncomfortable, but he was as gentle as he could be, and when he told me I had dilated another 2 centimeters, I felt that I could keep going on. It was nice for us to know that the birth was getting closer with each contraction.

**KEY TERMS**

- Accelerations 630
- Baseline rate 627
- Baseline variability 630
- Decelerations 632
- Early decelerations 633
- Electronic fetal monitoring (EFM) 624
- Intrauterine pressure catheter (IUPC) 615
- Late decelerations 633
- Leopold’s maneuvers 618
- Palpation 614
- Prolonged decelerations 634
- Scalp stimulation 638
- Variable decelerations 633

**OBJECTIVES**

1. Summarize intrapartal physical, psychosocial, and cultural assessments necessary for optimum maternal-fetal outcome.
2. Define the outer limits of normal progress of each of the phases and stages of labor.
3. Compare the various methods of monitoring fetal heart rate and contractions, giving advantages and disadvantages of each.
4. Describe the procedure for performing Leopold’s maneuvers and the information that can be obtained.
5. Differentiate between baseline and periodic changes in the fetal heart rate.
6. Identify the differences between fetal tachycardia and fetal bradycardia.
7. Identify fetal heart rates and patterns using National Institute of Child Health and Human Development (NICHD) terminology.
8. Outline the steps to be performed in the systematic evaluation of fetal heart rate tracings.
9. List factors to consider in evaluation of abnormal findings on a fetal heart rate tracing.
10. Identify the interventions that are indicated when a nonreassuring fetal heart rate pattern is identified.
11. Discuss the steps used to perform fetal scalp stimulation.

**MEDIALINK**

Additional resources for this content can be found on the Prentice Hall Nursing MediaLink DVD-ROM and on the Companion Web Site at http://www.prenhall.com/davidson. Click on “Chapter 23” to select the activities for this chapter.
The labor process is a period of increased physiologic stress for the pregnant woman and her fetus. The physiologic events that occur during the intrapartal period require many changes and rapid adaptations; thus, accurate and frequent assessment is crucial. The primary purpose of the intrapartal assessment is to collect the essential data needed to evaluate the response of the mother and fetus to the changes in labor and the well-being of the “maternal-fetal unit” throughout those changes. The nurse in the birth setting uses a wide variety of assessment skills, including observation, palpation, and auscultation, to provide care for two primary clients, the mother and her child. The expectant mother’s partner or support person is also an important member of the birthing team, and assessments of the couple’s coping, interactions, and teamwork are integral to the nurse’s knowledge base. The nurse’s physical presence with the laboring woman provides the best opportunity for ongoing assessment, even as the nurse quietly provides comfort measures and gently assists the “coach” in offering support.

In current practice, “hands-on” techniques can be augmented by the use of technology. For example, the nurse or clinician can use Doppler ultrasound to listen to the fetal heart rate (FHR) or an electronic fetal monitor to assist in recording contractions and the FHR. No matter what technology is used, however, it is important that the nurse remember that “the machine” or “the test” only provides information; it cannot replace the human interaction and support that are provided by the nurse. In the birth setting that provides “high-touch” nursing care, the “high-tech” assessments are easily integrated to provide comprehensive, high-quality care.

This chapter discusses the assessments that are an important part of nursing care in the birth setting.

MATERNAL ASSESSMENT

The goal of a maternal assessment is to create an accurate database of information from which healthcare providers best formulate an optimal plan of care for a patient given her current clinical situation. Assessment of the intrapartal client mother begins with a client history and screening for intrapartal risk factors. Data collection includes a variety of data assessment methods: the prenatal record, admission interviews of the client and family members to obtain historical data, a psychologic assessment, and the initial and ongoing assessments of the mother and fetus throughout labor (Cypher, Adelsperger, & Torgersen, 2003).

Assessment and evaluation of the potential intrapartal client may vary from client to client depending on the client’s condition and stage of labor. The professional guidelines for perinatal care state that pregnant women who present to the acute care setting should be evaluated in a timely manner. Clients may often need to be triaged upon presentation to the obstetrical unit; thus, nursing staff may be required to perform intrapartal assessments in various phases to facilitate prompt and efficient care for all clients. For instance, initial evaluation of a pregnant mother who presents for admission may normally include only the assessment of her vital signs, FHR, status of uterine contractions, and any abnormal symptoms or signs of distress such as vaginal bleeding, acute abdominal pain, temperature above 100.4F, premature labor, premature rupture of membranes, hypertension, or nonreassuring fetal patterns (American Academy of Pediatrics [AAP] & American College of Obstetricians and Gynecologists [ACOG], 2002).

If a pregnant client is suspected of being in labor or has ruptured membranes or vaginal bleeding, the nurse should promptly continue to assess and evaluate the mother and initiate appropriate treatment. If a client is in early labor and presents without complications, the nurse may defer the complete physical assessment and admission of the mother once fetal well-being has been determined. With a client who has received prenatal care and has been recently evaluated and had no risk factors found, assessment and evaluation may be limited to the interval between the points of care. On the other hand, a client who has received no prenatal care may require a complete assessment including history and physical, obstetrical evaluation, laboratory tests, ultrasound, and other indicated procedures as her condition warrants (AAP & ACOG, 2002). Regardless of status, the well-being of the mother and fetus are of primary concern, and it is the responsibility of the nursing and medical staff to obtain accurate and appropriate data regarding the client and to provide appropriate services as needed.

Prenatal Record

According to perinatal guidelines, when a pregnant woman approaches approximately 36 weeks’ gestation, a copy of the prenatal record should be available at the acute care facility so that the medical record is accessible to members of the healthcare delivery team. If the prenatal record is available, it can provide the foundation for the intrapartum assessment. Health conditions, risk factors, abnormal test results, and ongoing assessments that have been completed during the course of the pregnancy are often useful information in determining client care needs. Information contained in the prenatal record should be verified if possible to avoid the possibility of conflicts during subsequent client interviews.

Historical Data

During assessment interviews, the pregnant client is likely to be the primary source of information. Often her partner or another family member may be present and capable of providing information in the event that the mother cannot concentrate or participate in the interview because of her physical state or stage of labor. The client’s privacy must still remain a concern for the nurse in every circumstance, and every measure must be taken to safeguard it and the client’s right to confidentiality.

The historical data form the basis for intrapartum assessment. The historical or background data include the client’s demographic and socioeconomic information; medical, surgical, family, obstetrical, and gynecological histories; psychosocial-cultural assessments; and physical examination (Association of Women’s Health, Obstetric, and Neonatal Nurses [AWHONN],
Signs and Symptoms of Labor

**FAMILY’S EXPERIENCE:** At the prenatal visit, the father of the baby expresses concerns about recognizing true labor signs. “She has been having so many of these Braxton Hicks contractions, I am afraid we won’t know if it is really labor and she will have the baby at home! Is it that different? I keep having a reoccurring dream that she has the baby at home and we’re all alone!”

**NURSE’S RESPONSE:** “Many couples worry that the baby will come quickly and will be born at home, but this is quite rare. The contractions (Braxton Hicks) that she is having now are for the most part painless tightening although they can be more uncomfortable when you get closer to the due date. They are common and do not have any particular pattern to them.”

“True labor is marked by regular contractions that result in cervical change. The only way to know if you are having cervical change is to be examined. Once your contractions become regular and painful, you will come to the hospital where we will monitor your contraction pattern and examine your cervix.”

“You will also need to come in to the birth setting if your water breaks or if you have any vaginal bleeding or a decrease in the baby’s movement patterns.”

**NURSE’S ACTIONS AND RATIONALE:**

The nurse reassures the couple that labor is usually recognized and that there usually is adequate time to get to the birth setting. The nurse should review the signs of labor and danger signs and advise the couple when they should come to the birth setting. A written information sheet is helpful and allows the couple to review the information at home.
2003). Relevant data include the following (Cypher et al., 2003; Johnston & Herzig, 2006):

- **Demographic information**
  - Name and age
  - Attending obstetrician or certified nurse-midwife (CNM)
  - Pediatrician/family physician
- **Socioeconomic factors**
  - Housing, transportation
  - Ability to provide for the new baby
  - Support system
- **Medical and surgical histories**
  - History of previous illness, such as tuberculosis, heart disease, diabetes, convulsive disorders, immune system abnormalities, hematologic disorders, thyroid disorders, gastrointestinal abnormalities, asthma, sickle cell anemia, Tay-Sachs disease, psychologic disorders, and other inherited disorders
- **Family history**
  - Genetic disorders, medical conditions, psychiatric conditions
- **Obstetrical history**
  - Past pregnancies
    - Complications during pregnancy and delivery
    - High-risk factors
    - Previous abortions, term and preterm infants, number of living children, neonatal deaths
  - Mode of birth
  - Current pregnancy
    - Gravidity, parity
    - High-risk factors
    - Blood type; Rh factor; results of serology testing; complete blood count (CBC); quadruple screen results; hepatitis status, rubella status, chlamydia, gonorrhea, and group beta strep culture results, results of any genetic diagnostic testing (nuchal translucency testing, chorionic villus sampling, amniocentesis), and specialized testing (Tay-Sachs, cystic fibrosis, sickle cell)
    - Allergies to medications, foods, or substances
    - Drug and alcohol consumption and smoking during pregnancy
    - Elevated blood pressure, bleeding problems, recurrent urinary tract infection
    - Medications used during the pregnancy, including prescription medication, over-the-counter medications, and herbal supplements
    - Method chosen for infant feeding
    - Type of prenatal education (childbirth preparation classes)
  - Woman’s preferences regarding labor and birth, such as no episiotomy, no analgesics or anesthetics, or the presence/participation of the father or others at the birth
- **Gestational age assessment**
- **Fetal activity**
- **Leopold’s maneuvers**
- **Fetal positioning**
- **Psychosocial assessment**
  - Cultural factors
  - Resources and support systems
  - Domestic violence screening
  - Substance abuse/exposure
- **Clinical assessment**
  - Maternal vital signs
  - Maternal weight, height and weight gain this pregnancy
  - Nutritional status
  - Uterine activity
    - Contraction assessment
      - Onset, duration, frequency of uterine contractions
    - Fetal response to uterine contractions
  - Membrane status
    - Status of membranes, color of amniotic fluid
    - Date and time of rupture
  - Vaginal examination
    - Vaginal bleeding and discharge
    - Cervical exam
- **Biochemical examinations during pregnancy**
  - Laboratory studies
    - CBC, blood type, and Rh and antibody screen
    - Toxicology screening (if ordered)
    - Blood glucose screening
    - Urine for protein and sugar
  - Infectious disease evaluation
    - Chlamydia, gonorrhea, group beta strep, hepatitis B, rubella, syphilis
    - Optional infectious disease evaluation: cytomegalovirus, tuberculosis, trichomonas, human immunodeficiency virus (HIV), hepatitis A and C, herpes simplex virus
- **Fetal assessment**
  - Gestational age assessment
  - Last menstrual period (LMP)
  - Fetal movement
  - Ultrasound exams for dating
  - Fetal activity
  - Fetal movement by maternal report
  - Fetal movement by palpation
Intrapartal High-Risk Screening

Screening for intrapartal high-risk factors is an integral part of assessment of the normal laboring woman. While obtaining the history, the nurse notes the presence of any factors that may be associated with a high-risk condition (Joint Commission on Accreditation of Healthcare Organizations [JCAHO], 2004). 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. In addition to identifying the presence of a high-risk condition, the nurse must recognize the implications of the condition for the laboring woman and her fetus. For example, in the case of an abnormal fetal presentation, the nurse understands that the labor may be prolonged, prolapse of the umbilical cord may be more likely, and there is a greater possibility of a cesarean birth.

Although physical conditions are frequently listed as the major factors that increase risk in the intrapartal period, sociocultural variables such as poverty, nutrition, the amount of prenatal care, and cultural beliefs regarding pregnancy may also precipitate a high-risk situation in the intrapartal period. Recent research indicates that women who suffer from post-traumatic stress disorder (PTSD) may be at increased risk for some intrapartal complications (Kennedy & MacDonald, 2002). The nurse begins gathering data about sociocultural factors as the woman enters the birthing area.

Communication problems can also affect the course of labor, as well as the nurse’s ability to provide support and education. Thus, the nurse observes the communication pattern between the woman and her support person(s) and their responses to admission questions and initial teaching. If the woman and her support persons are not fluent in English or are hearing impaired, the nurse must find some way to provide information in their primary language or an interpreter to sign so that they can make informed decisions. If the nurse or other birthing room staff does not speak the woman’s primary language or is hearing impaired, an appropriate interpreter should be obtained. (See further discussion in Appendices C, D, and E). Communication may also be affected by cultural standards regarding when it is acceptable to speak, who should ask questions, or whether it is acceptable for the woman to let others know if she is experiencing discomfort (Spector, 2004).

A partial list of intrapartal risk factors appears in Table 23–1. The factors precede the Intrapartal Assessment Guide because they must be kept in mind during the assessment.

Intrapartal Physical and Psychosociocultural Assessment

A physical examination is part of the admission procedure and part of the ongoing care of the client. Although the intrapartal physical assessment is not as complete and thorough as the initial prenatal physical examination (see Chapter 15), it does involve assessment of some body systems and the actual labor process. The Intrapartal Assessment Guide on pages 608–612 provides a framework that the maternity nurse can use when examining the laboring woman.

