Thomas was born 8 hours ago at 40 weeks’ gestation to a 34-year-old married primipara. His mother had ongoing prenatal care and experienced no complications during pregnancy, labour, or birth. Upon entering the room during a routine assessment, the nurse finds Thomas lying on the bed, clothed in a shirt and diaper. His mother sits in the bed next to him. As the nurse begins to take vital signs, Thomas has a small emesis of breast milk. He gags and coughs; mucus comes through his nose. His mother is visibly upset. “What is happening?” she asks, worriedly. “Is he choking?”

William is a full-term newborn whose parents have chosen to circumcise. The nurse is providing the parents with instructions about the procedure. William’s father seems concerned about how the circumcision will be done and the pain the baby will experience. He tells the nurse that he thinks it is important that he and his son are physically similar, but he feels bad about causing his child to experience any trauma. The same nurse is providing care before, during, and after the procedure.

You will learn more about these clients as the chapter progresses. Nurses working with these and similar families need to understand the material in this chapter to manage care effectively and address issues appropriately. Before beginning, consider the following points related to the above scenarios:

- How should the nurse individualize care to ensure that each family’s needs are met—not only in terms of physical care, but also in terms of emotional and psychological care?
- What factors may be contributing to parental behaviour and reactions in these scenarios?
- Is there need for any additional assessment data or questions?
- What teaching might be appropriate for each family?
- What other health care personnel might assist in these scenarios?
LEARNING OBJECTIVES

On completion of this chapter, the reader should be able to:

● Identify the major differences between fetal circulation and newborn circulation.
● List three cardiopulmonary changes that must occur at birth for successful extrauterine transition.
● Discuss immediate nursing interventions at birth for active and healthy full-term newborns who are breathing and have pink mucous membranes.
● Describe appropriate calculation and use of Apgar scores.
● Identify signs of abnormal newborn transition.
● Describe collaborative strategies to promote normal newborn transition.
● Discuss the relationship between birthweight and gestational age.
● Describe normal and abnormal physical examination findings in newborns.
● Discuss four types of heat loss in newborns and preventive interventions for each.
● Identify two classifications of newborns at risk for hypoglycemia and six signs of neonatal hypoglycemia.
● Explain why most healthy full-term newborns experience jaundice in the first week of life.
● Explain why newborns are susceptible to infection.
● Identify infant behavioural states and cues.
● Identify risk factors for Sudden Infant Death Syndrome (SIDS).
● Describe an approach for assessing cultural differences in newborn care.
● List newborn care topics for parent education.

KEY TERMS

acid mantle meconium-stained amniotic fluid
acrocyanosis nasal flaring
Apgar score neutral thermal environment
apnea nonshivering thermogenesis
approach cues occipital–frontal circumference
appropriate for gestational age (AGA) periodic breathing
avoidance cues petechiae
Ballard Gestational Age Assessment Tool phototherapy
bilirubin physiologic jaundice
bradycardia pink
brick dust spots plethoric
brown adipose tissue postterm
circumcision preterm, premature
circumoral cyanosis pseudomenses/pseudomenstruation
cyanotic radiant warmer
ductus arteriosus retributions
foramen ovale small for gestational age (SGA)
free-flow oxygen Sudden Infant Death Syndrome (SIDS)
functional residual capacity surfactant
grunting tachycardia
hypoglycemia tachypnea
hypoxemia term
hypoxia total bilirubin
indirect (conjugated) bilirubin unconjugated bilirubin
jaundice vagal reflex
lanugo vernix caseosa
large for gestational age (LGA) very low birthweight (VLBW)
low birthweight (LBW) witch’s milk
meconium
The birth of a baby is a significant life event influenced by cultural norms and expectations. Nurses responsible for newborn care need to balance the expectations of the new mother and her family with astute assessment and timely interventions.

Nursing care for newborns begins with critical examination of the maternal prenatal and intrapartal history. At birth, the nurse assesses the newborn’s well-being and ensures that critical extrauterine adaptations are happening. During the complete physical examination, the nurse should distinguish normal findings and variations from abnormalities. He or she evaluates the newborn continuously thereafter, taking every opportunity to monitor how the infant’s condition, as well as teaching the parents how to care for their baby and appreciate his or her amazing innate abilities.

**QUOTE 20–1**

“It’s an incredible honour to be present at the birth of a new baby. The family always thanks me for being there, but I feel like I am the one who should be thanking them.”

*From a neonatal nurse*

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**FROM FETUS TO NEWBORN**

The newborn’s cry signifies the beginning of life outside the womb. New mothers, their families, and health care providers of all cultures eagerly anticipate this cry as an initial signal of wellness. The more complex mechanics underlying a successful transition from intrauterine to extrauterine life are discussed below. Knowledge of them provides a foundation for understanding the principles of neonatal resuscitation and anticipating abnormalities.

**Review of Fetal Circulation**

To understand newborn pulmonary physiology, the nurse needs to appreciate the differences between fetal circulation and extrauterine circulation. In Chapter 11 we discuss and illustrate details of fetal anatomy and physiology. The next paragraphs provide a quick review.

In utero, the placenta acts as a low-resistance circulatory pathway for gas exchange. The fetal lungs do not oxygenate tissues or excrete carbon dioxide; they are not filled with air, but with fluid consisting of secretions from the alveolar epithelium. The blood vessels that perfuse the fetal lungs are tightly constricted.

Two shunts (detours) within the fetal heart are essential to fetal circulation (see Chap. 11, Fig. 11-12). The **foramen ovale** and **ductus arteriosus** divert oxygenated blood away from the fetal lungs to the brain and other vital organs. The foramen ovale allows blood to pump directly from the right to the left ventricle. The ductus arteriosus connects the pulmonary artery and descending aorta, causing most of the blood to detour the fetal lungs (Blackburn, 2007).

The fetal lungs maintain a state of pulmonary arterial vasoconstriction. The small amount of relatively hypoxic blood that reaches the fetal lungs helps maintain this constricted state. In addition, fetal pulmonary arteries have smaller lumens and more muscle mass than adult pulmonary arteries, limiting blood flow through them. As the fetus matures, these blood vessels prepare for extrauterine life by becoming increasingly reactive to changes in oxygenation and acid–base levels (Blackburn, 2007).

Finally, resistance to blood flow is different in the fetal pulmonary blood vessels. Blood flows most easily from areas of high pressure to areas of low pressure. Fetal circulation functions so that the high pulmonary vascular resistance in the lungs encourages blood to bypass them and shunt from the right side of the heart to the left. The blood passes through the foramen ovale and ductus arteriosus to the fetal aorta and returns to the low-pressure placenta for gas exchange. In contrast, adult pulmonary vascular resistance is low to permit easy blood circulation from the pulmonary arteries into the lungs. In the adult, systemic vascular resistance is fairly high, allowing the aorta to distribute oxygenated blood throughout the body (Blackburn, 2007).

**Respiratory and Circulatory Transitions at Birth**

The fetal system of high pulmonary vascular resistance and low aortic systemic vascular resistance allows the placenta to be a low-resistance medium for gas exchange, which works well for the fetus. Critical transitions must occur within moments of birth, however, if transition to extrauterine life is to be successful (Fig. 20.1). If all goes correctly, three critical changes happen:

- **Respiration begins and continues effectively.**
- **Fluid is cleared from the airways.**
- **Systemic vascular resistance increases, shunts close, and blood circulates through the lungs** (Blackburn, 2007; Hernandez-Diaz et al., 2007; Kattwinkel, 2006.)

**Respiration**

Several factors induce respiration. During vaginal birth, the maternal birth canal compresses the fetal chest. As the chest emerges, the thorax recoils, and air is sucked into the lung fields. Additionally, clamping of the umbilical cord affects chemoreceptors sensitive to changes in arterial oxygen and carbon dioxide content, contributing to the onset of respirations.

Temperature also is influential. The sudden cooling of the wet newborn as he or she emerges from the warm intrauterine environment causes sensory receptors in the skin to transmit impulses to the respiratory centre (Blackburn, 2007). Finally, normal handling and drying of the newborn stimulates respirations; however, tactile stimulation does not always induce respirations in a newborn compromised at birth (Kattwinkel, 2006).
Clear Airways

First breaths must be strong enough to move the thick fluids that fill the fetal airway from the trachea to the terminal air sacs. Fetal lungs hold approximately 10 to 30 mL of fluid/kg of fetal body weight. Thus, the lungs of a newborn weighing 3000 g hold approximately 30 to 90 mL of fluid (Blackburn, 2007).

Fortunately, production of fetal lung fluid begins to decrease before labour begins (Blackburn, 2007). Release of catecholamines is associated with labour and may stimulate the lungs to stop secreting fluid (Askin, 2002), so that the baby must clear only a fraction of the original lung fluid volume at birth (Blackburn, 2007). In those cases in which the mother does not experience labour and exposure to catecholamines, the newborn is at risk for retaining lung fluid and developing transient tachypnea (Askin, 2002; Polin & Fox, 2004) (see Chap. 22).

For breathing to begin, liquid in the lungs must be replaced with an equal volume of air, and functional residual capacity must be established (Blackburn, 2007). This means that the newborn’s first breaths must be deep enough to displace the liquid in the airways and retain some air in the alveoli so that subsequent breaths are less difficult. A fatty substance acts as a surfactant and causes retention of air in the lungs, decreasing surface tension at the air–liquid interface (Blackburn, 2007). The surfactant consists of phospholipids and proteins produced by type II cells in the lining of the alveoli and secreted onto the alveolar surface. This surfactant is essential to normal lung function because it allows the alveoli to remain open instead of collapsing completely during exhalation. By 28 to 32 weeks’ gestation, the number of type II cells increases. Surfactant production peaks at about 35 weeks’ gestation. By 32 weeks, 60% of fetuses have adequate surfactant to support extrauterine respiration. Surfactant deficiency results in respiratory distress syndrome (Blackburn, 2007) (see Chap. 22).

With the first few breaths, alveolar fluid is absorbed into the lung tissue and the alveoli fill with air. The lymphatic system reabsorbs 10% to 20% of the lung fluid.
Aeration and increased oxygen tension increase alveolar blood flow and the capillaries’ ability to remove fluid. When these systems work efficiently, they disperse lung fluid in the first few hours after birth (Blackburn, 2007). This explains why newborns have audible crackles for a short time after birth. Residual air is retained in the lungs from the early breaths; within 1 hour after birth, 80% to 90% of functional residual capacity is created (Blackburn, 2007).

### Blood Circulation

Clamping of the umbilical cord shuts off the placental circuit and causes rapid changes in pulmonary vascular resistance and systemic vascular resistance. The low-resistance pathway removed, systemic vascular resistance increases. Other contributors include increased arterial blood volume, because the blood that previously had a placenta to return remains in the vascular system (Blackburn, 2007).

This increased systemic vascular resistance reduces right-to-left shunting and sends blood through the lungs rather than allowing it to detour through the foramen ovale and ductus arteriosus. The foramen ovale closes and seals as changes in circulatory pressures reduce pressure on the right side of the heart and increase pressure on the left side. Rising oxygen levels cause the other fetal shunt, the ductus arteriosus, to begin to constrict almost immediately after birth of a healthy newborn. In most cases, the ductus arteriosus is functionally closed by 96 hours of life; full anatomic closure with formation of a fibrous strand known as the ligamentum arteriosus is complete within 2 to 3 months (Blackburn, 2007). The ductus can reopen, however, in response to hypoxia (abnormally low oxygen concentration in tissues) or increased pulmonary vascular resistance. This return to fetal circulation, called pulmonary hypertension, results in a dangerous cycle of hypoxia and pulmonary vasoconstriction (Fig. 20.2). Thus, attaining and maintaining adequate ventilation and oxygenation in newborns and avoiding procedures that cause hypoxia, such as deep suctioning, are important concerns (see Chap. 22).

With gaseous distention and increased oxygen in the alveoli, the pulmonary blood vessels begin to dilate and relax. Vasodilation of these arterial vessels decreases pulmonary vascular resistance in the newborn by nearly 80%, which increases blood flow through the lungs and minimizes blood flow through the fetal shunts (Blackburn, 2007). Adequate oxygen is now available from the lungs.

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**FIGURE 20.2 Cycle of inadequate ventilation/oxygenation at or shortly after birth. PVR, pulmonary vascular resistance; SVR, system vascular resistance. (From Lockridge, T. [1999]. Persistent pulmonary hypertension of the newborn. *Mother Baby Journal, 4*(2), 23.)**
and enters the bloodstream. As the baby continues to take deep breaths, adequate oxygen moves from the lungs into the bloodstream. The baby changes from a grey-blue colour to pink. Note that this chapter uses the term pink to denote adequate oxygenation and perfusion for newborns of all racial and ethnic backgrounds. In newborns with dark complexions, pink mucous membranes (lips, tongues, and gums) denote adequate oxygenation and perfusion. In light-skinned newborns, providers assess the colour of the face, trunk, and mucous membranes.

**IMMEDIATE NURSING MANAGEMENT OF THE NEWBORN**

**QUOTE 20-2**

“I never realized how much in love I would be with my baby.”

*From a new mother*

Most pregnancies result in the birth of a healthy, full-term newborn who requires little assistance from health care personnel. Nevertheless, nurses must be prepared for any deviation from normal. Nursing actions in a compromised newborn’s first moments can have lifetime consequences (Kattwinkel, 2006). Therefore, nurses who attend births and are responsible for newborn resuscitation and admission need to assess prenatal and intrapartal history to determine risk factors for receiving a compromised newborn, ensure that all equipment for resuscitation and admission is available and working, possess skills and knowledge for competent assessment and intervention, and communicate with colleagues and the newborn’s family to ensure that the plan of care incorporates any special circumstances.

**Prenatal and Intrapartal History**

The nurse responsible for newborn admission should assess the prenatal and intrapartal history for any risk factors. Many maternal conditions can influence the course of labour and birth, the initial transition period, and beyond (Box 20.1). After the nurse checks the history, he or she should know whether to prepare for admission of a healthy newborn or to anticipate complications that will require interventions to stabilize an at-risk or sick newborn.

**Preparedness for Resuscitation**

At least 90% of newborns make a smooth extrauterine transition; approximately 10% need some assistance to begin breathing; rarely, 1% require complex resuscitation procedures to survive (American Heart Association, 2006). Although the need for resuscitation is usually evident before birth, a newborn may require resuscitation for an unanticipated reason. Therefore, all equipment necessary for complete resuscitation must be available and operational at all births. Supplies should be visible and

**Box 1 Risk Factors Associated With the Need for Neonatal Resuscitation**

<table>
<thead>
<tr>
<th>Antepartal Factors</th>
<th>Intrapartal Factors</th>
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<tbody>
<tr>
<td>Maternal diabetes</td>
<td>Emergency cesarean section</td>
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<tr>
<td>Pre-eclampsia</td>
<td>Forceps or vacuum-assisted delivery</td>
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<tr>
<td>Chronic hypertension</td>
<td>Breech or other abnormal presentation</td>
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<tr>
<td>Fetal anemia or isoimmunization</td>
<td>Premature labour</td>
</tr>
<tr>
<td>Previous fetal or neonatal death</td>
<td>Precipitous labour</td>
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<tr>
<td>Bleeding in second or third trimester</td>
<td>Chorioamnionitis</td>
</tr>
<tr>
<td>Maternal infection</td>
<td>Prolonged rupture of membranes (more than 18 hours before delivery)</td>
</tr>
<tr>
<td>Maternal cardiac, renal, pulmonary, thyroid, or neurologic disease</td>
<td>Prolonged labour (more than 24 hours)</td>
</tr>
<tr>
<td>Polyhydramnios</td>
<td>Prolonged second stage of labour (more than 2 hours)</td>
</tr>
<tr>
<td>Oligohydramnios</td>
<td>Fetal bradycardia</td>
</tr>
<tr>
<td>Premature rupture of membranes</td>
<td>Nonreassuring fetal heart rate patterns</td>
</tr>
<tr>
<td>Fetal hydrops</td>
<td>Use of general anesthesia</td>
</tr>
<tr>
<td>Postterm gestation</td>
<td>Uterine tetany</td>
</tr>
<tr>
<td>Multiple gestation</td>
<td>Narcotics administered to mother within 4 hours of delivery</td>
</tr>
<tr>
<td>Size–date discrepancy</td>
<td>Meconium-stained amniotic fluid</td>
</tr>
<tr>
<td>Drug therapy (eg, magnesium, adrenergic-blocking drugs)</td>
<td>Prolapsed cord</td>
</tr>
<tr>
<td>Maternal substance abuse</td>
<td>Abruptio placentae</td>
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<tr>
<td>Fetal malformation or anomalies</td>
<td>Placenta previa</td>
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<tr>
<td>Diminished fetal activity</td>
<td></td>
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<tr>
<td>No prenatal care</td>
<td></td>
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<tr>
<td>Age younger than 16 years or older than 35 years</td>
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</table>

arranged identically in every room to ensure that any member of the resuscitation team can always find them in the same location (Zaichkin, 2006).

Ideally, every birth is attended by at least one person whose primary responsibility is the baby and who is capable of initiating resuscitation. Either that person or someone else who is immediately available should have the skills required to perform a complete resuscitation (Assessment Tool 20.1). This means that the person designated to attend the newborn has no other responsibil-

**ASSESSMENT TOOL 20.1 ???**

- **Birth**
  - Term gestation?
  - Clear amniotic fluid?
  - Breathing or crying?
  - Good muscle tone?

- **Routine Care**
  - Provide warmth
  - Clear airway (as necessary)
  - Dry
  - Assess colour at 90 seconds of age

- **Assessment**
  - Breathing, HR >100 & Pink

- **Observational care**
  - Cyanotic

- **Evaluate respirations, heart rate, and colour**

- **Persistent cyanotic**
  - Give supplemental oxygen IF >90 seconds of age

- **Provide positive-pressure ventilation* with 21% oxygen if <90 seconds of age OR supplemental oxygen if >90 seconds of age**

- **Post-resuscitation care**
  - Recheck the effectiveness of
    - Ventilation
    - Chest compressions
    - Endotracheal intubation
    - Epinephrine delivery
    - Consider possibility of
    - Hypovolemia

- **Endotracheal intubation may be considered at several steps.**

- **Drying the skin does not apply for babies <28 weeks; these babies should be placed wet into a food-grade polyethylene bag below the neck.**

- **Evaluate respirations, heart rate and colour every 30 seconds.**
ities at this time, is capable of assessing the need for resuscitation, and can competently perform initial steps of resuscitation, bag-and-mask ventilation, and chest compressions. If complex resuscitation is necessary, someone who is competent to perform procedures such as endotracheal intubation or medication administration should be available immediately (Kattwinkel, 2006).

If a high-risk birth is anticipated, the nurse should follow the health care facility’s protocol for assembling a team of skilled resuscitation providers to attend the birth. Team composition varies, but may include a pediatrician, neonatologist, neonatal nurse practitioner, respiratory therapist, and neonatal nurses.

Assessment During the First Moments After Birth

The nurse assigned to care for the newborn should begin assessment as soon as the baby emerges. Although most newborns require no assistance to begin breathing, the newborn admission nurse needs to assess each baby in the first seconds and decide if he or she requires assistance (Kattwinkel, 2006).

The nurse should ask four questions to assess the need for intervention:

1. Is the amniotic fluid clear of meconium (the newborn’s first stool)? In some instances, such as fetal distress or breech birth, this thick, dark-green substance is released during labour. Meconium can enter the fetal airways in utero and be aspirated with the newborn’s first breath. If meconium is in the amniotic fluid or on the skin and the newborn is not breathing and active, special handling and airway suctioning are necessary to prevent life-threatening airway complications (Kattwinkel, 2006) (see Chap. 22).
2. Is the baby breathing or crying?
3. Is the baby demonstrating some muscle tone (flexed position)?
4. Is the baby full term (38 to 42 weeks’ gestation)?