The physical assessment includes assessments performed immediately on admission as well as ongoing assessments. When labor is progressing very quickly, the nurse may not have time for a complete assessment. In this case, the critical physical assessments would include maternal vital signs, labor status, fetal status, and laboratory findings. Psychologic disorders can also affect the intrapartum course. For example, the woman suffering from clinical depression may exhibit apathy, lack of energy, fear or hopelessness about the outcome of labor, or increased physical symptoms (Beal, Trougakos, Weiss et al., 2006). The woman with a panic disorder may have short-lived, unpredictable episodes of intense anxiety, whereas the woman with a generalized anxiety disorder may experience continual and excessive anxiety or worrying. The woman with obsessive-compulsive disorder may have irrational impulses that are relieved only with performing a ritualistic behavior, such as repetitive handwashing. Psychosis is one of the most disabling psychiatric disorders, and the woman may experience hallucinations and delusions. Women with acute psychosis typically require inpatient hospitalization.

Pregnancy further complicates psychiatric disorders because many of the medications used to treat the symptoms are contraindicated in pregnancy (Timbie, Horvitz-Lennon, Frank et al., 2006). For these reasons, the woman with a psychologic disorder may require additional support from the nurse.

Assessment of psychosocial history is a critical component of intrapartal nursing assessment. Because of the prevalence of physical and sexual assault against women in our society (see Chapter 9), the nurse needs to consider the possibility that the woman may have experienced such violence at some point in her life. If such is the case, she may be anxious about the labor process, or anxiety may arise during labor. Therefore, it is essential to review the woman’s prenatal record and any other available records for information that may indicate abuse.

The cultural assessment provides a starting point for a plan that honors the values and beliefs of the laboring woman (Spector, 2004). Frequently, however, the nurse feels uncertain about what to ask or consider, perhaps because there has
### Table 23–1 INTRAPARTAL HIGH-RISK FACTORS

<table>
<thead>
<tr>
<th>Factor</th>
<th>Maternal Implication</th>
<th>Fetal-Neonatal Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal presentation</td>
<td>↑ Incidence of cesarean birth</td>
<td>↑ Incidence of placenta previa</td>
</tr>
<tr>
<td></td>
<td>↑ Incidence of prolonged labor</td>
<td>Prematurity</td>
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<tr>
<td></td>
<td>↑ Incidence of fibroids</td>
<td>↑ Risk of congenital abnormality</td>
</tr>
<tr>
<td></td>
<td>Uterine distention → ↑ risk of postpartum hemorrhage</td>
<td>Neonatal physical trauma</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of cesarean birth</td>
<td>↑ Risk of intrauterine growth restriction</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of preterm labor</td>
<td>Low birth weight</td>
</tr>
<tr>
<td>Multiple gestation</td>
<td>Uterine distention → ↑ risk of postpartum hemorrhage</td>
<td>Prematurity</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of cesarean birth</td>
<td>↑ Risk of congenital anomalies</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of preterm labor</td>
<td>Feto-fetal transfusion</td>
</tr>
<tr>
<td>Hydramnios</td>
<td>↑ Discomfort</td>
<td>↑ Risk of esophageal or other high alimentary tract anesias</td>
</tr>
<tr>
<td></td>
<td>↑ Dyspnea</td>
<td>↑ Risk of CNS anomalies (myelocle)</td>
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<tr>
<td></td>
<td>↑ Risk of preterm labor</td>
<td>↑ Risk of TORCH infections</td>
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<tr>
<td></td>
<td>Edema of lower extremities/varicosities</td>
<td>↑ Risk of prolapse cord</td>
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<tr>
<td></td>
<td>Maternal fear of “dry birth”</td>
<td>↑ Risk of cord compression</td>
</tr>
<tr>
<td></td>
<td>Maternal fear of “dry birth”</td>
<td>Postmaturity</td>
</tr>
<tr>
<td></td>
<td>↑ Psychologic stress due to fear for baby</td>
<td>↑ Risk of fetal asphyxia</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of meconium aspiration</td>
<td>↑ Risk of meconium aspiration</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of pneumonia due to aspiration of meconium</td>
<td>↑ Risk of fetal acidosis</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of infection (chorioamnionitis)</td>
<td>↑ Risk of perinatal morbidity</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of preterm labor</td>
<td>Prematurity</td>
</tr>
<tr>
<td></td>
<td>↑ Anxiety/fear for the baby</td>
<td>↓ Birth weight</td>
</tr>
<tr>
<td></td>
<td>Prolonged hospitalization</td>
<td>↑ Risk of respiratory distress syndrome</td>
</tr>
<tr>
<td></td>
<td>↑ Incidence of tocolytic therapy</td>
<td>Prolonged hospitalization</td>
</tr>
<tr>
<td>Induction of labor</td>
<td>↑ Risk of hypercontractility of uterus</td>
<td></td>
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<tr>
<td></td>
<td>↑ Risk of uterine rupture</td>
<td></td>
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<tr>
<td></td>
<td>↑ Length of labor if cervix not ready</td>
<td></td>
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<tr>
<td></td>
<td>↑ Anxiety</td>
<td></td>
</tr>
<tr>
<td>Abruptio placenta/placenta previa</td>
<td>Hemorrhage</td>
<td>Fetal hypoxia/acidosis</td>
</tr>
<tr>
<td></td>
<td>Uterine atony</td>
<td>Fetal exsanguination</td>
</tr>
<tr>
<td></td>
<td>↑ Incidence of cesarean birth</td>
<td>↑ Perinatal mortality</td>
</tr>
<tr>
<td></td>
<td>↑ Maternal morbidity</td>
<td></td>
</tr>
<tr>
<td>Failure to progress in labor</td>
<td>Maternal exhaustion</td>
<td>Fetal hypoxia/acidosis</td>
</tr>
<tr>
<td></td>
<td>↑ Incidence of augmentation of labor</td>
<td>Intrapartum complications</td>
</tr>
<tr>
<td></td>
<td>↑ Incidence of cesarean birth</td>
<td></td>
</tr>
<tr>
<td>Precipitous labor (less than 3 hours)</td>
<td>Perineal, vaginal, cervical lacerations</td>
<td>Tentorial tears</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of postpartum hemorrhage</td>
<td></td>
</tr>
<tr>
<td>Prolapse of umbilical cord</td>
<td>↑ Fear for baby</td>
<td>Acute fetal hypoxia/acidosis</td>
</tr>
<tr>
<td></td>
<td>Cesarean birth → emergent</td>
<td></td>
</tr>
<tr>
<td>Fetal heart decelerations</td>
<td>↑ Fear for baby</td>
<td>Tachycardia, chronic asphyxic insult, bradycardia</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of cesarean birth, forcesps, vacuum</td>
<td>Acute asphyxic insult</td>
</tr>
<tr>
<td></td>
<td>Continuous electronic monitoring and intervention in labor</td>
<td>Chronic hypoxia</td>
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<tr>
<td></td>
<td></td>
<td>Congenital heart block</td>
</tr>
<tr>
<td>Uterine rupture</td>
<td>Hemorrhage</td>
<td>Fetal anoxia</td>
</tr>
<tr>
<td></td>
<td>Cesarean birth/hysterectomy</td>
<td>Fetal hemorrhage</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of morbidity/mortality</td>
<td>↑ Neonatal morbidity and mortality</td>
</tr>
<tr>
<td>Postdates (greater than 42 weeks)</td>
<td>↑ Anxiety</td>
<td>Postmaturity</td>
</tr>
<tr>
<td></td>
<td>↑ Incidence of induction of labor</td>
<td>↑ Risk of fetal-neonatal mortality and morbidity</td>
</tr>
<tr>
<td></td>
<td>↑ Incidence of cesarean birth</td>
<td>↑ Risk of antepartum fetal death</td>
</tr>
<tr>
<td></td>
<td>↑ Use of technology to monitor fetus</td>
<td>↑ Incidence/risk of large baby</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of shoulder dystocia</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>↑ Risk of hydramnios</td>
<td>↑ Risk of malpresentation</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of hypoglycemia or hyperglycemia</td>
<td>↑ Risk of macrosomia</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of preeclampsia</td>
<td>↑ Risk of intrauterine growth restriction</td>
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<tr>
<td></td>
<td></td>
<td>↑ Risk of respiratory distress syndrome</td>
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<tr>
<td></td>
<td></td>
<td>↑ Risk of congenital anomalies</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preeclampsia</td>
<td>↑ Abruptio placenta</td>
<td>↑ Risk of small-for-gestational-age baby</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of seizures</td>
<td>↑ Risk of preterm birth</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of stroke</td>
<td>↑ Risk of mortality</td>
</tr>
<tr>
<td></td>
<td>↑ Risk of HELLP</td>
<td></td>
</tr>
<tr>
<td>AIDS/STD</td>
<td>↑ Risk of additional infections</td>
<td>↑ Risk of transplacental transmission</td>
</tr>
<tr>
<td>PHYSICAL ASSESSMENT/ NORMAL FINDINGS</td>
<td>ALTERATIONS AND POSSIBLE CAUSES*</td>
<td>NURSING RESPONSES TO DATA†</td>
</tr>
<tr>
<td>-------------------------------------</td>
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<tr>
<td><strong>VITAL SIGNS</strong></td>
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<tr>
<td>Blood pressure (BP): less than or equal to 135 systolic and less than or equal to 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</td>
<td>High blood pressure (essential hypertension, gestational hypertension, preeclampsia, renal disease, apprehension, anxiety or pain) Low blood pressure (supine hypotension) Hemorrhage/hypovolemia Shock Drugs</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/CNM. Assess between contractions; if marked tachypnea continues, assess for signs of respiratory disease or respiratory distress. Encourage slow breaths if woman is hyperventilating. Apply O₂; notify physician/CNM. Assess for other signs of infection or dehydration.</td>
</tr>
<tr>
<td>Pulse: 60–90 bpm</td>
<td>Increased pulse rate (excitement or anxiety, cardiac disorders, early shock, drug use)</td>
<td></td>
</tr>
<tr>
<td>Respiration: 14–22/min (or pulse rate divided by 4)</td>
<td>Marked tachypnea (respiratory disease), hyperventilation in transition phase Decreased respirations (Narcotics) Hyperventilation (anxiety/pain)</td>
<td></td>
</tr>
<tr>
<td>Pulse ox 95% or greater</td>
<td>&lt; 90%: hypoxia, hypotension, hemorrhage Elevated temperature (infection, dehydration, prolonged rupture of membranes, epidural regional block)</td>
<td></td>
</tr>
<tr>
<td>Temperature: 36.2–37.6°C (98–99.6°F)</td>
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<td></td>
</tr>
<tr>
<td><strong>WEIGHT</strong></td>
<td>Weight gain greater than 35 lb (fluid retention, obesity, large infant, diabetes mellitus, preeclampsia), weight gain less than 15 lb (small for gestational age [SGA], substance abuse, psychosocial problems)</td>
<td>Assess for signs of edema. Evaluate dietary patterns. Assess for substance abuse and eating disorders.</td>
</tr>
<tr>
<td>25–35 lb greater than prepregnant weight</td>
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<td></td>
</tr>
<tr>
<td><strong>LUNGS</strong></td>
<td>Rales, rhonchi, friction rub (infection), pulmonary edema, asthma</td>
<td>Reassess; refer to physician/CNM</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. Provide fluids per physician/CNM orders.</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>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 15).</td>
<td>[<em>Possible causes of alterations are identified in parentheses.</em>]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>†This column provides guidelines for further assessment and initial intervention.</td>
<td></td>
</tr>
</tbody>
</table>
### ASSESSMENT GUIDE

#### Intrapartal—First Stage of Labor continued

<table>
<thead>
<tr>
<th><strong>PHYSICAL ASSESSMENT/ NORMAL FINDINGS</strong></th>
<th><strong>ALTERATIONS AND POSSIBLE CAUSES</strong></th>
<th><strong>NURSING RESPONSES TO DATA</strong></th>
</tr>
</thead>
<tbody>
<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; initiate care to newborn’s eyes; notify neonatal nursing staff and pediatrician.</td>
</tr>
<tr>
<td>Presence of small amount of bloody show that gradually increases with further cervical dilatation</td>
<td>Hemorrhage</td>
<td>Assess BP and pulse, pallor, diaphoresis; report any marked changes. Standard precautions.</td>
</tr>
</tbody>
</table>

#### LABOR STATUS

**Uterine contractions:** regular pattern

**Cervical dilatation:** progressive cervical dilatation from size of fingertip to 10 cm (Procedure 23–1)

**Cervical effacement:** progressive thinning of cervix (Procedure 23–1)

**Fetal descent:** progressive descent of fetal presenting part from station −5 to +4 (Figure 23–3 ◆ in Procedure 23–1)

**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

Amniotic fluid clear, with earthy or human odor, no foul-smelling odor

- Greenish amniotic fluid (nonreassuring fetal status)
- Bloody fluid (vasoprevia, abruptio placentae)
- Strong or foul odor (amnionitis)

*Possible causes of alterations are identified in parentheses.

1This column provides guidelines for further assessment and initial intervention.

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(Continued on next page)
## ASSESSMENT GUIDE

### Intrapartal—First Stage of Labor

**Physical Assessment/Normal Findings** | **Alterations and Possible Causes** | **Nursing Responses to Data**
---|---|---

### Fetal Status

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

Less than 110 or greater than 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 (nonreassuring fetal status or fetal demise)

Initiate interventions based on particular FHR pattern.