If the answer to any of these questions is “no,” the nurse should quickly move the baby to the radiant warmer for initial steps of resuscitation. A radiant warmer is a mattress on a cart, with a heat source above it, used to warm the newborn or to prevent cooling during procedures that require exposure (Fig. 20.3). The nurse places the infant supine with the head in “sniffing position,” the optimal position for opening the airway, and uses a bulb syringe to clear the mouth first, then the nose (wall suction is usually reserved for intubation or prolonged resuscitation). Then the nurse dries the newborn with a towel, removes the wet linen, and places the baby supine with the head in “sniffing position.” He or she should assess respiratory efforts, heart rate, and colour. If the newborn is breathing and has a heart rate of greater than 100 beats per minute (bpm) but remains dusky or cyanotic after 90 seconds, the nurse should direct free-flow oxygen to the nose and mouth. This type of oxygen is higher than 21% and blows passively through oxygen tubing, an oxygen mask, or the mask of a flow-inflating oxygen bag. If the baby becomes and stays pink without supplemental oxygen and shows no signs of respiratory distress, the nurse may return him or her to the mother and family members. A newborn who simply requires tactile stimulation and a few moments of free-flow oxygen is considered healthy but receives observational care, which entails more frequent assessment and closer monitoring than a newborn who requires minimal intervention and receives routine care (Kattwinkel, 2006).

If the baby does not respond to oxygen by turning pink, turns blue without supplemental oxygen, remains limp, or displays signs of respiratory distress, the nurse should keep the newborn under the radiant warmer for further evaluation and stabilization. If the baby is not breathing after suctioning, drying, and repositioning, the nurse should begin bag-and-mask ventilation. Most babies begin to breathe spontaneously within 30 seconds of bag-and-mask ventilation. If assessment at this point reveals apnea (no breathing for 20 seconds or more) or heart rate below 100 bpm, the nurse should provide bag-and-mask ventilation with supplemental oxygen. He or she may wish to activate the emergency response system to assemble additional members of a resuscitation team, especially if the heart rate is below 60 bpm and chest compressions are needed. At this point, complex resuscitation is under way, and the newborn is not considered healthy. Any newborn needing bag-and-mask ventilation or more complex interventions requires...
post-resuscitation care and a closely monitored transition in a special care nursery setting (Canadian Paediatric Society [CPS], 2007a) (see Chap. 22).

If the answers to all four of the above questions are “yes,” the newborn requires little nursing assistance. Most mothers welcome their babies onto their chest or abdomen, where a health care provider positions the newborn prone to help drain any remaining fluids from the mouth and nose. If the baby is not making gurgling sounds or draining fluid from the nose or mouth, repeated suctioning is unnecessary. Deep suction, by placing the tip of the bulb syringe deep in the throat or using a suction catheter, may elicit a gag and **vagal reflex.** This leads to apnea, **bradycardia** (heart rate less than 100 bpm), and resulting hypoxia, which unnecessarily complicates the baby’s transition. All that is required is to ensure that the newborn’s airway is clear by suctioning with a bulb syringe the mouth first and then the nose, or wiping both clear with a towel (Kattwinkel, 2006) (Fig. 20.4).

The nurse dries the baby as thoroughly as possible to prevent further heat loss and remove birth fluids. A towel is usually more efficient for drying than a baby blanket (Zaichkin, 2006). Hospital towels and blankets for newborn care need not be sterile but should be dry.

**Vaginal Birth**

A newborn doing well following vaginal birth requires only routine care (Kattwinkel, 2006). The nurse should provide warmth, clear the airway, and dry the baby quickly and thoroughly. Unless the mother has emergent medical needs or requests otherwise, there is no reason to separate her from her healthy newborn. A policy of taking a healthy newborn immediately to a radiant warmer or other location for observation and admission is outmoded and hinders attachment. The nurse can place the baby directly on the mother’s abdomen or chest, covering both with a dry, warm blanket. Skin-to-skin contact will maintain warmth (Kattwinkel, 2006).

**Cesarean Birth**

The nurse follows the same resuscitation and admission procedures in cases of cesarean birth. He or she should immediately receive the newborn at the radiant warmer and suction, dry, and position the baby for further assessment. If the newborn requires no special care, the father or birth partner may use warm blankets to hold and show the newborn to the mother (Fig. 20.5).

**Apgar Scoring**

While handling the newborn and assessing progress in the first minute of life, the nurse also assesses the 1-minute **Apgar score** (Assessment Tool 20.2). Created by anaesthesiologist Virginia Apgar in 1952, the Apgar score has become the standard of practice for assessing and documenting the infant’s response to birth (Apgar, 1953). In 1962, the acronym APGAR was proposed to recall the components of the scoring system (Butterfield, 1962):

- **A:** Appearance (colour)
- **P:** Pulse (heart rate)
● **G:** Grimace (reflex irritability)
● **A:** Activity (muscle tone)
● **R:** Respiration (respiratory effort)

Each component is assigned a value of 0, 1, or 2; the five numbers are then added. Scoring is done at 1 minute and 5 minutes after birth. To help ensure accuracy, scoring should occur at the 1-minute and 5-minute marks, not retrospectively (Apgar, 1966). The Apgar score does not determine resuscitation efforts; therefore, resuscitative efforts are not delayed while waiting for the 1-minute Apgar to be determined. If the newborn does not attain a 5-minute score of at least 7, additional scores are assigned every 5 minutes up to 20 minutes (Kattwinkel, 2006).

Because Apgar scoring should be objective, Dr. Apgar suggested that an impartial observer, not the delivering practitioner, assign the scores (Apgar, 1966). In most cases, the person responsible for newborn resuscitation and admission assigns the Apgar scores of a healthy newborn. If the newborn requires resuscitation, a collaborative effort from all resuscitation team members, in conjunction with narrative documentation of interventions and their timing, ensures an accurate record of events.

Most healthy full-term newborns receive 1-minute scores of 7 to 9 and 5-minute scores of 8 or 9. Because pink hands and feet are rare in the first few minutes of life, a perfect score of 10 is unusual.

New criteria appear on the revised and expanded Apgar chart introduced by the American Academy of Pediatrics (AAP) and American College of Obstetricians and Gynecologists (ACOG) in 2006. The criteria allow for the different responses expected at birth from a preterm newborn or a baby requiring resuscitation, and more accurately describe the newborn’s responses resulting from a resuscitation intervention (AAP & ACOG, 2006, CPS 2007c).

The Apgar score alone is not sufficient evidence on which to predict neurologic outcomes in term newborns. The difference between 1-minute and 5-minute Apgar scores reflects the effectiveness of resuscitation efforts.

An Apgar score of 0 to 3 at 5 minutes may correlate with neonatal mortality but does not necessarily predict later neurologic dysfunction (AAP & ACOG, 2006).

Apgar scoring is standard practice and a useful tool for documenting the newborn’s responses to the extrauterine environment and resuscitation efforts. In addition to Apgar scores, complete documentation, including a narrative description of the newborn’s behaviour and responses to interventions, is essential to a complete medical record.

**ASSESSMENT TOOL 20.2 Apgar Scoring System**

<table>
<thead>
<tr>
<th>Sign</th>
<th>Score 0</th>
<th>Score 1</th>
<th>Score 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Blue or pale</td>
<td>Acrocyanotic</td>
<td>Completely pink</td>
</tr>
<tr>
<td>Heart rate</td>
<td>Absent</td>
<td>Slow (&lt;100 bpm)</td>
<td>≥ 100 bpm</td>
</tr>
<tr>
<td>Reflex irritability</td>
<td>No response</td>
<td>Grimace</td>
<td>Cry or active withdrawal</td>
</tr>
<tr>
<td>Muscle tone</td>
<td>Limp</td>
<td>Some flexion</td>
<td>Active motion</td>
</tr>
<tr>
<td>Respiration</td>
<td>Absent</td>
<td>Weak cry: hypoventilation</td>
<td>Cry or active withdrawal</td>
</tr>
</tbody>
</table>


Recall Thomas, the 8-hour-old newborn described at the beginning of the chapter. Suppose he had an Apgar score of 5 at 1 minute and 6 at 5 minutes. How would the nurse proceed?

**COLLABORATIVE CARE: IMMEDIATE NEWBORN CARE**

The team responsible for the newborn needs to ensure that the plan of care is clear and agreed upon before birth and well in advance of the final moments of labour. The nurse who has been involved in maternal intrapartum care and who shifts her responsibilities to the newborn should already have assessed family preferences for involvement in the first few minutes after birth. The nurse assigned to perform newborn admission may need to clarify the plan with the family and the labour and delivery team; he or she should check the prenatal and intrapartal history and clarify any risk factors. The newborn admission nurse usually asks the labour nurse if there are any new risk factors with implications for the newborn, such as abnormalities in fetal heart rate, meconium staining, maternal fever, prolonged rupture of membranes, or recent maternal narcotic administration.

Family preferences may include the partner’s wish to cut the umbilical cord, the mother’s preference to re-
ceive the newborn on her chest immediately after birth, or the family’s desire to wait to hold the baby until he or she has been dried. A client giving her newborn to an adoptive family may have specific wishes about seeing and holding the baby. The nurse should ask the family about cultural or spiritual beliefs that influence admission procedures and adapt routine policies to accommodate reasonable requests. The nurse’s responsibility to facilitate integration of the newborn into the family begins immediately at birth; however, if the newborn requires resuscitation or intervention, nursing and medical care take precedence. Following such an emergency, the nurse should make sure to include the mother and support partners in the newborn’s plan of care.

Assessment
At birth, the nurse should assess many parameters simultaneously (Kattwinkel, 2006):

- Any meconium on the newborn’s skin
- Breathing
- Muscle tone
- Heart rate (by palpating the umbilical pulse)
- Reflex irritability (grimacing response to bulb suction or gagging on mucus)
- Approximate gestational age
- Colour

The experienced neonatal nurse also assesses approximate weight and, by doing so, compares it to expected gestational age. If the newborn appears smaller or larger than average, the nurse should be prepared to address risk factors requiring immediate intervention, before a complete physical examination. He or she also should quickly inspect the baby, scanning for unusual variances or congenital anomalies that might interfere with normal transition.

Select Potential Nursing Diagnosis
The following nursing diagnosis may be appropriate during the first few moments after birth:

- **Ineffective Breathing Pattern** related to obstructed airway, neuromuscular immaturity, perinatal compromise, or physiologic inability to transition to extra-uterine circulation.

Planning/Intervention
The nurse ensures that the baby’s airway is clear and dries fluids from the skin. The following findings and interventions may be appropriate:

- Breathing but not pink—provide free-flow oxygen.
- Limp or having acute respiratory distress—take the infant to a radiant warmer for more thorough assessment, remembering that ventilation is the most important intervention.

Evaluation
The healthy newborn is term, pink, and active and has minimal signs of respiratory distress soon after birth.

**EARLY NEWBORN CARE PROCEDURES**

The first hours after a baby’s birth are busy for perinatal and neonatal staff. The timing of procedures varies with institutional protocols and family preferences.

Identification
Identical identification bands are written for mother and newborn with information including the mother’s hospital number, the baby’s sex, and the date and time of birth. For multiple births, each baby’s band denotes birth order; for example, “Twin A” signifies the firstborn of twins. Another team member present in the delivery room verifies the accuracy of information printed on the bands. The nurse places one band on the mother’s wrist and usually one on the newborn’s wrist and ankle. Banding the mother and newborn must occur before separating them for any reason. Each time the newborn is reunited with the mother, the nurse compares the identi-
UNIT 5 Postpartum Period and Newborn Care

The nurse is checking the newborn’s and mother’s identification bands to ensure a match (Fig. 20.7). This is important to avoid inadvertently giving a mother an infant who does not belong to her.

Weight
Parents and family members are usually eager to learn the newborn’s weight. The nurse should take care to obtain an accurate weight while protecting the newborn from cold and undue stress (Nursing Procedure 20.1). He or she records the weight shortly after birth (the infant may breastfeed first, if desired) and daily thereafter (AAP & ACOG, 2002).

Measurements
Measurement of length and occipital–frontal circumference is necessary to assess appropriateness of size for gestational age. Using a nonstretchable measuring tape, the nurse measures length by either of the following methods (Tappero & Honeyfield, 2003):

- Place the infant supine, with the legs extended and the infant looking straight up. Mark on the bed to indicate the crown of the head and the infant’s heel. Measure the distance between the two marks (Fig. 20.8).
- Position the infant as described above. Place the zero point of the tape measure at the heel and run it alongside the infant to the head. Mark the end spot on the tape with a finger and read the measurement.

The nurse measures occipital–frontal circumference by wrapping the tape around the infant’s head, over the occipital, parietal, and frontal prominences, avoiding the ears. He or she should measure three times and

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**NURSING PROCEDURE 20.1**

**Weighing the Newborn**

**PURPOSE**
To measure the newborn to help determine gestational age and to establish a baseline for use in evaluating growth and development

**ASSESSMENT AND PLANNING**
- Assess the newborn’s Apgar scores at 1 and 5 minutes to determine newborn’s transition to extraterine life.
- Assess the newborn’s temperature and determine whether he or she is experiencing cold stress; if so, delay the procedure until temperature stabilizes.
- Calibrate the scale if necessary.
- Explain the procedure to the parents.
- Gather the necessary equipment:
  - Calibrated scale
  - Prewarmed blanket or disposable scale covering
  - Clean gloves

**IMPLEMENTATION**
1. Wash hands and put on gloves.
2. Place prewarmed blanket or covering on scale to minimize risk for heat loss from conduction.
3. Reset the scale to zero to ensure accuracy of measurement.

**Continued**
NURSING PROCEDURE 20.1 (CONTINUED)
Weighing the Newborn

4. Place naked newborn on the covering. Position the newborn on the scale to minimize stress; keep one hand over the newborn body without touching the newborn to ensure safety.

5. Quickly note the weight.

6. Remove the newborn from the scale, and continue with care, removing gloves and washing hands when care is completed.

7. Document the weight in the newborn’s medical record.

EVALUATION

• Newborn is weighed without difficulty.
• Newborn experiences no evidence of cold stress.

AREAS FOR CONSIDERATION AND ADAPTATION

Lifespan Considerations

• Keep in mind that while the newborn remains at the facility, weights are obtained daily.
• Avoid placing the naked newborn directly on the scale’s cold surface in the supine position. The newborn is more likely to be startled, to cry and move about, interfering with obtaining an accurate weight. Additionally, placing the naked newborn on a cold surface facilitates heat loss.

Community-Based Considerations

Obtain newborn weights at each visit. Typically, parents do not have a baby scale in their home. The home care nurse needs to bring a scale to the visit.

FIGURE 20.8 To measure the newborn’s length, the nurse extends the baby’s leg and marks the pad at the heel (A) and measures from the newborn’s head to the heel mark (B).
record the largest finding (Fig. 20.9). Cranial moulding or scalp edema may affect the measurement. The nurse notes such findings in the medical record (Tappero & Honeyfield, 2003).

Chest circumference measurement is optional, but is performed in many institutions (Fig. 20.10). The nurse measures the chest circumference around the nipples during newborn expiration (Tappero & Honeyfield, 2003), making sure that, if using a paper tape, it does not stick or tear and result in an incorrect measurement. Also, the nurse should lift the infant’s torso off the mattress to remove the tape measure from the back; pulling the tape measure out from under the supine infant can result in paper cuts on the infant’s torso.

**Gestational Age Assessment**

Gestational age assessment is performed to estimate a newborn’s postconceptual age (Tappero & Honeyfield, 2003). The nurse needs to know the gestational age and the appropriate growth parameters, because neonatal risks for each classification are different. A newborn’s gestational age is not evident by assessing weight alone. An infant who weighs 1800 grams at 39 weeks’ gestation has a different set of risk factors and management interventions than an infant who weighs 1800 grams at 35 weeks’ gestation.

Gestational age can be assessed in four ways:

1. **Maternal menstrual history:** An average term pregnancy is 266 days (38 weeks after ovulation) or 280 days (40 weeks from the first day of the last menstrual period) (Blackburn, 2007). Assessing gestational age by using the date of the last ovulation or menstrual period depends on the regularity of maternal menstrual cycles. Irregular cycles, failed contraception, and inaccurate recall by the woman can affect this method (Lynch & Zhang, 2007)

2. **Ultrasound examination:** Fetal measurements are taken during pregnancy and, using standard formulae, are compared with age-specific references. Using data derived from *in vitro* fertilization, researchers determined that in 95% of pregnancies, ultrasound was accurate to within 5 days, if done in the first trimester, and to within 7 days, if done in the second trimester (Kalish et al., 2003). The main criticism of ultrasound-based dating is that it does not account for normal variability (Lynch & Zhang, 2007).

3. **Ballard assessment:** The Ballard Gestational Age Assessment Tool originated from the Dubowitz Assessment of Gestational Age (Dubowitz et al., 1970). The Dubowitz scale consists of 11 external physical characteristics and 10 neurologic signs. Ballard and colleagues (1979) simplified the Dubowitz tool using six physical and six neuromuscular criteria. Studies have shown that, in general, these scales overestimate the gestation of infants born at less than 40 weeks, with a range of 2 weeks (Dubowitz) to 2 to 4 days (New Ballard), and underestimate the gestation when the infant is born at or past 40 weeks. In addition, the extent of the error may differ according to racial origin of the infant (Lynch & Zhang, 2007).

4. **Lens vascularity:** Used to a limited extent, this method can help determine gestational age when differences among other methods are significant. The developing lens of the eye has a vascular system that invades and nourishes the eye during fetal growth. The vascular system appears at approximately 27 weeks’ gestation and disappears after 34 weeks’ gestation. The stages of atrophy are divided into four grades according to the pattern and presence of blood vessels visualized on the eye lens with an ophthalmoscope. The grading system must be performed between 24 to 48 hours of age (Tappero & Honeyfield, 2003).

**Infant Classification**

To determine infant gestational age, the nurse can use the Ballard Gestational Age Assessment Tool according to
the directions and descriptors (Assessment Tool 20.3). After examining the newborn and scoring each criterion, the nurse adds the two scores for neuromuscular category and the physical category to obtain the total and matches the final maturity rating with the “weeks” on the same line. Instructions are unclear as to which gestational age score to assign when the total falls between those listed. It has been suggested that the gestational age that most closely approximates the maturity rating should be chosen. For example, if the maturity rating score is 23, a gestational age of 33 weeks is assigned (Tappero & Honeyfield, 2003).

Gestational age is based on the following definitions:

- A preterm or premature infant is less than 37 completed weeks’ gestation (less than 38 weeks’ gestation).

### ASSESSMENT TOOL 20.3 Ballard Scoring With Instructions

**Instructions for Use of the Ballard Gestational Age Assessment Tool**

**Neuromuscular Maturity**

*Posture* is the position the baby naturally assumes when lying quietly on his back. A very premature infant will lie with arms and legs extended in whatever posture he is placed. As intrauterine development progresses, the fetus is capable of more and more flexion. When born at term, an infant lies with his arms flexed to his chest, his hands fists, and his legs flexed towards his abdomen. *Square window* (wrist) is the angle achieved when the infant’s palm is flexed toward his forearm. A premature infant’s wrist exhibits poor flexion and makes a 90-degree angle with the arm. An extremely immature infant has no flexor tone and cannot achieve even 90-degree flexion. A term infant’s wrist will flex completely against the forearm. This can also be done with the ankle, but ankle flexion was excluded from the Ballard tool because it duplicates the wrist flexion and may not be possible or accurate in babies with intrauterine positional effects.