- Report to physician; 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 side-lying or hands/knee to promote rotation of fetal head.
- Carefully evaluate FHR; apply fetal monitor.
- Report to physician/CNM.

### Laboratory Evaluation

- **Hematologic tests**
- **Hemoglobin:** 12–16 g/dL
- **CBC**
  - Hematocrit: 38%–47%
  - RBC: 4.2–5.4 million/mm³
  - WBC: 4500–11,000/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 Laboratories (VDRL) test: nonreactive Rh
  - Rh-positive fetus in Rh-negative woman
  - Positive reaction (see Chapter 15, Initial Prenatal Physical Assessment Guide)
  - Rh-positive fetus in Rh-negative woman
- **Urinalysis**
  - Glucose: negative
  - Ketones: negative
  - Proteins: negative
  - Red blood cells: negative
  - White blood cells: negative
  - Casts: none

- Glycosuria (low renal threshold for glucose, diabetes mellitus)
- Ketonuria (starvation ketosis)
- Proteinuria (urine specimen contaminated with vaginal secretions, fever, infection, kidney disease; proteinuria of 2+ or greater found in uncontaminated urine may be a sign of ensuing preeclampsia
- Blood in urine (calculus, cystitis, glomerulonephritis, neoplasm)
- Presence of white blood cells (infection in genitourinary tract)
- Presence of casts (nephrotic syndrome)

Evaluate woman for problems due to decreased oxygen-carrying capacity caused by lowered hemoglobin.

- 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; test urine for ketones; ketonuria and glycosuria require further assessment of blood sugars.
- Instruct woman in collection technique; incidence of contamination from vaginal discharge is common.
- Report any increase in proteinuria to physician/CNM.
- Assess collection technique (may be bloody show).
- Assess for signs of urinary tract infection.

### Cultural Assessment

Cultural influences determine customs and practices regarding intrapartal care. Individual preferences may vary.

- Cultural influences determine customs and practices regarding intrapartal care.
- Individual preferences may vary.

§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 identified in parentheses.**

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

‡Glycosuria should not be discounted. The presence of glycosuria necessitates follow-up.
### ASSESSMENT GUIDE

#### Intrapartal—First Stage of Labor  

**Chapter 23**

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<tr>
<th><strong>CULTURAL ASSESSMENT</strong></th>
<th><strong>VARIATIONS TO CONSIDER</strong></th>
<th><strong>NURSING RESPONSES TO DATA</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask the following questions: Who would you like to remain with you during your labor and birth?</td>
<td>She may prefer only her coach to remain or may also want family and/or friends.</td>
<td>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.</td>
</tr>
<tr>
<td>What would you like to wear during labor?</td>
<td>She may be more comfortable in her own clothes.</td>
<td>Offer supportive materials such as Chux if needed to protect her own clothing. Avoid subtle signals to the woman that she should not have chosen to remain in her own clothes. Have other clothing available if the woman desires. If her clothing becomes contaminated, it will be simple to place it in a plastic bag.</td>
</tr>
<tr>
<td>What activity would you like during labor?</td>
<td>She may want to ambulate most of the time, stand in the shower, sit in the jacuzzi, sit on a chair/stool/birthing ball, remain on the bed, and so forth.</td>
<td>Support the woman’s wishes; provide encouragement and complete assessments in a manner so her activity and positional wishes are disturbed as little as possible.</td>
</tr>
<tr>
<td>What position would you like for the birth?</td>
<td>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.</td>
<td>Collect 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.</td>
</tr>
<tr>
<td>Is there anything special you would like?</td>
<td>She may want the room darkened or to have curtains and windows open, music playing, a Leboyer birth, her coach to cut the umbilical cord, to save a portion of the umbilical cord, to save the placenta, to videotape the birth, and so forth.</td>
<td>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.</td>
</tr>
<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.</td>
<td>Provide fluids as desired.</td>
</tr>
<tr>
<td>Observe the woman’s response when privacy is difficult to maintain and her body is exposed.</td>
<td>Some women do not seem to mind being exposed during an exam or procedure; others feel acute discomfort.</td>
<td>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: Southeast Asian women may not want any family member in the room during exam or procedures. Her partner may not be involved with coaching activities during labor or birth. Muslim 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>If the woman is to breastfeed, ask if she would like to feed her baby immediately after birth.</td>
<td>She may want to feed her baby right away or may want to wait a little while.</td>
<td></td>
</tr>
</tbody>
</table>

### PSYCHOSOCIAL ASSESSMENT

#### PREPARATION FOR CHILDBIRTH

<table>
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<th><strong>VARIATIONS TO CONSIDER</strong></th>
<th><strong>NURSING RESPONSES TO DATA</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Woman has some information regarding process of normal labor and birth.</td>
<td>Add to present information base.</td>
</tr>
<tr>
<td>Woman has breathing and/or relaxation techniques to use during labor.</td>
<td>Support breathing and relaxation techniques that client is using; provide information if needed.</td>
</tr>
</tbody>
</table>

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5These 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.

6This column provides guidelines for further assessment and initial intervention.
## ASSESSMENT GUIDE

**Intrapartal—First Stage of Labor**

### PREPARATION FOR CHILDBIRTH (continued)

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<th>PSYCHOSOCIAL ASSESSMENT</th>
<th>VARIATIONS TO CONSIDER</th>
<th>NURSING RESPONSES TO DATA†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woman and support person have done extensive preparation for childbirth (Bradley Classes, Lamaze).</td>
<td>Some women have strong opinions regarding labor and birth preparation.</td>
<td>Support woman’s wishes to participate in her birth experience; support birth plan.</td>
</tr>
</tbody>
</table>

### RESPONSE TO LABOR

| Latent phase: relaxed, excited, anxious for labor to be well established | May cope well or feel unable to cope with contractions because of fear, anxiety, or lack of information. | Provide support and encouragement; establish trusting relationship. |
| Active phase: becomes more intense, begins to tire | May remain quiet and without any sign of discomfort or anxiety, may insist that she is unable to continue with the birthing process. | Provide support and coaching if needed. |
| Transitional phase: feels tired, may feel unable to cope, needs frequent coaching to maintain breathing patterns | May feel marked anxiety and apprehension, may not have coping mechanisms that can be brought into this experience, or may be unable to use them at this time. | Support coping mechanisms if they are working for the woman; provide information and support if she exhibits anxiety or needs alternative to present coping methods. |
| Coping mechanisms: Ability to cope with labor through use of support system, breathing, relaxation techniques, and comfort measures including frequent position changes in labor, warm water immersion, and massage. | Survivors of sexual abuse may demonstrate fear of IVs or needles, may recoil when touched, may insist on a female caregiver, may be very sensitive to body fluids and cleanliness, and may be unable to labor lying down. May show extreme distress with vaginal examinations. | Encourage participation of coach/significant other if a supportive relationship seems apparent. Establish rapport and a trusting relationship. Provide information that is true and offer your presence. |

### ANXIETY

| Some anxiety and apprehension is within normal limits | May show anxiety through rapid breathing, nervous tremors, frowning, grimacing, clenching of teeth, thrashing movements, crying, increased pulse and blood pressure. | Provide support, encouragement, and information. Teach relaxation techniques; support controlled breathing efforts. May need to provide a paper bag to breathe into if woman says her lips are tingling. Note FHR. |

### SOUNDS DURING LABOR

| Some women are very quiet; others moan or make a variety of noises. | Provide a supportive environment. Encourage woman to do what feels right for her. |

### SUPPORT SYSTEM

| Physical intimacy between mother and father (or mother and support person/doula) caretaking activities such as soothing conversation, touching Support person stays in close proximity Relationship between mother and father (or support person): involved interaction | Some women would prefer no contact, others may show clinging behaviors. Limited interaction may come from a desire for quiet. The support person may seem to be detached and maintain little support, attention, or conversation. | Encourage caretaking activities that appear to comfort the woman; encourage support for the woman; if support is limited, the nurse may take a more active role. Encourage support person to stay close (if this seems appropriate). Support interactions; if interaction is limited, the nurse may provide more information and support. Ensure that coach/significant other has short breaks, especially/prior to transition. |

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

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been no personal opportunity to become aware of varying cultural values and beliefs. It is important to remember that despite one’s cultural background, variations in different individuals and families can vary dramatically. Some individuals may not embrace cultural beliefs that are inherent in their culture. This section of the assessment guide (see pages 610–611) should help.

The final section 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. The adequacy of resources, such as housing, transportation, utilities, and access to social services, should also be questioned. By assessing her psychosocial status, the nurse can meet the woman’s needs for information and support. The nurse can then support the woman and her partner; in the absence of a partner, the nurse may become the support person.

Evaluating Labor Progress

Intrapartal nursing care requires competent assessment and clinical skills and a comprehensive knowledge of maternal-fetal anatomy and the physiology of the labor process. An ongoing, accurate assessment of both the mother and fetus and their response to labor is necessary to provide the data required to make sound clinical judgments and provide appropriate care. Labor can be monitored in a number of ways, each having its own benefits and limitations. If a “low technology” approach is desired, a nurse can monitor uterine contractions and the FHR intermittently using techniques such as palpation and auscultation. However, if the clinical situation demands, as in the case of a high-risk pregnancy, the laboring client may be monitored electronically. External devices (tocodynamometer and ultrasound) or internal devices (intrauterine pressure catheter and fetal scalp electrode) may be used when a continuous graphic data record is needed to evaluate the mother and fetus during labor.

The method of monitoring during labor may vary, depending on the presence of risk factors at admission, the preferences of the client and healthcare provider, and the institution’s policies (AAP & ACOG, 2002; ACOG, 2005). If intermittent monitoring is used, the nurse must perform a “hands-on” assessment, including auscultation of fetal heart tones (FHT) and palpation of uterine contractions (UC). If continuous electronic fetal monitoring (EFM) is used, the amount of physical “hands-on” care may vary depending on whether an internal or external mode of monitoring is used.

Professional associations, such as ACOG and AWHONN, and individual healthcare institutions generally set the guidelines for the level of intrapartum monitoring. The frequency of the maternal-fetal assessment and documentation depends on the mother’s stage of labor and the presence of risk factors. When EFM is used, ACOG recommends that the nurse or physician review EFM data frequently. For low-risk pregnancies, FHR tracings can be reviewed every 30 minutes in first stage labor and every 15 minutes in second stage labor. The FHR tracings of high-risk pregnancies should be reviewed more frequently—every 15 minutes in first stage labor and every 5 minutes in second stage labor. Periodic documentation should accompany each review of the FHR tracing. See Table 23–2 for the frequency of recommended assessments and documentations.

The recommended frequency of FHR tracing assessment and documentation is only a guideline for practice. At times, the nurse may find it necessary to monitor the FHR more frequently. Certain clinical events such as vaginal exams, rupture of membranes, abnormal uterine activity patterns, administration of medications, or procedures such as epidurals, amniocentesis, external versions, and other events have the potential to adversely affect the FHR tracing. It is beneficial to assess the FHR tracing before and after such events or anytime a nonreassuring FHR tracing is detected (Cypher et al., 2003).

Since its introduction into clinical practice in the late 1960s, EFM has continuously been researched and evaluated in regard to its ability to improve fetal outcomes and reduce morbidity and mortality. In the beginning, EFM was used in high-risk pregnancies, because it was thought that electronic assessment was far more accurate and valuable for diagnosing nonreassuring fetal status in labor. It was believed that continuous fetal monitoring could identify nonreassuring fetal status earlier, facilitate earlier interventions, and prevent fetal morbidity and mortality. Researchers originally thought EFM could prevent cerebral palsy, which was thought to be caused by neurologic damage from nonreassuring fetal status (Cunningham, Leveno, Bloom et al., 2005). Today’s research does not support these earlier suppositions.

In 2002, 85% of all labors were monitored electronically, making EFM the most prevalent assessment procedure in maternal-fetal health care (ACOG, 2005). However, despite its widespread use, research has failed to show that it has significantly improved the outcomes at birth. Multiple controlled random trials have failed to show that EFM is beneficial over intermittent auscultation in preventing neonatal morbidity and mortality (ACOG, 2005; AWHONN, 2004; Cunningham et al., 2005). Intermittent assessment of the maternal-fetal couplet labor is generally considered to be as appropriate an assessment technique as electronic monitoring, especially for low-risk pregnancies when proper technique and nurse-to-patient ratio are used (AWHONN, 2003; Will, Hennicke, Jacobs et al., 2006).

UTERINE ACTIVITY ASSESSMENT

Monitoring uterine activity throughout labor is essential and provides data regarding the labor progress and fetal well-being. Numerous internal and external factors affect the maternal and fetal well-being. UCs occur in wavelike patterns. Beginning at the fundus (top or apex of the uterus), the UC progresses downward through the lower segments of the uterus and is then followed by a similar wave of relaxation. The contraction of the upper uterine segment increases intrauterine pressure and leads to cervical dilatation and effacement and the descent of the fetus. During and between UCs, the fundus changes shape and firmness, reflecting the intensity of the UC. By monitoring the changes in the fundus, the nurse can...
determine the timing and intensity of the UC and the resting tone of the uterus between contractions (AWHONN, 2004). The intensity and frequency of the UC varies from woman to woman and labor to labor. Three methods of monitoring UCs are currently used: palpation, external electronic monitoring with a tocodynamometer, and internal electronic monitoring with an intrauterine pressure catheter. Each method is discussed.