*Arm recoil* is elicited by first flexing the arms at the elbows to the chest, then fully extending them and releasing. Term infants will resist extension and briskly return their arms to the flexed position. Very preterm infants will not resist extension and respond with weak and delayed flexion in a small arc. The flexion angle of the elbow is estimated.

*Popliteal* angle is assessed with the infant lying supine. Keeping his pelvis flat, flex his thigh to his abdomen and hold it there while extending his leg at the knee. The angle at the knee is estimated. The preterm infant will achieve greater extension.

*Scarf sign* is elicited by moving the baby’s arm across his chest as far toward the opposite shoulder as possible while he is lying supine. The term infant’s elbow will not cross midline, but it will be possible to bring the preterm infant’s elbow much farther toward the opposite shoulder.

*Heel to ear* is similar to popliteal angle, but the knee and thigh are not held in place. The baby’s foot is drawn as near to the head or ear as possible. Scoring is based on the distance from heel to head. The premature baby will be able to get his foot close to his head.

**Physical Maturity**

*Skin* is assessed for thickness, transparency and texture. Premature skin is thin, with visible vessels, and smooth. Extremely preterm infants have sticky, transparent skin. A term infant’s skin is thick, veins are difficult to see and the texture may be flaky.

*Lanugo* is the fine hair seen over the back of premature babies by 24 weeks. It begins to thin over the lower back first and disappears last over the shoulders.

*Plantar creases* are the deep folds and creases seen over the bottom of the foot. One or two appear over the pad of the foot at approximately 32 weeks. At 36 weeks, the creases cover the anterior two-thirds of the foot. At term, they cover the whole foot. At very early gestation, the length of the sole is measured. For extremely immature infants, this item was expanded to include foot length measured from the tip of the great toe to the back of the heel.

*Breast tissue* is examined for visibility of nipple and areola and size of bud when grasped between thumb and forefinger. The very premature infant will not have visible nipples or areola. These become more defined and then raised by 34 weeks, with a small bud appearing at 36 weeks and growing to 5–10 mm by term.

*Ear formation* includes the development of cartilage and the curving of the pinnae. Lack of cartilage in earlier gestation results in the ear folding easily and retaining this fold. As gestation progresses, soft cartilage can be felt with increasing resistance to folding and increasing recoil. The pinnae are flat in very preterm infants. Incurving proceeds from the top down toward the lobes as gestation advances.

*Eyes* in the extremely immature infant are examined, and the degree of eyelid fusion is assessed with gentle traction.

*Genitalia* are virtually indistinguishable at 20 weeks. In males, the testes are in the inguinal canal around 28 weeks, and rugae are beginning to be visible. By 36 weeks, the testes are in the upper scrotum, and rugae cover the anterior portion of the scrotum. At term, rugae cover the scrotum, and at postterm the testes are pendulous. In females, the clitoris is initially prominent and the labia minora are flat. By 36 weeks, the labia majora are larger and the clitoris is nearly covered.

(Continued)
A term infant is 38 to 41 weeks’ gestation. A postterm infant is more than 42 weeks’ gestation. A low-birthweight infant weighs less than 2500 g and can be preterm, term, or postterm.

Chapter 22 provides an illustrated comparison of the differences in Ballard screening characteristics for preterm and term infants.

Next, the nurse plots the infant’s weight on the growth curve chart (Fig. 20.11). Weight is on the vertical axis; gestational age is on the horizontal axis. The nurse notes whether the plot point falls into the shaded area denoting less than the 10th percentile (small for gestational age [SGA]), between the 10th and 90th percentile (appropriate for gestational age [AGA]), or above the 90th percentile (large for gestational age [LGA]). For example, if the infant is 37 weeks’ gestation and weighs 1800 g, the infant is preterm and SGA. Any newborn whose plot point falls into the SGA shading is below the 10th percentile for growth, which means that the newborn is smaller than 90% of all other babies of the same gestational age.
Weight and gestational age combine to describe an infant who is:

- Preterm and SGA, AGA, or LGA
- Term and SGA, AGA, or LGA
- Postterm and SGA, AGA, or LGA

After plotting the weight, the nurse marks the length and head circumference on the corresponding charts and notes if an SGA infant has not grown at the expected rate for one, two, or all three growth parameters. The SGA newborn who experienced growth restriction late in gestation is usually SGA for weight only. This is termed asymmetric growth restriction. The infant less than the 10th percentile for weight and length suffered from limited growth earlier in gestation than the newborn lacking in weight only. If all three parameters are in the 10th percentile, the infant is referred to as having symmetric or proportionate growth restriction. This type of growth restriction has a poor prognosis, given the factors that may have caused diminished growth early in gestation, such as viral infections, single-gene defects, and chromosome disorders (Tappero & Honeyfield, 2003). However, asymmetric growth restriction, particularly if it is associated with maternal hypertension, has a more optimistic prognosis (Resnik, 2002).

An infant at 36 weeks’ gestation who weighs 3200 g is LGA and preterm, likely to be the infant of a mother with diabetes, and at risk for hypoglycemia, respiratory distress syndrome (RDS), and slow feeding. An infant of 40 weeks’ gestation weighing 1200 g is term and SGA.
and at risk for fetal distress, hypoglycemia, congenital anomalies, congenital infection, and polycythemia.

The experienced neonatal nurse quickly and accurately assesses gestational age during the initial newborn assessment. If the estimated date of delivery is based on the last menstrual period, ultrasound examination, or both, the nurse uses the initial assessment results to confirm the obstetrical estimation. If estimated gestational age is unclear, the nurse can quickly assess four physical parameters: ear, nipples, genitalia, and plantar creases. These findings should give enough information to develop an initial assessment and management plan. From these four criteria, the nurse can determine whether the newborn appears preterm, term, or postterm. Using an experienced eye for estimating weight, the nurse can link the gestational age assessment to estimated weight to decide if the newborn is AGA, SGA, or LGA. This information is critical for assessing medical risks, preventing complications, assessing developmental capabilities, and implementing nursing care. Therefore, by the time the nurse has ensured that the newborn’s airway is clear, wiped the baby dry, assigned the first Apgar score, and done a quick visual assessment to rule out major anomalies, he or she also has estimated gestational age and size for age and begun to formulate a plan of care based on this initial assessment.

The First Bath
The first bath is an additional opportunity to examine newborn skin and responses to stimuli. Parents often assist with the first bath and gain important information about their newborn and caregiving skills. In addition, a bath can improve the newborn’s appearance and is important for infection control (AAP & ACOG, 2002). See Research Highlight 20.1.

Timing and procedure vary among institutions. The initial bath is now given sooner than in the past to decrease the possibility of transmitting blood-borne pathogens through contact with maternal body fluids on the newborn’s skin. Early bathing (1 to 2 hours after birth) of the stable term newborn also decreases the use of latex gloves, which are required for health care personnel handling newborns before and during the first bath. Decreased latex exposure may minimize latex allergies (Varda & Behnke, 2000).

Until the first bath has been given, health care team members need to use standard precautions when handling the newborn (AAP & ACOG, 2002). They delay the first bath until the newborn’s temperature is within normal limits. Because bathing can be stressful, providers delay the first bath for any baby exhibiting distress during transition, such as respiratory distress, temperature instability, or hypoglycemia.

Research regarding the timing of the first bath has demonstrated no negative effects on temperature stability. For a healthy term newborn protected from thermal stress before, during, and after washing, the first bath may occur as early as 60 minutes of age (Behring et al., 2003; Nako et al., 2000; Varda & Behnke, 2000).

Warm tap water is adequate. Water temperature should be only slightly cooler than an adult would find acceptable for bathing and not lower than infant body temperature (36.7°C). One research study found that the water temperature nurses used for newborn bathing ranged from 36.1°C to 38.9°C (Behring et al., 2003).

Soaps are generally not needed; alkaline soap destroys the skin’s acid mantle by neutralizing the pH, which

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**RESEARCH HIGHLIGHT 20.1 Tub Bathing vs. Sponge Bathing**

**OBJECTIVE:** To compare the effects of tub bathing and sponge bathing on newborn temperature, state control, and condition of the umbilical cord.

**PARTICIPANTS AND SETTING:** Twenty infants 1 to 4 days old participated in this hospital-based study. The same nurse sponge-bathed 10 babies and tub-bathed the 10 remaining babies. The nurse took the axillary temperature of all babies before and after the bath and measured and maintained the temperature of the bath water between 37.8°C to 39.4°C. The nurse recorded behavioral states. Cord care followed hospital protocol.

**RESULTS:** The axillary temperatures of 90% of the sponge-bathed infants dropped slightly, remaining within the normal range of 36.1°C to 36.7°C. All the temperatures of the tub-bathed infants remained within normal range. Ninety percent of the sponge-bathed babies cried during the procedure. Seventy percent of the tub-bathed babies were drowsy or quiet alert. Cord care did not differ between the two groups.

**CONCLUSION:** In this small group, tub bathing was more beneficial than sponge bathing in comparisons of temperature and behavioural state. Assessing the effect of tub bathing on umbilical cord condition and time of separation is difficult because this study did not follow the babies after discharge. Parents may prefer giving a tub bath to a sponge bath if the baby seems less stressed by a tub bath. More research is required using larger populations.

Illustrated guidelines for the initial bath appear in Nursing Procedure 20.2. The newborn may be bathed under the protection of a radiant warmer. In this procedure, the infant’s temperature has been taken to ensure stability within normal limits, and no transitional distress is present (Teaching Tips 20.1).

**Medication Administration**

Canadian newborns routinely receive two medications at birth: intramuscular vitamin K and an antibiotic agent for eye prophylaxis. Parents may refuse either or both; however, it is important to document the reasons for refusal as well as information given to parents about the risks of foregoing recommended treatment. Some facilities have specific forms for parents to sign should they refuse standard procedures recommended for newborn care.