**Palpation.**

**Palpation** is the technique of assessing a UC by touch. To assess UCs, the nurse places the fingertips of one hand on the top of the uterus. Hand placement is usually on the fundus, but the location may vary based on maternal or fetal position, uterine size and shape, or maternal body composition. Gentle pressure is applied to the abdomen until the firmness of the underlying uterine wall is felt.

The frequency of the contractions is measured from the beginning of one contraction to the beginning of the next. The length of the contraction, referred to as the **duration**, is measured from the beginning of the contraction, when the muscle begins to tense, to the end of the same contraction, when the muscle is completely relaxed. Uterine resting tone is determined between UCs, when optimum uterine relaxation is achieved.

During the acme (peak) of the contraction, intensity can be evaluated subjectively by estimating the firmness of the fundus. It can be useful to compare the contraction to the firmness of a nose, chin, or forehead. A tense fundus that is easily indented (tip of the nose) is considered mild intensity. When the fundus becomes firm and difficult to indent with the fingertips (chin), the strength of the UC is considered moderate. The fundus that is hard and cannot be indented (forehead) is classified as strong.

The nurse should assess successive contractions to provide reliable data. Table 23–3 compares contraction characteristics in different phases of labor. Direct uterine palpation is used with intermittent auscultation of the fetal heart or in conjunction with continuous EFM. The frequency of palpation depends on the risk status of the mother and fetus and the stage of labor.

Palpation has its capabilities, benefits, and limitations. Palpation allows the nurse to assess relative frequency, duration, and subjective strength of the contraction and uterine resting tone. UC assessment by palpation is beneficial over electronic monitoring because it (1) is noninvasive and does not increase the risk for infection or patient injury; (2) is readily accessible, requiring no equipment; (3) increases the “hands-on” care of the client that can be reassuring to the client; and (4) allows the mother freedom from restricting and sometimes uncomfortable abdominal belts, thus permitting her to move freely and ambulate if her condition permits. Palpation is limited because it does not provide actual quantitative measure of uterine pressure; thus subjective differences between nurses and nurse-to-client interpretations may exist. Palpation offers no permanent record, which can hinder interpretation by others. Maternal size and increased adipose tissue from obesity and maternal positioning may prevent direct palpation of the fundus. The limitations of palpation may outweigh the benefits in some clinical situations, and electronic monitoring may be a more appropriate choice for uterine assessment (Will et al., 2006).

### Electronic Monitoring with External Tocodynamometer.

Electronic monitoring of uterine contractions can be done externally by using a tocodynamometer or tocotransducer (toco). A toco is a pressure monitoring device that is placed on the maternal abdomen at or near the fundus (the area of greatest contractility) and held in place with an elastic belt, belly band, or other adhesive material (Figure 23–1 ◦). By placing the toco over a fetal part in the fundus rather than a pocket of amniotic fluid, a better contraction tracing can be obtained. As the uterus contracts, pressure exerted against the toco is amplified and transmitted to the EFM and recorded on graph paper.

The procedure for applying the tocotransducer begins with palpation of the uterus to locate the fundus. The toco is placed at or near the point of maximum contractility or strength of the uterine muscle. It is then secured with a belt, strap, or other type of adhesive device and plugged into a fetal monitor. The toco monitors uterine activity transabdominally by detecting changes in the abdominal wall and converting the fundal movement into elec-

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<th>Table 23–3</th>
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<tr>
<td><strong>Contraction Characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Latent phase:</td>
<td>Every 10–30 min × 20–40 sec; mild, progressing to Every 5–7 min × 30–40 sec; moderate</td>
</tr>
<tr>
<td>Active phase:</td>
<td>Every 2–3 min × 40–60 sec; moderate to strong</td>
</tr>
<tr>
<td>Transition phase:</td>
<td>Every 1½–2 min × 60–90 sec; strong</td>
</tr>
<tr>
<td><strong>Labor Progress Characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Primipara:</td>
<td>1.2 cm/hr dilatation 1 cm/hr descent Less than 2 hr in second stage</td>
</tr>
<tr>
<td>Multipara:</td>
<td>1.5 cm/hr dilatation 2 cm/hr descent Less than 1 hr in second stage</td>
</tr>
</tbody>
</table>

**Figure 23–1 ◦** Woman in labor with external monitor applied. The tocodynamometer placed on the uterine fundus is recording uterine contractions. The lower belt holds the ultrasonic device that monitors the fetal heart rate. The belts can be adjusted for comfort. SOURCE: © Stella Johnson (www.stellajohnson.com)
Electronic impulses. The toco can be used to assess UCs for frequency (timing) and duration (length). However, it cannot determine UC intensity (strength). The displayed numbers and graph tracing for UC intensity are arbitrary and are influenced by how tightly the belt is applied around the maternal abdomen and/or the maternal position. Palpation must be used to assess UC intensity when the external toco monitor is used. When the belt is tight enough, the nurse should be able to note the beginning of contractions on the monitor just before or at the same time the woman begins to feel them (Will et al., 2006).

A beltless tocodynamometer system featuring remote telemetry is available. This system consists of an adhesive transducer that is applied to the most prominent part of the woman’s abdomen with a double-sided adhesive film. The nonbelted tocodynamometer tends to be preferred by the laboring woman because it allows more freedom of movement, is easily applied, needs readjustment only infrequently, and generally is more convenient (Figure 23–2 ◆). It enables upright positions, which promote fetal descent by gravity, as well as ambulation, which can shorten the labor course and increase comfort for the laboring woman.

The advantages to using a toco for assessing uterine contractions are that it is noninvasive, easy to place, and may be used both before and following rupture of membranes. Because it is noninvasive, it can be used intermittently to allow the woman to ambulate, shower, or use a whirlpool bath. The toco also provides a permanent, continuous recording of the duration and frequency of contractions for future evaluation. Placement of the tocotransducer influences the accuracy of the uterine graphic tracing. As with any type of technology, no toco is flawless, and the monitor cannot fill the role of the nurse. The nurse should routinely palpate the intensity of the contractions and the relaxation of the uterus between contractions and compare the assessment with data recorded by the monitor. Another disadvantage is that sometimes the belt may become uncomfortable because it must be worn snugly to monitor UCs accurately. The belt may require frequent readjustment as the mother changes position. The mother may also feel inhibited to move or as though she needs to remain in one position so as not to disturb the belt.

"Trying to figure out if I was in labor was quite a task. Here I was, a birthing room nurse, and I couldn’t decide if my contractions were the real thing. I timed them, and about the time I decided this was it, they would slow down. How exasperating not to know! It was so hard on me. But now I see that all women are in this spot. They want so much to be right, and we often treat them as if they should be able to sense when it’s the real thing. I’d like the birthing room nurses to remember this."

**Electronic Monitoring by Internal Pressure Catheter.**

Electronic monitoring of UCs can be done internally by using an *intrauterine pressure catheter (IUPC)*. The IUPC is a catheter that is inserted into the uterine cavity through the cervix os. With correct placement in the uterus, usually in the area of the fetal small parts (arms or legs), the catheter reflects the pressure inside the uterine cavity. As the pressure changes in the uterus, the changes are relayed through a transducer to the fetal monitor, producing a tracing on the graph paper. The IUPC can measure the resting tone of the uterus between contractions and the actual amount of intrauterine pressure during contractions, referred to as UC intensity.

IUPCs can be one of two types: fluid-filled catheters and solid-tipped catheters. Fluid-filled catheters are a single-lumen catheter connected to a pressure-sensitive diaphragm outside the uterus. As intrauterine pressure changes, the column of fluid in the catheter fluctuates and exerts pressure on the diaphragm, sending signals to the transducer and fetal monitor. The solid-tipped catheter uses more recent technology in that the catheter contains a solid-state micropressure transducer (electronic sensor) at its tip, and the catheter that is inserted directly into the uterus. The catheter is then connected by a cable to the EFM. The catheter also incorporates a second lumen, permitting amniinfusion while simultaneously providing accurate monitoring of intrauterine pressure (Figure 23–3 ◆). Regardless of the type of catheter, fluid filled or solid tipped, the IUPC can be used only after membranes are ruptured and the client has adequate cervical dilation, usually 3 centimeters or more.

The IUPC has several benefits over an external tocotransducer or palpation. Because the IUPC is inserted directly into the uterus, it provides near-exact pressure measurements for contraction intensity and uterine resting tone. The increased sensitivity of the IUPC allows for very accurate timing of UCs, thus making it extremely useful in cases when the provider needs closer uterine monitoring. The IUPC may be the preferred method of monitoring when it is particularly important to avoid hyperstimulation and possible uterine rupture in women with a previous history of cesarean birth who are attempting a vaginal birth after cesarean (VBAC) and are receiving oxytocin. If the woman’s labor is prolonged, internal monitoring can be used to accurately assess the frequency and strength of contractions. If a nonreassuring FHR tracing is present, internal monitoring with IUPC and fetal scalp electrode may be essential to correlate UC intensity.
However, with all of its benefits, the IUPC has its limitations and risks. Use of IUPCs is limited by the clinical situation. Membranes must be ruptured and adequate cervical dilation must be achieved for insertion. The procedure is invasive and increases the risk of uterine infection or uterine perforation or trauma. When an intrantrum catheter is used, there is a 1% risk of infection, but this seems to depend on the duration of ruptured membranes and length of labor. Invasive equipment like the IUPC is contraindicated in cases when active infections can be transmitted vertically through the cervix into the uterus to the fetus. Insertion of an IUPC with a low-lying placenta can result in placenta puncture, which can cause hemorrhage and nonreassuring fetal status (Sciscione, Duhl, Pullook et al., 2005). IUPCs also require proper insertion and zeroing procedures; thus competency in insertion technique and equipment maintenance and troubleshooting is essential.

**CERVICAL ASSESSMENT**

Cervical dilatation and effacement are evaluated directly by vaginal examination (see Procedure 23–1: Performing an Intrapartal Vaginal Examination). The vaginal examination can also provide information regarding fetal position, station of the presenting part, and membrane status (intact or ruptured). To assist in evaluating membrane status, the nurse assesses for the presence of amniotic fluid (Procedure 23–2: Assessing for Amniotic Fluid).

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**PROCEDURE 23-1 Performing an Intrapartal Vaginal Examination**

<table>
<thead>
<tr>
<th>NURSING ACTION</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preparation</strong></td>
<td><strong>This position provides access to the woman’s perineum. The drape ensures privacy. Relaxation decreases muscle tension and increases comfort.</strong></td>
</tr>
</tbody>
</table>
| • Explain the procedure, the indications for the exam, what the exam may feel like, and that it may cause discomfort.  
• Assess for latex allergies.  
• Position the woman with her thighs flexed and abducted. Instruct her to put the heels of her feet together. Drape the woman with a sheet, leaving a flap to access the perineum.  
• Encourage the woman to relax her muscles and legs.  
• Inform the woman before touching her. Be gentle. | |
| **CLINICAL TIP** | Use nonlatex gloves if the woman has a latex allergy |

**Equipment and Supplies**

Clean disposable gloves if membranes not ruptured  
Sterile gloves if membranes ruptured  
Lubricant  
Nitrazine test tape  
Slide  
Sterile cotton-tipped swab (Q-tip)

**Before the Procedure: Test for Fluid Leakage**

If fluid leakage has been reported or noted, use Nitrazine test tape and Q-tip with slide for fern test before performing the exam (see Procedure 23–2).
PROCEDURE 23-1 Performing an Intrapartal Vaginal Examination

**NURSING ACTION**

**RATIONALE**

**Procedure: Clean Gloves (Sterile if membranes ruptured)**

1. Pull glove onto dominant hand.

2. Using your gloved hand, position the hand with the wrist straight and the elbow tilted downward. Insert your well-lubricated second and index fingers of the gloved hand gently into the vagina until they touch the cervix. Use care when positioning your hand.

3. If the woman verbalizes discomfort, acknowledge it and apologize. Pause for a moment and allow her to relax before progressing.

4. To determine the status of labor progress, perform the vaginal examination during and between contractions.

5. Palpate for the opening, or a depression, in the cervix. Estimate the diameter of the depression to identify the amount of dilatation (Figure 23–4 ◆).

6. Determine the status of the fetal membranes by observing for leakage of amniotic fluid. If fluid is expressed, test for amniotic fluid.

7. Palpate the presenting part (Figure 23–5 ◆).

8. Assess the fetal descent (Figure 23–6 ◆) and station by identifying the position of the posterior fontanelle.

9. Record findings on woman’s chart and on fetal monitor strip if fetal monitor is being used.

**Documentation**

Document that the procedure was explained to the client, and that the woman verbalized understanding and provided consent before the vaginal examination. The woman’s reaction and how the procedure was tolerated should be documented. The findings of the examination should be clearly documented using a facility-appropriate documentation form.

---

**CLINICAL TIP**

Digital examination may be deferred if the woman has ruptured membranes but is not in active labor (AAP & ACOG, 2002).

- Single glove is worn when membranes are intact. If a sterile exam is needed, both hands will be gloved with sterile gloves.
- This position allows the fingertips to point toward the umbilicus and find the cervix.
- This validates the woman’s discomfort and helps her feel more in control.
- Cervical effacement, dilatation, and fetal station are affected by the presence of a contraction.
- Allows determination of effacement and dilatation.
- Determine the presenting part is necessary to assess the position of the fetus and to evaluate fetal descent.

Figure 23–4 ◆ 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.

(Continued on next page)
PROCEDURE 23-1 Performing an Intrapartal Vaginal Examination continued

Figure 23–5 ◆ Palpation of the presenting part (the portion of the fetus that enters the pelvis first). A, Left occiput anterior (LOA). The occiput (area over the occipital bone on the posterior part of the fetal head) is in the left anterior quadrant of the woman’s pelvis. When the fetus is in LOA, the posterior fontanelles (located just above the occipital bone and triangular in shape) are in the upper left quadrant of the maternal pelvis. B, Left occiput posterior (LOP). The posterior fontanelle is in the lower left quadrant of the maternal pelvis. C, Right occiput anterior (ROA). The posterior fontanelle is in the upper right quadrant of the maternal pelvis. D, Right occiput posterior (ROP). The posterior fontanelle is in the lower right quadrant of the maternal pelvis.

NOTE: The anterior fontanelle is diamond shaped. Because of the roundness of the fetal head, only a portion of the anterior fontanelle can be seen in each of the views, so it appears to be triangular in shape.

FETAL ASSESSMENT
A complete intrapartal fetal assessment requires determination of the fetal position and presentation and evaluation of the fetal status.

Determination of Fetal Position and Presentation
Fetal position is determined in several ways, including the following:
• Inspection of the woman’s abdomen
• Palpation of the woman’s abdomen (Leopold’s maneuvers)
• Vaginal examination to determine the presenting part
• Ultrasound

INSPECTION
The nurse should observe the woman’s abdomen for size and shape. The lie of the fetus should be assessed 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 (Figure 23–7 ◆). 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).

Care should be taken to ensure the woman’s comfort during Leopold’s maneuvers. The woman should have recently emptied her bladder and should lie on her back with her abdomen uncovered. To aid in relaxation of the abdominal wall, the shoulders should be raised slightly on a pillow and the knees drawn up a little. The procedure should be completed between contractions. The examiner’s hands should be warm. The order in which Leopold’s maneuvers are performed may vary from one clinician to another.
PROCEDURE 23-1  Performing an Intrapartal Vaginal Examination  continued

While inspecting and palpating the maternal abdomen, the nurse should consider the following questions:

- Is the fetal lie longitudinal or transverse?
- What is in the fundus? Am I feeling buttocks or head?
- Where is the fetal back?
- Where are the small parts or extremities?
- What is in the inlet? Does it confirm what I found in the fundus?
- Is the presenting part engaged, floating, or dipping into the inlet?
- Is there fetal movement?
- How large is the fetus (appropriate, large, or small for gestational age)?
- Is there one fetus or more than one?
- Is fundal height proportionate to the estimated gestational age?

First Maneuver

While facing the woman, the nurse palpates the upper abdomen with both hands (see Figure 23–7, A ◆). The nurse determines the shape, size, consistency, and mobility of the form that is found. The fetal head is firm, hard, and round and moves independently of the trunk. The breech feels softer and symmetric and has small bony prominences; it moves with the trunk.

Second Maneuver

After ascertaining whether the head or the buttocks occupies the fundus, the nurse tries to determine the location of the fetal back and notes whether it is on the right or left side of the maternal abdomen. Still facing the woman, the nurse palpates the abdomen with deep but gentle pressure, using the palms (see Figure 23–7, B ◆). The right hand should be steady while the left hand explores the right side of the uterus. The nurse then repeats the maneuver, probing with the right hand and steadying...
PROCEDURE 23-2  Assessing for Amniotic Fluid

**NURSING ACTION**

**RATIONALE**

**Preparation**

- Explain the procedure, indications for the procedure, what the woman will feel, and information that may be obtained.

- Determine whether she has noted the escape of any fluid from her vagina.

**Equipment and Supplies**

- Nitrazine test tape
- Sterile speculum
- A glass slide and a sterile cotton-tipped swab (Q-tip)
- Sterile syringe
- Microscope

**Procedure: Sterile Gloves**

1. Complete this test before doing an examination that requires the use of lubricant.

2. Put on sterile gloves. With one gloved hand, spread the labia, and with the other gloved hand place a small section of Nitrazine tape (approx. 2 in. long) against the vaginal opening. Take care not to touch the tape with bare fingers prior to the test.

3. Compare the color on the test tape to the guide on the back of the Nitrazine test tape container to determine test results.

4. Amniotic fluid may also be obtained by speculum exam. This is indicated in preterm premature rupture of membranes. If fluid is present in sufficient amount to draw some into a syringe, a small amount should be collected, or the pool of fluid in the posterior vagina can be obtained with a sterile cotton swab. A small amount of fluid is placed on a glass slide, allowed to dry, and then examined under the microscope. A ferning pattern confirms the presence of amniotic fluid. See Figure 12–4 for an example of ferning.

**Documentation**

Record the findings on the labor record. Documentation of the status of membranes should include whether they are intact or ruptured. Other characteristics, such as color, odor, and amount of fluid present, should also be recorded, along with the time of rupture.

Contamination of the Nitrazine test tape with lubricant can make the test unreliable. Enough fluid needs to be placed on the test tape to make it wet. Amniotic fluid is alkaline, and an alkaline fluid turns the Nitrazine test tape a dark blue. If the test tape remains a beige color, the test is negative for amniotic fluid. Obtaining a specimen by speculum examination reduces the contamination of the fluid with other substances such as blood and cervical mucus and reduces the chance of infection for the woman who is not actively laboring.

the uterus with the left hand. The fetal back should feel firm and smooth and should connect what was found in the fundus with a mass in the inlet. Once the back is located, the nurse validates the finding by palpating the fetal extremities (small irregularities and protrusions) on the opposite side of the abdomen.

**Third Maneuver**

Next, the nurse should determine what fetal part is lying above the inlet by gently grasping the lower portion of the abdomen just above the symphysis pubis with the thumb and fingers of the right hand (see Figure 23–7, C ◆). This maneuver yields the opposite information from what was found in the fundus and validates the presenting part. If the head is presenting and is not engaged, it may be gently pushed back and forth.

**Fourth Maneuver**

For this portion of the examination, the nurse faces the woman’s feet and attempts to locate the cephalic prominence or brow. Location of this landmark assists in assessing the descent of the presenting part into the pelvis. The fingers of both hands are moved gently down the sides of the uterus toward the pubis (see Figure 23–7, D ◆). The cephalic prominence (brow) is located on the side where there is greatest resistance to the descent of the fingers toward the pubis. It is located on the opposite side from the fetal back if the head is well flexed. However, when the fetal head is extended, the occiput is the first cephalic prominence felt, and it is located on the same side as the back. Therefore, when completing the fourth maneuver, if the nurse finds that the first cephalic prominence palpated is on the same side
as the back, the head is not flexed. If the first prominence found is opposite the back, the head is well flexed.

**VAGINAL EXAMINATION**

The vaginal examination reveals information regarding the fetus such as presentation, position, station, degree of flexion of the fetal head, and any swelling that may be present on the fetal scalp (caput succedaneum).

**CLINICAL TIP**

If you are having difficulty reaching a posterior cervix, ask the woman to place her fists under her buttocks or use a bedpan to facilitate a pelvic tilt, which will make the cervix more accessible.

**ULTRASOUND**

Real-time ultrasound is frequently available in the birth setting. It may be used to assess fetal lie, presentation, and position; obtain measurements of biparietal diameter to estimate gestational age; assess for anomalies when a vaginal examination reveals suspicious findings, and assess placement of the placenta. Ultrasound is often helpful to locate the fetal heart location when the nurse is having difficulty locating it, such as in cases where there are multiple fetuses. It can also be used to diagnose a fetal demise. (See Chapter 21 for further discussion of the use of ultrasound for fetal assessment).

**Auscultation of Fetal Heart Rate**

Auscultation is the direct auditory monitoring and interpretation of the fetal heart in utero. The number of fetal heart beats per minute (bpm) is referred to as the FHR or FHT. Auscultation uses a handheld instrument, such as a fetoscope or ultrasound Doppler, to listen to and count the FHR (Figure 23–8). Each instrument uses slightly different technology. Fetoscopes magnify actual fetal heart sounds, whereas Dopplers use ultrasound to convert fetal myocardial movement into sound waves that are then amplified and sent through a speaker from which the heart rate can be counted. Some Dopplers display a digital readout in addition to the audible sound produced.
Before listening to the FHR the first time, the nurse may choose to perform Leopold’s maneuvers to determine the probable location of the FHR. The FHR is heard most clearly at the fetal back (Figure 23–9 ◆). 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 the FHR may be heard best just above or just below the umbilicus. As the presenting part descends and rotates through the maternal pelvis during labor, the FHR tends to descend and move toward the midline. In some instances, the monitor may track the maternal heart rate instead of the FHR. However, the nurse can avoid the error by comparing the maternal pulse with the FHR.

After the FHR is located, it is usually counted for 30 to 60 seconds to obtain the number of beats per minute. The nurse should listen before, during, and just after a contraction to detect any abnormal heart rate, especially if the FHR is over 160 (tachycardia) or under 110 (bradycardia), or if irregular beats are heard. Listening through a contraction may be difficult because of maternal movement or a muffling of the FHR sounds. It is especially important to listen during and after the contraction to detect any deceleration that might occur. It is also important to listen immediately after each contraction when the woman is pushing during second stage, because fetal bradycardia frequently occurs as pressure is exerted on the fetal head during descent. See Procedure 23–3: Auscultation of Fetal Heart Rate and Table 23–4 for guidelines regarding how often to auscultate FHR.

Auscultation has been used for many years and remains a very valuable assessment technique even though it uses less technology than EFM. Research and standards have shown that intermittent auscultation is equally effective for monitoring the FHR.
PROCEDURE 23-3  Auscultation of Fetal Heart Rate

**NURSING ACTION**

<table>
<thead>
<tr>
<th>RATIONALE</th>
</tr>
</thead>
</table>

**Preparation**
- Explain the procedure, the indications for it, and the information that will be obtained.
- Uncover the woman’s abdomen.

**Equipment and Supplies**

- Doppler device
- Ultrasonic gel

**Procedure**

**CLINICAL TIP**

The fetal heart rate (FHR) is heard most clearly through the fetal back. Locate the fetal back using Leopold’s maneuvers.

1. To use the Doppler:
   - Place ultrasonic gel on the diaphragm of the Doppler. Gel is used to maintain contact with the maternal abdomen and enhances conduction of sound.
   - Place the Doppler diaphragm on the woman’s abdomen halfway between the umbilicus and symphysis and in the midline. You are most likely to hear the FHR in this area. Listen carefully for the sound of the fetal heartbeat.

2. Check the woman’s pulse against the fetal sounds you hear. If the rates are the same, reposition the Doppler and try again.

3. If the rates are not similar, count the FHR for 1 full minute. Note that the FHR has a double rhythm and only one sound is counted.

4. If you do not locate the FHR, move the Doppler laterally (see Figure 23–8, A).

5. Auscultate the FHR between, during, and for 30 seconds following a uterine contraction (UC).

6. Frequency recommendations:
   - Low-risk women: Every 30 minutes during the first stage, and every 15 minutes in the second stage.
   - High-risk women: Every 15 minutes during the first stage, and every 5 minutes in the second stage.

**Documentation**

Document that the procedure was explained to the woman and that she verbalized understanding. The location of the FHR, FHR baseline, changes in FHR that occur with contractions, and presence of accelerations or decelerations should be included. Other characteristics should include variability, maternal position, the type of device used, uterine activity, maternal pulse, and nursing interventions that were performed.

**The Fetoscope**

The fetoscope is an older assessment tool; however, some clinicians prefer it because it is “natural” and does not rely on ultrasound.

To use the fetoscope:
- Place the fetoscope earpieces in your ears and the device support against your forehead; use the handpiece to position the bell of the fetoscope on the mother’s abdomen.
- Place the diaphragm halfway between the umbilicus and symphysis and in the midline. You are most likely to hear the FHR in this area.
- Without touching the fetoscope, listen carefully for the FHR.
as EFM when a 1:1 nurse-to-client ratio is maintained and the pregnant client remains low risk. Low-risk status has been defined as “no pregnancy risk factors, no meconium stained fluid, normal labor patterns, and labor without augmentation or induction” (ACOG, 2005; Will et al., 2006). Outside these parameters, intermittent auscultation may not be appropriate and should not be used to assess high-risk pregnancies (ACOG, 2005).

Auscultation is a learned skill and requires practice and knowledge of its benefits and limitations as an assessment tool. It has many advantages that make it a preferred method of monitoring by both mothers and nurses. Auscultation uses minimum instrumentation, is portable, and allows for maximum maternal movement; thus it is convenient and economical. Its disadvantages include the limited data this technique can provide compared with EFM. Only the baseline FHR (BL FHR), rhythms of the FHR, and obvious increases and decreases can be monitored. Auscultation also does not provide a permanent record, thus making interpretation of the FHR impossible in the future or by another care provider. Identifying patterns and nonreassuring FHR is difficult and requires training. Auscultation must be practiced to ensure accurate interpretation of data.

Identifying UCs and the FHR simultaneously is necessary to determine patterns in the FHR and the relationship between the FHR and the UC. Auscultation does not allow for the detection of small changes in the FHR and cannot determine baseline variability (BL VAR). It may also be limited by maternal obesity and movement by the mother and fetus (AWHONN, 2006). In such instances, it may be essential to monitor using electronic means, regardless of the client’s risk status.