**Vitamin K**

The nurse administers intramuscular vitamin K (phytonadione) within 6 hours of birth (Canadian Paediatric Society [CPS] and College of Family Physicians of Canada [CFPC], 2004) (Nursing Procedure 20.3). If parents refuse intramuscular Vitamin K, an oral dose can be

(text continues on page 000)
water in a cup or small pitcher and slowly pour it onto the infant’s head over the sink. If the parent is uneasy about pouring, thoroughly soak a washcloth in running water and use it to wet the hair.

6. Use a small amount of soap and massage it gently into the scalp. Do not rub vigourously to remove tenacious vernix. (Some vernix may remain firmly attached to the baby’s skin.) Comb soap through the hair to loosen and remove blood, if necessary.

7. Rinse the hair thoroughly and gently dry the head with a towel. Cover the baby’s head with the towel and return the infant to the radiant warmer.

8. Wash the body:
   a. Lay the infant under the radiant warmer. Positioning the infant with the head and feet across the width of the warmer provides room for a basin of clean water and supplies at the head of the warmer. Remove the baby’s blanket and diaper. Expose the head to the radiant heat to help ensure drying by the end of the bath.
   b. Quickly moisten the infant’s body with a wet washcloth. Do not worry about wetting the blanket underneath the baby. Work quickly and finish washing the baby’s body within 1 or 2 minutes.
   c. Rub the soap into a lather with your gloved hands. Quickly massage the soap over the infant’s body with your gloved hands (hands reach into infant folds faster and more efficiently than a bulky washcloth), starting at the neck creases and working down. Wash the arms, armpits, and fingers. Wash the chest. Roll the infant onto the side to wash the back. Then wash the legs and feet. Do not wash the buttocks or genitals yet.
   d. Thoroughly wet a clean washcloth and rinse the infant, ensuring that you rinse soap from neck and armpit creases. If the infant is lying on top of soaked towels at this time, remove those towels and place the baby on a dry towel.
   e. Now use this clean wet washcloth to wash the genital area. Wipe vernix and secretions out of thigh creases. For girls, separate the labia and wipe front to back to remove secretions. Always use a clean portion of the washcloth for a front-to-back maneuver. For uncircumcised boys, do not attempt to retract the foreskin. Gently and quickly move around the genital area, remembering to lift the scrotal sac and clean the skin underneath.
   f. Clean the bottom last. Rinse any soap remaining in this area.

9. Lift the newborn off the radiant warmer to remove the waterproof pad (and with it, the wet linen on top): lay it aside or place it inside a nearby linen receptacle. Do not throw linen on the floor.
Nursing Procedure 20.2  Continued

Bathing the Newborn

10. Lay the baby down on the dry towel underneath the radiant warmer. Finish drying the baby gently and thoroughly. Do not vigorously rub the skin. Discard the towel.

11. Diaper the infant.

12. Complete any necessary admission procedures, such as the vitamin K injection and cord care, if prescribed.

13. Place the newborn skin to skin with the mother or her partner if desired, with a head covering and a warm blanket over the baby. Or attach a thermistor probe to the newborn for rewarming on the radiant warmer for 10 to 15 minutes.

14. Check the baby’s temperature 15 to 30 minutes after the bathing procedure is complete to monitor thermal recovery.

Evaluation

- Newborn is bathed without difficulty.
- Newborn experiences no evidence of cold stress.

Teaching Tips 20.1 Newborn Nursing Care

- Practice newborn resuscitation skills before you need them! Palpate the umbilical pulse at the base of the umbilicus at every birth, even if the baby is pink, active, and crying. Estimate the heart rate by palpating the pulse for 3 or 4 seconds. Then double-check your estimation by counting the pulse rate for 6 seconds and multiplying by ten. Competence at palpating the umbilical pulse and quickly estimating a heart rate is important during assessment of a depressed newborn in need of resuscitative measures.

- When using the bulb syringe, suction the Mouth first, then the Nose to prevent aspiration. Remember to suction the mouth first because M comes alphabetically before N.

- Parents often wish to take a photo of the baby being weighed at admission, with the digital readout of pounds and ounces showing on the scale. The baby will be warm and comfortable for this photo if he is in a warm blanket and placed prone on the scale for this procedure.

- “Dress” the radiant warmer in layers that facilitate the admission and bathing process. Layering your linen on the radiant warmer prevents multiple errands to obtain linen during this busy time.

- Radiant warmer “dressing”
  - Layer 1: A baby blanket covers the mattress
  - Layer 2: Two baby blankets are spread out and ready to wrap the newborn.
  - Layer 3: Two towels are spread out and ready to dry the newborn after bathing.
  - Layer 4: waterproof pad
  - Layer 5: Two baby blankets ready to wrap the newborn after birth
  - Top layer: Two towels ready to dry the newborn at birth.
  - A clean T-shirt and two blankets are folded and set to the side on the warmer, ready to dress the infant after bathing.
  - Admission and bathing supplies are within easy reach or kept in the supply drawer of the warmer.

- Perform the physical assessment in front of parents and talk through what you are seeing, hearing, and touching. Although parents may not understand everything you are doing, they will learn about things they would not have asked about, and many of their other questions will be answered as they listen. Sharing your knowledge increases parental confidence in your ability to care for their baby.

- If the physical assessment reveals a defect or variance in the midline of the body, look carefully for additional midline defects. For example, if a cleft palate is present, look closely for accompanying defects such as a two-vessel umbilical cord, hypospadias, or an imperforate anus.

- Assess degree of jaundice in natural light, near a window if possible. Gently pressing and releasing the tip of the newborn’s nose will reveal jaundice on the nose (therefore, on the face), if it is present.
NURSING PROCEDURE 20.3
Administering Vitamin K to a Newborn

PURPOSE
To prevent Vitamin K deficiency bleeding in the newborn

ASSESSMENT AND PLANNING
• Assess the newborn for time of birth to ensure that medication is given within 6 hours of birth.
• Check the medical record for the medication and dose ordered.
• Prepare the prescribed dose of medication in the syringe using the appropriate size needle.
• Ensure the environment is well lit.
• Explain the reason for the procedure to the parents.
• Assess the newborn’s thigh to determine an appropriate injection site.
• Gather the necessary equipment:
  • Syringe with appropriate size needle attached containing prescribed dose of vitamin K (25-gauge needle recommended)
  • Alcohol wipes
  • Clean gloves
  • Clean cotton balls, gauze pads, or washcloth

IMPLEMENTATION
1. Wash hands and put on clean gloves.
2. Confirm the newborn’s identity.
3. Clean the skin of the newborn’s thigh with warm water to reduce maternal body fluids on the skin.
4. Swaddle the newborn’s upper body to minimize movement and possible injury during injection.
5. Locate the vastus lateralis muscle and select the injection site.
6. Clean the area with an alcohol wipe working from the centre outward in a circular pattern and allow to air dry.
7. Using the nondominant hand, grasp the newborn’s thigh to stabilize it.
8. Remove the cap from the syringe and quickly insert the needle using a dart-like motion into the selected site at a 90-degree angle.
9. Stabilize the syringe with the nondominant hand and pull back on the plunger to aspirate for blood.
10. If no blood appears in the syringe, slowly inject the medication; if blood appears, quickly remove the syringe and discard; prepare a new syringe and restart the procedure.
11. When all of the medication has been injected, remove the syringe and cover the site with an alcohol wipe. Apply pressure and massage the site to promote distribution of the drug into the muscle.
12. Inspect the injection site to check for any signs of bleeding or bruising.
13. Discard syringe and used equipment appropriately.

Continued
CHAPTER 20 The Healthy Newborn

NURSING PROCEDURE 20.3 (CONTINUED)

Administering Vitamin K to a Newborn

EVALUATION

- The newborn receives the prescribed vitamin K injection without difficulty.
- Injection site is free of any redness, bruising, or hematoma.
- Newborn tolerates procedure well.

AREAS FOR CONSIDERATION AND ADAPTATION

Lifespan Considerations

- If appropriate, enlist the aid of an additional person, such as support person, parent, or other health care team member to help contain the newborn and prevent movement that could result in injury during the injection.
- Keep in mind that a 2.5 cm needle may be necessary to reach the muscle tissue, depending on the newborn’s size.
- Always double-check the dosage to be administered.
- Assess the newborn for signs and symptoms of bleeding, such as tarry stools, hematuria, blood oozing from sites such as the umbilical cord base, and decreased hemoglobin and hematocrit levels. This may indicate the need for additional vitamin K.

Community-Based Considerations

- At the follow-up home visit, question the parents about any possible signs and symptoms of bleeding and notify the health care provider if any occur.
- If the newborn was delivered at home, expect to administer vitamin K as soon as possible after the home birth.

given at the first feeding, with follow-up oral doses given at 2 to 4 weeks of age and 6 to 8 weeks of age. Parents electing to have their newborn receive oral Vitamin K should be advised that there is an increased risk of late hemorrhagic disease with this regimen (CPS and CFPC, 2004).

A single parenteral dose or three oral doses of vitamin K prevent vitamin K–deficiency bleeding (VKDB), formerly known as classic hemorrhagic disease of the newborn (Miller, 2003). The prevalence of VKDB is 0.4–0.7 per 100 infants if no Vitamin K is given (Blackburn, 2007). Vitamin K is not actually required to make clotting factors. It is required to convert precursor proteins made in the liver into activated proteins with coagulant properties. Fetal vitamin K levels are low because of poor placental transport and because the fetus lacks intestinal flora that synthesize vitamin K. Infants who are exclusively breastfed have limited intake of Vitamin K and may be at higher risk for late VKDB (Greer, 2004). Infants with intestinal malabsorption defects are also at risk. Without administration of vitamin K at birth, bleeding can occur from the gastrointestinal (GI) tract, umbilicus, circumcision site, and any puncture sites in some newborns (Blackburn, 2007).

Vitamin K prophylaxis has generated controversy since 1961 when the American Academy of Pediatrics first recommended it. Researchers have investigated its effectiveness, possible complications, and use of oral versus parenteral forms (CPS & CFPC, 2004). Even though it is possible that not all newborns require vitamin K, it is difficult to identify which infants require prophylaxis and which do not. Clinical decisions must be made on the best available evidence, despite controversy and a lack of definitive answers to many clinical questions. Therefore, IM administration of vitamin K remains the standard of practice (CPS & CFPC, 2004).

Eye Prophylaxis

Three topical medications are acceptable for prevention of gonococcal ophthalmia in newborns (CPS, 2002).

- Tetracycline (1%)
- Erythromycin (0.5%)
- 1% silver nitrate

Within 1 hour of birth, the nurse deposits a 1- to 2-cm ribbon of sterile ophthalmic ointment or two drops of silver nitrate solution into the lower conjunctival sac and, after 1 minute, wipes away excess ointment with sterile cotton (Nursing Procedure 20.4). The eyes should not be irrigated with sterile water or saline (CPS, 2002).
NURSING PROCEDURE 20.4
Performing Eye Prophylaxis

PURPOSE
To prevent the development of severe eye infections (ophthalmia neonatorum) from gonorrhea or chlamydia

ASSESSMENT AND PLANNING
- Check the newborn’s medical record for maternal history of sexually transmitted infections.
- Review the order for prescribed agent and check to ensure that the agent is for ophthalmic use only.
- Assess the newborn’s state of reactivity, ensuring that the newborn is in a quiet alert state.
- Explain the rationale for the procedure to the parents.
- Gather equipment.
  - Prescribed sterile ophthalmic ointment
  - Sterile cotton balls or dry sterile gauze pads
  - Clean gloves

IMPLEMENTATION
1. Wash hands and put on gloves.
2. Gently wipe the newborn’s face with a soft gauze pad or cotton ball to dry the face and prevent the hand from slipping.
3. Open the prescribed ointment, making sure to keep the tip of the tube sterile.
4. Open one eye by gently separating the upper and lower lids, exposing the conjunctiva of the lower lid to allow placement of the ointment.
5. Lay a thin ribbon of ointment, approximately 1 to 2 cm in length, along the conjunctival sac, from the inner to outer canthus.
6. Release the eyelids and allow the newborn to close his or her eyes to permit the ointment to be dispersed within the eye.
7. After 1 minute, wipe away excess ointment with a sterile cotton ball or gauze.
8. Repeat the steps with the other eye to ensure complete prevention.
9. Document the procedure in the newborn’s medical record according to agency policy.

EVALUATION
- Ophthalmic ointment was applied to both eyes without difficulty.
- Newborn tolerated procedure without any problems.

AREAS FOR CONSIDERATION AND ADAPTATION
Lifespan Considerations
- Check the specific agency policy for the timing of eye prophylaxis. In some agencies, eye prophylaxis is performed immediately after birth. In other agencies, it may be postponed for about 1 hour to allow the parents to bond with their newborn immediately after birth without interference from the ointment, which could blur the newborn’s vision.
Performing Eye Prophylaxis

- If necessary, dim the lights to prevent the newborn from experiencing undue discomfort and upset due to the glare of the lights.
- After instilling the ointment, do not irrigate with eyes with sterile water or saline.

Community-Based Considerations

- When making the first home visit, check with the parents to ensure that the newborn received eye prophylaxis before he or she was discharged.

Administration of eye prophylaxis is often challenging. It is nearly impossible to force open the eyelids of a newborn who is crying or lying under bright lights; therefore, the infant should be in a quiet, alert state. This state is most likely if the baby is in a somewhat upright position and under dimmed lights.

Think back to William, the newborn about to be circumcised. The nurse should check William’s medical record to determine which medication he has received.

Full Physical Examination

Physical examination begins at birth and continues throughout the hospital stay. Table 20.1 summarizes the complete newborn physical examination, which should occur by 2 hours of age (AAP & ACOG, 2002).

Table 20.2 reviews newborn reflexes, and Box 20.2 summarizes an approach to newborn assessment. The astute nurse quickly recognizes signs of abnormalities and intervenes before further compromise develops.

When preparing to participate in the physical examination, the nurse should proceed as follows (Tappero & Honeyfield, 2003):

- Wash your hands before beginning. If parents are present, teach the importance of good hand washing. If the examination takes place before the initial bath, standard precautions mandate that the nurse wear gloves (AAP & ACOG, 2002).
- Gather necessary equipment before beginning.
- Keep the newborn warm. A radiant warmer provides a thermally safe environment and easy access to the exposed newborn. Warm hands and a warm stethoscope help decrease newborn stress.
- Look and listen before touching or handling the infant. Observe posture, muscle tone, colour, respiratory efforts, and behavioural state. Listen for expiratory grunting, stridor, or other audible signs of respiratory distress before disturbing the infant.
- Keep the newborn as calm as possible. Start with the least invasive and obtrusive manoeuvres (observation, auscultation); finish with those assessments that may be more upsetting (assessment of Moro reflex). Handle the newborn gently. If parents are present, use teachable moments to point out newborn developmental capabilities.
- Choose a quiet environment for auscultation.
- Establish a routine. Performing the physical assessment approximately the same way each time decreases the risk for forgetting any aspect of the examination.

The Newborn Transitional Period

Full-term healthy newborns demonstrate a predictable pattern of behavioural changes, behavioural states and cues, sensory abilities, and physiologic adaptations during the first 6 to 8 hours of life. This time frame is referred to as the transitional period (Bakewell-Sachs et al., 1997).

Behavioural Changes

The transitional period is divided into an initial period of reactivity and inactivity and a second period of reactivity. Time periods vary depending on labour management, maternal medications, and initial feeding (Bakewell-Sachs et al., 1997).

Initial Period of Reactivity

The initial period of reactivity occurs in the first 30 to 60 minutes of life and is characterized by an alert, intensely exploratory newborn. At this time, the healthy, term newborn is fully alert and active and has a strong desire to suck. This is the optimal time for the first breastfeeding. It also is good for interaction (Fig. 20.12). The nurse can facilitate parent–child eye contact by minimizing unnecessary bright lights and delaying instillation of prophylactic eye medication.

(text continues on page 000)
### TABLE 20.1 Physical Examination of the Newborn

<table>
<thead>
<tr>
<th>ASSESSMENT AREA AND TECHNIQUE</th>
<th>NORMAL FINDINGS</th>
<th>NORMAL VARIATIONS</th>
<th>SIGNIFICANT DEVIATIONS*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Appearance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colour</td>
<td>Consistent with genetic background; pink mucous membranes</td>
<td>Pigmentation: pink, ruddy, especially over face; olive; yellowish-pink; black</td>
<td>Pallor (grey colour could indicate hypotension)</td>
</tr>
<tr>
<td></td>
<td>Mottled with cooling</td>
<td>Acrocyanosis (blue palms and soles)</td>
<td>Plethora (deep red colour could denote polycythemia)</td>
</tr>
<tr>
<td></td>
<td>Bruises over presenting part</td>
<td>Circumoral cyanosis (blue around mouth): normal for first 24 hours, then evaluate</td>
<td>Central cyanosis (blue trunk, lips, mucous membranes denote hypoxia)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jaundice (yellow skin colour): mild jaundice normal after day 1 of life</td>
<td>Jaundice, especially in first 24 hours of life</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Harlequin colour change (in side-lying position, red colour demarcated on dependent side, pale colour on upper half; persists 1–30 minutes; colour reverses if infant is rotated to other side)</td>
<td></td>
</tr>
<tr>
<td><strong>Respiratory effort</strong></td>
<td>Diaphragmatic and abdominal breathing</td>
<td>Expiratory grunting, nasal flaring, and mild retracting in initial part of transition (with rapid resolution)</td>
<td>Grunting, flaring, retracting that worsens or does not resolve quickly in transition</td>
</tr>
<tr>
<td></td>
<td>Rate: 40–60 breaths/min; may decrease in deep sleep and increase after crying</td>
<td></td>
<td>Apnea (cessation of breathing &gt; 20 seconds with decreased heart rate and colour change to pale or dusky)</td>
</tr>
<tr>
<td></td>
<td>Periodic breathing: pauses in breathing up to 20 seconds without bradycardia or colour change</td>
<td></td>
<td>Gaspin (intermittent rapid inhalation)</td>
</tr>
<tr>
<td><strong>Tone/neuromuscular</strong></td>
<td>Term infant flexed, fists clenched</td>
<td>Mild tremors with startling</td>
<td>Stridor (high-pitched sound during breathing indicates obstruction)</td>
</tr>
<tr>
<td></td>
<td>Term infant with healthy tone can be pulled up to sitting position using elicited palmar grasp reflex</td>
<td>Frank breech: extended legs for brief time</td>
<td>Marked jitteriness (could indicate low blood glucose level)</td>
</tr>
<tr>
<td></td>
<td>Head moves side to side</td>
<td></td>
<td>Tremors that continue when care provider touches or holds area (suspect seizure activity); marked hypertonia or extension</td>
</tr>
<tr>
<td></td>
<td>Moves all extremities</td>
<td></td>
<td>Marked hypotonia</td>
</tr>
<tr>
<td></td>
<td>Moves smoothly between behavioural states (term infant)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gestational Age</strong> (see gestational assessment information on pages xxx–xxx)</td>
<td></td>
<td>Fever is rare sign of infection; unstable temperature in stable environment is more worrisome.</td>
<td></td>
</tr>
<tr>
<td>VITAL SIGNS: Temperature</td>
<td>(broad range of normal; standard varies regionally)</td>
<td>Hyperthermia or hypothermia is stressful and dangerous; requires evaluation of etiology such as environmental threat, sepsis, or neurologic abnormality</td>
<td></td>
</tr>
<tr>
<td>● Axillary (preferred)</td>
<td>36.5°–37.3°C</td>
<td>Bradydacty (persistent resting rate &lt; 100 bpm, unless term in deep sleep without distress)</td>
<td></td>
</tr>
<tr>
<td>● Skin (usually used for special care infant)</td>
<td>36°–36.5°C (term)</td>
<td>Tachycardia (resting rate 180–200 bpm)</td>
<td>Persistent irregular rhythm</td>
</tr>
<tr>
<td>● Rectal (not preferred, risky)</td>
<td>36.2°–37.2°C (preterm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>● Tympanic (not recommended)</td>
<td>36.5°–37.5°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart rate (apical)</td>
<td>120–160 bpm; increases with and after crying</td>
<td>Term infant’s heart rate may increase to 180 bpm during crying and decrease to 80–100 bpm during deep sleep.</td>
<td></td>
</tr>
</tbody>
</table>