**ELECTRONIC FETAL MONITORING**

Electronic fetal monitoring (EFM) provides a continuous tracing of the FHR, allowing characteristics of the FHR to be observed and evaluated (see Procedure 23–4: Electronic Fetal Monitoring). When the FHR is monitored electronically, the interval between two successive fetal heartbeats is continually measured, and the rate is displayed as if the beats occurred at the same interval for 60 seconds. For example, if the interval between beats is 0.5 seconds, the rate for the full minute would be 120 bpm.

In the late 1990s, standardized definitions for FHR tracings were proposed (NICHD, 1997) in an effort to resolve controversy surrounding the benefits of EFM, the primary interpretation of FHR patterns, and appropriate interventions for nonreassuring tracings (Cunningham et al., 2005). In 2004, JCAHO recommended standardized and consistent use of fetal monitoring terminology among all healthcare professionals and the development of clear guidelines for fetal monitoring of potential high-risk patients (JCAHO, 2004). In response, in May 2005, ACOG issued a bulletin that reviewed FHR assessment terminology and described the management of nonreassuring FHR patterns (ACOG, 2005). At the same time, the AWHONN revised its fetal monitoring courses to incorporate the standardized terminology. In December 2005, ACOG modified its May bulletin to match AWHONN guidelines and the NICHD terminology. This chapter reflects the most recent guidelines instituted by ACOG and AWHONN and the NICHD terminology for FHR tracings.

**Indications for Electronic Fetal Monitoring**

ACOG states that the frequency of FHR monitoring used during labor should be based on risk factors (ACOG, 2005). Although there is as yet no standardized list, Table 23–5 identifies some common indications for EFM.

**External Monitoring**

Electronic monitoring of the FHR can be done externally by using an ultrasound (US) transducer. The US transducer is a Doppler device with computerized logic to interpret and count the Doppler signals (Cunningham et al., 2005). The US transducer is placed on the maternal abdomen over the fetal back (as determined by Leopold’s maneuvers), where the FHR is usually the loudest, and is held in place with an elastic belt. A water-soluble gel is applied to the underside of the transducer to aid in conduction of the fetal heart sounds. The US transducer then emits ultrasonic beams that reflect off the moving fetal myocardium and return to the transducer. The transducer receives the signal and interprets it before amplifying it in the
PROCEDURE 23-4  Electronic Fetal Monitoring

NURSING ACTION  RATIONALE

**Preparation**

• Explain the procedure, the indications for it, and the information that will be obtained.

**Equipment and Supplies**

Monitor
Two elastic monitor belts
Tocodynamometer (“toco”)
Ultrasound transducer
Ultrasound gel

**Procedure**

**CLINICAL TIP**

Evaluating the FHR tracing provides information about fetal status and response to the stress of labor. The presence of reassuring characteristics is associated with good fetal outcomes. Rapid identification of nonreassuring characteristics allows prompt interventions and the opportunity to determine the fetal response to the interventions.

1. Turn on the monitor.
2. Place the two elastic belts around the woman’s abdomen.
3. Place the “toco” over the uterine fundus off the midline on the area palpated to be most firm during contractions. Secure it with one of the elastic belts.
4. Note the UC tracing. The resting tone tracing (that is, without a UC) should be recording on the 10 or 15 mm Hg pressure line. Adjust the line to reflect that reading.
5. Apply the ultrasonic gel to the diaphragm of the ultrasound transducer.
6. Place the diaphragm on the maternal abdomen in the midline between the umbilicus and the symphysis pubis.
7. Listen for the FHR, which will have a whiplike or galloping sound. Move the diaphragm laterally if necessary to obtain a stronger sound (see Figure 23–9).
8. When the FHR is located, attach the second elastic belt snugly to the transducer.
9. Place the following information on the beginning of the fetal monitor paper: date, time, woman’s name, gravida, para, membrane status, and name of physician or certified nurse-midwife.

Note: Each birthing unit may have specific guidelines about additional information to include.

**Document**

Document that the procedure was explained to the woman and that she verbalized understanding. The location of the FHR, FHR baseline, changes in FHR that occur with contractions, and presence of accelerations or decelerations should be included. Other characteristics should include variability, maternal position, the type of device used, and maternal pulse, presence of fetal movement, procedures performed, and contraction characteristics (duration, frequency, strength).

Entry documenting FHR, variability, response of FHR to UC, the intervention used, and subsequent positive fetal response to the intervention.

8-3-06 FHR BL 135–140. Minimal variability noted. Late decelerations noted with decrease of FHR to 130 bpm for 20 sec. UC every 3 min × 50–60 sec of moderate intensity by palpation. Client turned to left side. No further deceleration with three subsequent UCs. Two accelerations of 20 bpm × 20 sec noted with fetal movement. Client instructed to remain on left side. B Burch, RNC
Internal Monitoring

Internal fetal monitoring is accomplished with a fetal scalp electrode (FSE), a fine surgical spiral wire, attached to the fetal scalp or other presenting part. The FSE is the most precise method of monitoring because it is a direct ECG of the FHR and produces the most accurate FHR tracing. The FSE is attached to the fetus during a vaginal exam. Once in place, the electrode is connected to the fetal monitor. The monitor determines the time between fetal “R” waves in the “QRS” complex and calculates the findings into a FHR. The FHR is then recorded on graph paper.

For the spiral electrode to be inserted, the cervix must be dilated at least 2 cm, the presenting fetal part must be accessible by vaginal examination, and the membranes must be ruptured. Even though it is not possible to apply the electrode and catheter under strict sterile conditions, the procedure should be performed as aseptically as possible. After determining fetal position by vaginal examination, the examiner (physician or nurse) inserts the electrode, which is encased in a plastic guide, to the level of the internal cervical os and attaches it to the presenting part, being careful not to apply it to the face, suture lines, fontanelles, cervix, or perineum if the fetus is in a breech presentation. The electrode is rotated clockwise until it is attached to the presenting part and is then disengaged from the guide tube. The guide tube is removed, and the end wires are connected to a leg plate that is attached to the woman’s thigh. The cable from the leg plate is connected to the monitor. Infections and injuries from internal electrodes and catheters are a small but actual risk. Although nurses in some facilities apply internal monitors, in many settings their application is limited to the physician or CNM.

Because the risk of transmission to the fetus is increased by the small puncture in the fetal scalp, use of internal scalp electrodes should be avoided if at all possible in the presence of known maternal infections such as HIV, hepatitis, or group B streptococcus. Also, women who have had internal monitors and subsequently given birth by cesarean are more likely to have postpartum infections (Chan & Johnson, 2005). Fetal scalp monitors are also avoided in preterm infants because of the increased risk of ventricular hemorrhage.

The FHR tracing at the top of Figure 23–10 was obtained by internal monitoring, and the uterine contraction tracing at the bottom by external monitoring. A comparison shows that the spiral electrode provides an instantaneous and continuous recording of FHR that is clearer than the data provided by external monitoring. Notice that the FHR is variable (the tracing moves up and down instead of in a straight line), ranging between about 140 and 155 bpm.

Telemetry

As discussed previously, FHR and uterine activity may also be monitored by a telemetry system. Equipment consists of US transducers or other presenting part. The FSE is the most precise method of monitoring because it is a direct ECG of the FHR and produces the most accurate FHR tracing. The FSE is attached to the fetus during a vaginal exam. Once in place, the electrode is connected to the fetal monitor. The monitor determines the time between fetal “R” waves in the “QRS” complex and calculates the findings into a FHR. The FHR is then recorded on graph paper.

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Telemetry

As discussed previously, FHR and uterine activity may also be monitored by a telemetry system. Equipment consists of US transducers or other presenting part. The FSE is the most precise method of monitoring because it is a direct ECG of the FHR and produces the most accurate FHR tracing. The FSE is attached to the fetus during a vaginal exam. Once in place, the electrode is connected to the fetal monitor. The monitor determines the time between fetal “R” waves in the “QRS” complex and calculates the findings into a FHR. The FHR is then recorded on graph paper.

For the spiral electrode to be inserted, the cervix must be dilated at least 2 cm, the presenting fetal part must be accessible by vaginal examination, and the membranes must be ruptured. Even though it is not possible to apply the electrode and catheter under strict sterile conditions, the procedure should be performed as aseptically as possible. After determining fetal position by vaginal examination, the examiner (physician or nurse) inserts the electrode, which is encased in a plastic guide, to the level of the internal cervical os and attaches it to the presenting part, being careful not to apply it to the face, suture lines, fontanelles, cervix, or perineum if the fetus is in a breech presentation. The electrode is rotated clockwise until it is attached to the presenting part and is then disengaged from the guide tube. The guide tube is removed, and the end wires are connected to a leg plate that is attached to the woman’s thigh. The cable from the leg plate is connected to the monitor. Infections and injuries from internal electrodes and catheters are a small but actual risk. Although nurses in some facilities apply internal monitors, in many settings their application is limited to the physician or CNM.

Because the risk of transmission to the fetus is increased by the small puncture in the fetal scalp, use of internal scalp electrodes should be avoided if at all possible in the presence of known maternal infections such as HIV, hepatitis, or group B streptococcus. Also, women who have had internal monitors and subsequently given birth by cesarean are more likely to have postpartum infections (Chan & Johnson, 2005). Fetal scalp monitors are also avoided in preterm infants because of the increased risk of ventricular hemorrhage.

The FHR tracing at the top of Figure 23–10 was obtained by internal monitoring, and the uterine contraction tracing at the bottom by external monitoring. A comparison shows that the spiral electrode provides an instantaneous and continuous recording of FHR that is clearer than the data provided by external monitoring. Notice that the FHR is variable (the tracing moves up and down instead of in a straight line), ranging between about 140 and 155 bpm.
which can be worn on a shoulder strap, allows the woman to ambulate, helping her to feel more comfortable and less confined during labor, yet provides for continuous monitoring. Telemetry provides for direct as well as indirect monitoring of FHR, indirect monitoring of uterine pressure, and dual FHR monitoring of twins.

**FETAL HEART RATE PATTERNS**

FHR is evaluated by assessing the BL rate, the BL VAR, and the periodic and episodic changes that occur in response to the intermittent stress of UCs.

The standardized definitions for FHR tracings developed by NICHD, mentioned previously, have potential benefits. Standardized terminology minimizes variation among care providers and allows for accurate documentation of the fetal status in medical records. If everyone on the perinatal team communicates clearly, treatment can be initiated promptly and there may be a decreased risk of adverse outcomes (AWHONN, 2005). The NICHD definitions were developed for visual interpretation by perinatal care providers, and complete understanding of FHR requires an understanding of the FHR characteristics presented next using these NICHD definitions (ACOG, 2005).

**Baseline Rate**

The **baseline rate** is the mean (average) FHR during a 10-minute period, rounded to increments of 5 bpm (e.g., 125, 130, 135, 140). The area for selection to determine the BL FHR should be the largest segment of the BL in any given 10-minute segment (Curran & Torgersen, 2006). The average FHR excludes periodic or episodic changes in FHR, periods of marked FHR variability, or segments of BL that differ by more than 25 bpm. The BL must be observed for a minimum of 2 minutes in any 10-minute segment, and it can be determined before, during, or after contractions as long as none of the previous conditions exist (ACOG, 2005). The 2-minute period to determine the BL FHR can be either 2 consecutive minutes or two 1-minute segments that occur within the 10-minute segment (AWHONN, 2006). If a 10-minute window does not contain 2 minutes of readable BL, the BL for that 10-minute period is considered indeterminate and the preceding 10-minute window must be used to determine the BL (Cypher et al., 2003). For example, if FHR over a period of 10 minutes fluctuates between 142 bpm and 156 bpm, the BL FHR would be documented as 150 bpm with moderate variability.

The normal BL rate ranges from 110 to 160 bpm, depending on gestational age. As the gestational age of the fetus increases, the FHR decreases. The FHR decreases an average of 16 bpm between 16 weeks’ gestation and term. The slowing of the FHR occurs as the parasympathetic nervous system matures and exerts control over the fetal heart activity (Cunningham et al., 2005).

**TACHYCARDIA**

**Fetal tachycardia** is an FHR BL greater than 160 bpm for at least a 10-minute period. The possible causes of tachycardia...
may be idiopathic, maternal, fetal, or a combination of maternal and fetal. Some of the most common causes are the following:

**Maternal**
- Fever (Metabolism of the fetus accelerates because of increased maternal temperature.)
- Dehydration
- Anxiety
- Betasapthomimetic drugs, such as ritodrine, terbutaline, atropine, and isoxsuprine (These drugs have a cardiac stimulant effect.)
- Maternal hyperthyroidism (Thyroid-stimulating hormones may cross the placenta and stimulate the FHR.)
- Supraventricular tachycardia

**Fetal**
- Early fetal hypoxia (This leads to stimulation of the sympathetic nervous system (SNS) as the fetus compensates for reduced blood flow.)
- Asphyxia
- Fetal anemia (The heart rate increases as a compensatory mechanism to improve tissue perfusion.)
- Infection
- Prematurity
- Prolonged fetal stimulation

Tachycardia is considered a nonreassuring sign if it is accompanied by other FHR patterns such as late decelerations, severe variable decelerations, or decreased or absent variability. If tachycardia is associated with maternal fever, treatment may consist of antipyretics, cooling measures, and antibiotics. Fetal arrhythmia or dysrhythmia needs to be ruled out. The pediatrician should be notified, because tachycardia may cause heart failure in the newborn.

Intervention for tachycardia usually requires treatment of the underlying cause. Additional testing and monitoring may be used to further determine fetal well-being.

**BRADYCARDIA**

*Fetal bradycardia* is an FHR BL less than 110 bpm for at least a 10-minute period. The lower limits of the FHR have been debated in the past. An FHR as low as 90 bpm with good variability has been classified as benign and reassuring (Freeman, 2003). When bradycardia is accompanied by decreased variability or late decelerations, or both, it is considered ominous and a sign of advanced fetal compromise (Cunningham et al., 2005). The possible causes of bradycardia include the following:

- Stimulation of the vagus nerve (prolonged head compression as in early decelerations, application of the forceps or vacuum extractor, or prolonged scalp stimulation)
- Drugs that stimulate the parasympathetic nervous system or block the sympathetic (anesthesia and regional analgesia)
- Maternal hypotension (Maternal hypotension results in decreased blood flow to the fetus.)

- Prolonged umbilical cord compression (Fetal baroreceptors are activated by cord compression, which produces vagal stimulation, and in turn decreases FHR.)
- Fetal dysrhythmia (This is associated with complete heart block in the fetus.)
- Hypoxemia or late fetal asphyxia (There is depression of myocardial activity.)
- Accidental monitoring of maternal pulse

**WANDERING BASELINE**

A *wandering baseline* is a smooth, meandering, unsteady BL that fluctuates in the normal BL range without variability (Cunningham et al., 2005). The possible causes of this type of BL may be a congenital defect or metabolic acidosis. Immediate interventions should be taken to enhance fetal oxygenation, and delivery should be anticipated (AWHONN, 2006).

**SINUSOIDAL BASELINE**

A sinusoidal BL is an FHR pattern consisting of a series of cycles that are extremely smooth and regular (not necessarily identical) in amplitude and duration. The pattern resembles a perfect letter “S” lying on its side. The FHR undulates in a sine pattern between 120 and 160 bpm with variability amplitude of 5 to 15 bpm. Accelerations do not occur spontaneously, nor can they be induced (Figure 23–11 ◆).

Sinusoidal patterns may be benign (pseudosinusoidal) or pathological (true sinusoidal) patterns. Although not recognized by the NICHD, there are additional resources that describe pseudosinusoidal patterns as “sinusoidal patterns falsely induced by medication administration” (Curran & Torgersen, 2006; Cypher et al., 2003). Pseudosinusoidal FHR patterns may be caused by medications, such as meperidine or morphine; rhythmic fetal movement, such as thumb sucking; or infections, such as amnionitis. The wave pattern often lacks the regularity and smoothness of true sinusoidal patterns and is often followed by a normal FHR pattern when the stimulus causing the pattern is removed or corrected. Pathologic sinusoidal patterns are indicative of nonreassuring fetal status and require immediate attention (Cunningham et al., 2005). The possible causes of a true sinusoidal pattern include the following:

- Fetal anemia
- Chronic fetal bleeding
- Fetal isoimmunization
- Twin-to-twin transfusion
- Umbilical cord occlusion
- Central nervous system (CNS) malformations (Cunningham et al., 2005)

If the sinusoidal pattern is uncorrectable and pseudosinusoidal pattern has been ruled out, interventions include immediate notification of the healthcare provider and expeditious delivery.

**ARRHYTHMIAS AND DYSRHYTHMIAS**

Arrhythmias, a term often used interchangeably with dysrhythmias, are disturbances in the FHR pattern that are not
associated with abnormal electrical impulse formation or conduction in the fetal cardiac tissue. An arrhythmic pattern demonstrates a normal P wave and QRS complexes (Curran & Torgersen, 2006; Torgersen, 2003). However, dysrhythmic FHR patterns may exhibit abnormal electrical impulse formation and/or conduction in the fetal cardiac tissues, resulting in abnormal P waves or QRS complexes, or both. Arrhythmic and dysrhythmic patterns get their names from the origin of the pattern, for example, sinus node variants, atrial node patterns, or ventricular patterns (Curran & Torgersen, 2006; Torgersen, 2003).

FHR dysrhythmias are estimated to occur in 2% to 14% of all pregnancies. Whereas 90% of dysrhythmias are benign, 10% can be life threatening and require the consultation of a neonatal or pediatric cardiology expert (AWHONN, 2006; Torgersen, 2003). For this reason, it is important to accurately diagnose abnormal FHR patterns and distinguish fetal arrhythmias from artifact and electrical interference. Fetal dysrhythmias can be difficult to diagnose, because detection of the fetal cardiac electrical activity is best accomplished by invasive or advanced monitoring techniques such as fetal scalp electrode, real-time ultrasound, Doppler velocimetry, fetal echocardiogram, and echocardiogram monitoring (e.g., M-Mode EchoCG, and Pulsed Doppler EchoCG) (Torgersen, 2003). With the exception of the fetal scalp electrode, more advanced and expensive diagnostic testing may not be readily available.

The most common causes of FHR dysrhythmias are discussed in Table 23–6.

**Table 23–6 COMMON CAUSES OF VARIOUS TYPES OF FETAL DYSRHYTHMIAS**

<table>
<thead>
<tr>
<th>Sinus Node Variants</th>
<th>Atrial Dysrhythmias</th>
<th>Ventricular Dysrhythmias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bradycardia</td>
<td>Parasympathetic response to fetal hypoxemia</td>
<td>Beta-blocker drugs</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>Maternal ingestion of stimulants (e.g., caffeine, tobacco, alcohol, cocaine)</td>
<td>Complete heart blocks (AV malformation)</td>
</tr>
<tr>
<td>Marked sinus arrhythmia</td>
<td>Abnormal reentry conduction</td>
<td>Congenital heart disease</td>
</tr>
<tr>
<td>Infections</td>
<td>Cardiomyopathy</td>
<td>Autoimmune disease (AV malformation)</td>
</tr>
<tr>
<td>CNS disturbances</td>
<td>Fetal-maternal placental hemorrhage</td>
<td>Maternal collagen disorders (AV malformation)</td>
</tr>
<tr>
<td></td>
<td>Nonimmune hydrops fetalis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wolf-Parkinson White syndrome</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cardiac structural abnormalities (e.g., ASD, VSD, valve malformation)</td>
<td></td>
</tr>
</tbody>
</table>

**Sources:** Data from AWHONN, 2004; Cunningham et al., 2005; Torgersen, 2003; Tucker, 2004.
Baseline Variability

Baseline variability (BL VAR) is a reliable indicator of fetal cardiac and neurological function and well-being. The opposing “push-pull” balancing between the sympathetic nervous system and the parasympathetic nervous system directly affects the FHR. The NICHD has defined BL VAR as BL fluctuations of 2 cycles per minute or greater, and it is classified by the visually quantified amplitude of peak-to-trough in beats per minute. Evaluation of BL VAR is based on visual assessment of the amplitude of the BL cycles (AWHONN, 2005). The BL VAR is classified into four categories (ACOG, 2005; Curran & Torgersen, 2006; Cypher et al., 2003):

- Absent—amplitude undetected
- Minimal—amplitude range detectable but 5 bpm
- Moderate—amplitude range of 6 to 25 bpm
- Marked—amplitude greater than 25 bpm

Figures 23–12◆ and 23–13◆ illustrate examples of each of these categories.

Fetal Heart Rate Changes

In addition to changes in the average FHR BL range, the FHR may also exhibit intermittent or transient deviations or changes from the BL that are commonly referred to as accelerations and decelerations. These transient deviations or changes in BL are classified as episodic or periodic. Episodic changes (formerly referred to as nonperiodic changes) are not associated with UCs. Periodic changes occur with UCs. If a periodic change occurs with 50% or more of UCs in a 20-minute period, it is further classified as a recurrent change or pattern.

The nurse must remember that it is very important to examine all changes in FHR in relation to the surrounding BL and uterine activity. A comprehensive evaluation of the maternal-fetal interaction facilitates effective and efficient treatment and fetal well-being.

ACCELERATIONS

An acceleration is described as a visually apparent increase in the BL FHR, with an onset-to-peak of less than 30 seconds beginning at the most recent calculated BL. The duration of the acceleration is defined as the time from the initial change in FHR from the BL to the return of the FHR to the BL. After 32 weeks’ gestation, an acceleration must peak 15 beats above the BL and last for a total of 15 seconds from the time it leaves the BL FHR until the time it returns to the FHR BL. At gestations of less than 32 weeks, an acceleration of 10 beats by 10 seconds is acceptable. A prolonged acceleration is any acceleration that lasts longer than 2 minutes. Prolonged accelerations that last more than 10 minutes are classified as changes in BL.

Accelerations can be either episodic or periodic. Episodic, or spontaneous, accelerations are not associated with contractions and tend to be more peaked and abrupt. They are often associated with fetal movement, stimulation, or an environmental stimulus. Episodic accelerations are reassuring FHR patterns, whether or not they are accompanied by fetal movement. Periodic accelerations are associated with uterine contractions. When they occur on a repetitive basis, they may be smooth in configuration, multiphasic, and may precede variable decelerations. Various types of accelerations are displayed in Figure 23–14◆.

Accelerations are generally associated with the stimulation of the autonomic nervous system (ANS), specifically the SNS, which increases the FHR. If the heart rate increases with CNS stimulation, it usually indicates an intact fetal nervous system and fetal well-being. FHR accelerations can be associ-

Figure 23–12◆ A and B, Moderate variability. C, Minimal variability. D, Absent variability.
Marked variability. FHR varies markedly between 120 and 190 bpm. With this type of pattern, it is not possible to determine average baseline FHR because of the wide, marked variations.

Infants of extreme prematurity are less likely to accelerate because of their immature parasympathetic nervous system. In fetuses of less than 32 gestational weeks, an acceleration of at least 10 bpm for 10 seconds is reassuring. Fetuses suffering from intrauterine growth restriction (IUGR)
experience fewer accelerations than normal, healthy, well-oxygenated fetuses. Medications administered to the mother may inhibit accelerations because of their effect on the SNS. Some of the drugs seen to affect fetuses are beta blockers and CNS depressants. Hypoxia is also a large contributing factor to lack of accelerations and may be the first sign of a non reassuring FHR tracing.

Accelerations are generally benign because they are associated with an intact fetal nervous system, lack of fetal hypoxia, and acidosis. The patterns are considered reassuring, thus no intervention is required (Cunningham et al., 2005; Curran & Torgersen, 2006; Cypher et al., 2003; Tucker, 2004).

**DECELERATIONS**

Decelerations, often referred to as decels, are generally defined as decreases in the FHR below the BL. Each deceleration has its own unique characteristics, etiology, and significance. Each deceleration consists of several components:

- **Onset**: point at which the deceleration leaves the FHR BL
- **Descent**: time from onset to nadir
- **Nadir**: lowest point of the deceleration
- **Depth**: the level (in beats per minute) a deceleration reaches its nadir
- **Recovery**: time from nadir to return to BL
- **Duration**: the total length of time from onset to return to BL

Decelerations are identified and classified by their shape, appearance, rate of descent, and timing in relationship to uterine contractions (Figure 23–15 ◆).

**Abrupt or Gradual**

Decelerations are classified into two types based on the rate at which the FHR descends after it leaves the FHR BL. Based on NICHD nomenclature, *abrupt deceleration* of the FHR (onset to nadir) occurs in less than 30 seconds. Variable decelerations de-
scend abruptly. *Gradual deceleration* of the FHR (onset to nadir) requires 30 seconds or longer (ACOG, 2005; AWHONN, 2005). Early and late decelerations both descend gradually but differ in respect to their timing with the UC. Early and late contractions are discussed further later in this section.

**Episodic or Periodic**

Decelerations can be episodic or periodic. Episodic implies that the decelerations occur without relationship to UCs. They may occur without or between contractions and usually are the result of environmental stimuli, such as vaginal exams, rupture of membranes, the administration of regional anesthesia or medications, or other events. Periodic refers to decelerations that occur in direct association with UCs. Episodic or periodic decelerations are considered *repetitive* if they occur with 50% or more of UCs (ACOG, 2005; AWHONN, 2005).

**Early or Late**

Periodic decelerations associated with UCs are also classified by their timing in respect to them. There are three types of deceleration patterns: early, late, and variable. *Early decelerations* occur simultaneously with UCs; thus their onset, nadir, and recovery occur at the same time as the onset, acme (peak), and recovery, respectively, of the UC. *Late decelerations* are delayed after the UC in that their onset, nadir, and recovery occur after the beginning, peak, and end of the contraction, respectively (ACOG, 2005). *Variable decelerations* can occur either early or late with respect to a UC.

The etiology and clinical significance of each type of deceleration are unique. Clinical interventions and treatments are based on the systematic assessment of the FHR tracing and the overall evaluation of the mother, the fetus, and labor status. Deceleration characteristics and the discussion of their clinical significance and interventions are included in the following sections.

**Early Decelerations.** An early deceleration is a visually apparent, gradual decrease in the FHR with a return to BL. The decrease from the BL is gradual (onset to nadir of 30 seconds or more), and the nadir of the deceleration occurs at the same time as the peak of the contraction. Early decelerations are a result of vagal nerve stimulation caused by fetal head compression that occurs during UCs (Figure 23–16 ◆). Early decelerations are usually uniform in shape and mirror the shape of the UC. The depth of the deceleration is rarely more than 30 to 40 bpm (AWHONN, 2003) (Figure 23–17 ◆). Early decels occur most frequently during the active phase of labor (between 4 and 7 cm dilation) and are considered benign (Cypher et al., 2003; Freeman, 2003).

![Figure 23–16 ◆ Mechanism of early deceleration (head compression).](image)


![Figure 23–17 ◆ Early decelerations. Baseline FHR is 150 to 155 bpm. Nadir (lowest point) of decelerations is 130 to 145 bpm.](image)
Early decels are not associated with loss of variability, tachycardia, or other FHR changes that are associated with fetal hypoxia, acidosis, or low Apgar scores. They are viewed as reassuring unless they are seen with the lack of descent of the fetal head into the pelvis.

**Late Decelerations.** A late deceleration is a visually apparent, gradual (onset to nadir is greater than 30 seconds) decrease in the FHR with a return to BL. The descent (onset to nadir) and the recovery of the FHR are usually smooth and uniform. The onset, nadir, and recovery of the deceleration occur after the beginning, peak, and end of the contraction, respectively.

Late decelerations, often referred to as *lates* or *late decels*, are due to uteroplacental insufficiency and are a result of decreased blood flow and/or oxygen transfer to the fetus through the intervillous space during contractions. Late decels may be one of two types: reflexive or myocardial. The pathophysiology of late decels is complicated and is not always understood (Cunningham et al., 2005; Cypher et al., 2003; Tucker, Parry, Penney et al., 2003).

When uteroplacental reserve is adequate, the fetus normally tolerates the transient stress of repetitive contractions. If a decrease in uteroplacental blood flow (for example, from maternal hypotension or excessive uterine activity) lowers the oxygen level in the intervillous space to a level lower than the oxygen level in the fetus, fetal chemoreceptors are stimulated and FHR decreases. This response to the lowered oxygen level is reflexive, because it is a normal physiological chemical response to low oxygen levels in the blood. The delay in the FHR deceleration is due to the time it takes for the normal physiological response of the neurologic system to respond to the lowered oxygen environment. This type of late decels is generally considered nonacidemic and is associated with moderate BL V AR. The BL V AR is the key to determining an intact fetal CNS and should always be considered when evaluating late decelations and the level of intervention required.

In some cases, repetitive or chronic episodes of decreased oxygen in the intervillous space exist and the fetus experiences a chronic state of hypoxia that leads to metabolic acidosis. The fetal CNS is affected by the metabolic acidosis and progresses to myocardial depression. Late decelerations are produced by the myocardial depression (Cypher et al., 2003) (Figure 23–18 ◆).

The decrease in heart rate resulting from late decelerations is usually shallow, typically 10 to 20 bpm; however, it may approach 30 to 40 bpm below the BL (Cunningham et al., 2005) (Figure 23–19 ◆). The depth of the late deceleration is usually proportional to the strength of the UC; however, late decels may be of any depth, depending on the preexisting fetal oxygen reserve. Late decelations are considered a nonassuring sign. When they are repetitive and uncorrectable and associated with minimal or absent BL V AR and/or BL rate changes, they indicate fetal hypoxia and acidemia and require prompt attention and intervention. The objective of intervention is to improve fetal oxygenation and uteroplacental perfusion while assessing and eliminating the stressor as reflected by the deceleration. If this is not possible, immediate birth may be indicated.

Sometimes late or variable decelerations are due to the supine position of the laboring woman. In this case, the decrease in uterine blood flow to the fetus may be alleviated by raising the woman’s upper trunk or turning her to the side to displace pressure of the gravid uterus on the inferior vena cava. If the woman remains flat on her back, the fetus will continue to have decelations because of oxygen compromise. Immediate nursing interventions include changing the maternal position and increasing the administration of intravenous fluids. Oxygen should be provided to the mother via face mask if hypoxia is suspected, such as when there is absent or minimal variability. If oxytocin (Pitocin) is being administered, the infusion should be stopped immediately until the FHR recovers or the physician or CNM has instructed that the infusion be resumed. The physician or CNM should be notified immediately in the event that late decelerations occur.

Late decelations normally occur within the normal heart range (110 to 160 bpm) and may be quite obvious or very subtle and almost indistinguishable. Some fetuses at highest risk demonstrate a flat FHR BL with late decelations that are barely noticeable.

**Variable Decelerations.** A variable deceleration is a visually apparent, abrupt (onset to nadir less than 30 seconds) decrease in the FHR below the BL. The decrease in FHR is 15 bpm or more with a duration of 15 seconds or more but less than 2 minutes (ACOG, 2005). (See Figures 23–20 ◆ through 23–22 ◆).

**Prolonged Decelerations.** A prolonged deceleration is a visually apparent decrease in the FHR below the BL that lasts more than 2 minutes and less than 10 minutes from onset to return to BL (Figure 23–23 ◆).
Figure 23–19 ◆ Late decelerations. Baseline FHR is 130 to 148 bpm. Nadir (lowest point) of decelerations is 110 to 120 bpm. Absent variability.

Figure 23–20 ◆ Variable decelerations with overshoot. The timing of the decelerations is variable, and most have a sharp decline. A rebound acceleration (overshoot) occurs after most of the decelerations. Baseline FHR is 115 to 130 bpm. Nadir of decelerations is 55 to 80 bpm. Variability is minimal.

Evaluation of Tracings

The effective nurse uses a systematic approach in evaluating FHR tracings to avoid interpreting findings on the basis of inadequate or erroneous data. With a systematic approach, the nurse can make a more accurate and rapid assessment; easily communicate data to the woman, physician or CNM, and staff; and have a universal language for documenting the woman’s record.
Figure 23–21 ◆ Mechanism of variable deceleration.

Figure 23–22 ◆ Atypical variable decelerations. The presence of any of these types of variable decelerations strongly suggests fetal hypoxia, especially when variability is decreased.
Evaluation of the electronic monitor tracing begins with a look at the uterine contraction pattern. To evaluate the contraction pattern, the nurse should:

1. Determine the uterine resting tone.
2. Assess the contractions:
   a. What is the frequency?
   b. What is the duration?
   c. What is the intensity (if internal monitoring)?

The next step is to evaluate the FHR tracing.

1. Determine the baseline:
   a. Is the baseline within normal range?
   b. Is there evidence of tachycardia?
   c. Is there evidence of bradycardia?
2. Determine FHR variability:
   a. Is variability absent, minimal, or moderate? Is variability minimal or marked?
3. Determine whether a sinusoidal pattern is present.
4. Determine whether there are periodic changes.
   a. Are accelerations present?
   b. Is there a reassuring tracing or FHR pattern?
   c. Are decelerations present?
   d. Are they uniform in shape? If so, determine if they are early or late decelerations.
   e. Are they nonuniform in shape? If so, determine if they are variable decelerations.

After evaluating the FHR tracing for the factors just listed, the nurse may further 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:

- BL rate is 110 to 160 bpm.
- Variability is present and ranges more than 2 cycles per minute.
- Periodic patterns consist of accelerations with fetal movement, and early decelerations may be present.
- No late, variable, or prolonged decelerations.

Nonreassuring patterns indicate that the fetus is becoming stressed and intervention is needed. Characteristics of nonreassuring patterns include the following:

- Variable decelerations (FHR drops below 70 bpm for longer than 30 to 45 seconds and is accompanied by rising BL or decreasing variability.)
- Late decelerations of any magnitude
- Absence of variability
- Prolonged deceleration (Deceleration lasts greater than 2 minutes but less than 10 minutes.)
- Severe (marked) bradycardia (FHR BL is 70 bpm or less.)

Nonreassuring patterns may require continuous monitoring and more involved treatment and intervention.
It is important to provide information to the laboring woman regarding the FHR pattern and the interventions that will help her fetus. Sharing information with the laboring woman reassures her that a potential or actual problem has been identified and that she is an active participant in the interventions. Occasionally, a problem arises that requires immediate intervention. In that case, the nurse can 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, the nurse must not forget that it is the woman’s body and her baby.

Labor and birth nurses must be skilled and competent in evaluating electronic FHR patterns and responding appropriately (Table 23–7). Competence can be maintained through frequent in-services, formal courses, and continuing education programs.

**INDIRECT METHODS OF FETAL ASSESSMENT**

When there is a question regarding fetal status, indirect methods such as **scalp stimulation** (pressing on the fetal scalp with the examining fingers during a vaginal exam to elicit an acceleration of FHR), **acoustic stimulation** (using a sound device placed against the maternal abdomen to elicit an acceleration in FHR),
or stimulation by maternal abdominal palpation (patting or shaking the abdomen) can be used to stimulate the fetus. When one of the indirect methods is used, the fetus who is not in any stress responds with an acceleration of the FHR, described as a reactive response (acceleration of 15 bpm amplitude with a duration of 15 seconds). Whereas reactivity is associated with fetal well-being, the absence of acceleration does not diagnose acidemia or predict fetal compromise. Further observation and assessment measures are indicated.

**Scalp Stimulation**

Scalp stimulation is the use of direct stimulation to the fetal scalp in utero to elicit an acceleration when auscultating or when interpreting a nonreassuring EFM pattern. Scalp stimulation is accomplished by applying direct digital pressure to the fetal scalp during a vaginal examination. It is considered an indirect method of assessing fetal acid-base balance when the FHR pattern does not show accelerations. Uncompromised fetuses with adequate oxygen reserve will eliciting an acceleration of at least 15 bpm for 15 seconds. If the fetus is able to generate an acceleration, it is not acidotic.

**Cord Blood Analysis at Birth**

In cases in which significant abnormal FHR patterns have been noted before birth, amniotic fluid is meconium stained, or the infant is depressed at birth, umbilical cord blood may be analyzed immediately after birth to assess the infant’s respiratory status. The cord is usually clamped before the infant takes his or her first breath to provide an evaluation of blood gas status before the infant interacts with the extraterine environment, because values can change after only a few seconds of neonatal breathing.

An 8- to 10-inch segment of the umbilical cord is double-clamped and cut, and a small amount of blood is aspirated from one of the umbilical arteries (arterial blood seems to provide the most reliable indication of blood gas status and fetal tissue pH).
Blood is collected in a heparinized syringe unless it is to be analyzed immediately; it should not be allowed to remain in the segment of cord longer than 30 minutes. Some clinicians may collect a segment of cord and send blood samples only if the Apgar score is below 7 at 5 minutes, as recommended by the AAP and ACOG (2002). In this instance, values might be used to clarify the cause of a low Apgar score while minimizing any medical-legal exposure and expense. Determination of pH and base deficit values can differentiate whether fetal acidemia is due to hypoperfusion of the placenta or to cord compression.

CHAPTER REVIEW

FOCUS YOUR STUDY

• Intrapartal assessment includes attention to both physical and psychosociocultural parameters of the laboring woman, assessment of the fetus, and ongoing assessment for conditions that place the woman and her fetus at an increased risk.

• Birthing room nurses have responsibilities for recognizing and interrupting fetal monitoring patterns, notifying the physician or CNM of problems, and initiating corrective and supportive measures when needed.

• Uterine contractions may be assessed externally through palpation or by an electronic monitor. An intrauterine pressure catheter can be placed internally to measure uterine activity more accurately.

• A vaginal examination determines the status of cervical dilatation, effacement, and fetal presentation, position, and station.

• Fetal presentation can also be assessed by inspection, vaginal examination, or ultrasound.

• Leopold’s maneuvers provide a systematic evaluation of fetal presentation and position.

• Indications for electronic fetal monitoring include fetal, maternal, and uterine factors; presence of pregnancy complications; regional anesthesia; and elective monitoring.

• The fetal heart rate may be assessed by auscultation or electronic fetal monitoring.

• Electronic fetal monitoring is accomplished by indirect ultrasound or by direct methods that require the placement of a spiral electrode on the fetal presenting part.

• Variability refers to baseline fluctuations of 2 cycles per minute or greater in the FHR and it is classified by the visually quantified amplitude of peak-to-trough in beats per minute.

• The normal range of FHR is 110 to 160 beats per minute.

• Baseline changes in the FHR include tachycardia, bradycardia, and variability.

• Tachycardia is defined as a rate of 160 beats per minute or more for at least a 10-minute segment of time.

• Bradycardia is defined as a rate of 110 beats per minute or less for at least a 10-minute segment of time.

• Baseline variability is an important parameter of fetal well-being.

• Periodic changes in the FHR from baseline include decelerations and accelerations. Accelerations are normally caused by fetal movement.

• Decelerations are categorized as early, late, or variable according to the NICHD categories.

• Early decelerations are due to compression of the fetal head during contractions and are generally considered benign when they occur with ongoing fetal descent. They typically do not require intervention.

• Late decelerations are associated with uteroplacental insufficiency.

• Variable decelerations are associated with compression of the umbilical cord.

• Sinusoidal patterns are characterized by an undulant sine wave.

• Fetal scalp stimulation can be used when there is a question regarding fetal status.
NCLEX review questions, case studies, and other interactive resources for this chapter can be found on the Web Site at http://www.prenhall.com/davidson. Click on “Chapter 23” to select the activities for this chapter.

For tutorials including animations and videos, more NCLEX review questions, and an audio glossary, access the accompanying Prentice Hall Nursing MediaLink DVD-ROM in this book.

**CRITICAL THINKING IN ACTION**

**BENEFITS OF AMBULATION DURING LABOR**

View the Critical Thinking in Action video for Chapter 23.

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 before 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, and 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 to 147 with accelerations to 156; no decelerations are noted. Contractions are 5 to 6 minutes apart, moderate intensity, and lasting 40 to 50 seconds. Cindy states that 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?