*(table continues on page 000)*
## TABLE 20.1 Physical Examination of the Newborn (continued)

<table>
<thead>
<tr>
<th>ASSESSMENT AREA AND TECHNIQUE</th>
<th>NORMAL FINDINGS</th>
<th>NORMAL VARIATIONS</th>
<th>SIGNIFICANT DEVIATIONS*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory rate</td>
<td>Shallow, irregular 40–60 breaths/min; may decrease when in deep sleep and increase after crying</td>
<td>Transient tachypnea (fast rate) after stress or crying Rate may slow when sleeping</td>
<td>Tachypnea (resting respiratory rate &gt; 60 breaths/min) Bradypnea (respiratory rate &lt; 25–30 breaths/min) Apnea (cessation of breathing &gt; 15 seconds with decreased heart rate and colour change to pale or dusky) Gasping (intermittent rapid inhalation)</td>
</tr>
<tr>
<td>Blood pressure not routinely required; oscillometric measurement preferred</td>
<td>Varies with weight, gestational age, and infant state; approximately 78/42 mm Hg</td>
<td>Weight, length, and OFC must be assessed with gestational age to determine whether the newborn is SGA, AGA, or LGA. An infant is classified as SGA, AGA, or LGA and preterm, term, or postterm.</td>
<td></td>
</tr>
<tr>
<td>Measurements: Weight</td>
<td>Varies with genetic composition 2500–3800 g</td>
<td>Weight, length, and OFC must be assessed with gestational age to determine whether the newborn is SGA, AGA, or LGA. An infant is classified as SGA, AGA, or LGA and preterm, term, or postterm.</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>45–52 cm</td>
<td>Weight, length, and OFC must be assessed with gestational age to determine whether the newborn is SGA, AGA, or LGA. An infant is classified as SGA, AGA, or LGA and preterm, term, or postterm.</td>
<td></td>
</tr>
<tr>
<td>OFC (occipital-frontal circumference)</td>
<td>32–37 cm</td>
<td>Weight, length, and OFC must be assessed with gestational age to determine whether the newborn is SGA, AGA, or LGA. An infant is classified as SGA, AGA, or LGA and preterm, term, or postterm.</td>
<td></td>
</tr>
<tr>
<td>Chest circumference (not routinely required)</td>
<td>30–35 cm</td>
<td>Usually 2 cm smaller than the OFC; however, cranial moulding can influence OFC and chest measurements.</td>
<td></td>
</tr>
<tr>
<td>Skin</td>
<td>Soft, smooth, elastic Hydrated skin springs back into shape if pinched Initially edematous Flaky and dry by day 2–3 Vernix caseosa (greasy yellow-white substance) Lanugo (fine hair on cheeks, shoulders, forehead, pinna of ears) Milia (tiny white papules on brow, cheeks, nose) Erythema toxicum or “newborn rash” (small white or yellow papules on a red base; lasts several hours to several days) Sucking blisters (vesicles on lips, hands from in utero or postnatal sucking) Stork bite or nevus simplex (pink macule on nape of neck, upper eyelids, bridge of nose or upper lip that usually fades)</td>
<td>Meconium staining (cord, nails, skin may be stained greenish-brown from meconium-stained amniotic fluid) Forceps marks on cheek(s) Petechiae over presenting part Port wine nevus (flat pink or purple lesion on white skin and solid black on black skin, usually on face; does not blurch, grow, or fade) Mongolian spots or hyperpigmented macule (bluish or grey-blue areas of pigmentation on dorsum and buttocks) commonly found on non-Caucasian babies. Café-au-lait patches (less than six) Pigmented nevus (dark brown or black macule) Strawberry hemangioma (bright red, raised, soft, grows then regresses over years; most appear by 6 mo of age)</td>
<td>Loose, wrinkled skin may indicate growth aberration or dehydration. Widespread petechiae not associated with presenting part Rash, especially if vesicular Skin tags (depending on positioning and associated physical findings) Webbing of hands, feet Laceration infrequently occurs during cesarean birth. More than 6 café-au-lait patches may indicate neurofibromatosis.</td>
</tr>
</tbody>
</table>

(table continues on page 000)
TABLE 20.1 Physical Examination of the Newborn (continued)

<table>
<thead>
<tr>
<th>ASSESSMENT AREA AND TECHNIQUE</th>
<th>NORMAL FINDINGS</th>
<th>NORMAL VARIATIONS</th>
<th>SIGNIFICANT DEVIATIONS*</th>
</tr>
</thead>
</table>

**Head**
- Fontanels:
  - Anterior palpated as 5-cm diamond
  - Posterior palpated as smaller triangle
  - Palpate sutures; should be unjoined
  - Generally symmetric shape
  - Full range of motion
- Cranial moulding and asymmetry, difficulty palpating fontanels and suture lines because of moulding
- Scalp lesion or abrasion (from scalp electrode, vacuum extractor)
- Cephalhematoma (haematoma between periosteum and skull bone; raised lump does not cross suture lines and resolves in months)
- Caput succedaneum (tissue swelling may cross suture lines and resolves quickly)
- Petechiae (if breech birth or cord around neck)
- Torticollis (head held immobile at angle)
- Subconjunctival hemorrhage (red spot on sclera; resolves)
- Slightly blue sclera
- No tears when crying

**Eyes**
- Eyes placed at same level
  - Eyelids above pupils but within iris
  - Edema in first days of life
  - Lashes and eyebrows present
  - Eyes open and eyeballs present
  - Eyes move freely, fix, and follow
  - Eyes close in response to bright light
  - Blinking present
  - Occasional strabismus (crossed eyes)
  - Slight nystagmus (involuntary eye movements)
  - Blue colour in light-skinned baby and brown colour in dark-skinned baby (eye colour established at approximately 3 months)
- Unusually wide set eyes
- Eyes never seen open, even in dim light
- Constant strabismus, nystagmus, or both
- Purulent drainage
- Ulceration
- Unusual lashes (absent, bushy, unusually long)
- Upward slant in non-Asian (may indicate Down syndrome)
- Jaundiced sclera (hyperbilirubinemia)

**Ears**
- Well-formed cartilage
  - Visibly open auditory canal
  - Placement: line drawn through inner and outer canthi of eye lines up with top notch of ear
  - Responds to voices, loud noises when awake
- Darwin’s tuberde (nodule on posterior helix)
- Preauricular skin tag, especially if accompanied by other variances
- Sinus tract near ear
- Low-set ears (may require assessment after cranial moulding has resolved)
- Abnormal ear attachment to head

**Nose**
- Midline placement
  - Normal breathing when mouth is closed
  - Frequent sneezing
- Asymmetric appearance because of birth trauma
- Cyanosis or respiratory distress when mouth is closed (choanal atresia)
- Nasal flaring (respiratory distress)
- Persistent or marked nasal drainage
- Unusual nose, such as pointed or upturned

*(table continues on page 000)*
### Table 20.1 Physical Examination of the Newborn (continued)

<table>
<thead>
<tr>
<th>Assessment Area and Technique</th>
<th>Normal Findings</th>
<th>Normal Variations</th>
<th>Significant Deviations*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mouth and Throat</strong></td>
<td>Symmetric movement of mouth</td>
<td>Sucking blisters on lips</td>
<td>Mouth pulls to one side (asymmetric strength or movement)</td>
</tr>
<tr>
<td></td>
<td>Coordinated breathing, sucking, and swallowing during feeding</td>
<td>Epstein’s pearls (small white epithelial cysts) on hard palate</td>
<td>Cleft palate (hard or soft palate)</td>
</tr>
<tr>
<td></td>
<td>Pink gums</td>
<td></td>
<td>Large or deeply ridged tongue</td>
</tr>
<tr>
<td></td>
<td>Free-moving tongue</td>
<td></td>
<td>Excessive drooling; frequent choking (evaluate for esophageal atresia or tracheoesophageal fistula)</td>
</tr>
<tr>
<td></td>
<td>Sucking pads inside cheeks</td>
<td></td>
<td>Shrill, weak, or absent cry</td>
</tr>
<tr>
<td></td>
<td>Dome-shaped hard palate</td>
<td></td>
<td>Cheesy coating on tongue that does not wipe off or bleeds when wiped (indicative of oral thrush—Candida albicans)</td>
</tr>
<tr>
<td></td>
<td>Midline, single uvula</td>
<td></td>
<td>Teeth (may be deciduous or deciduous): aspiration risk if loose</td>
</tr>
<tr>
<td></td>
<td>Lusty cry of moderate pitch and tone</td>
<td></td>
<td>Small jaw and recessive chin, especially if accompanied by respiratory distress (Robin syndrome)</td>
</tr>
<tr>
<td><strong>Neck</strong></td>
<td>Short, straight</td>
<td>Fractured clavicle(s) from difficult birth: popping or cracking felt or heard when palpated</td>
<td>Abnormally short neck</td>
</tr>
<tr>
<td></td>
<td>Creased anterior</td>
<td></td>
<td>Hyperextended or arched neck</td>
</tr>
<tr>
<td></td>
<td>Clavicles intact</td>
<td></td>
<td>Webbing (Turner’s syndrome)</td>
</tr>
<tr>
<td></td>
<td>Head held in midline with free range of motion</td>
<td></td>
<td>Excessive skin folds</td>
</tr>
<tr>
<td><strong>Chest</strong></td>
<td>Circular, barrel shape</td>
<td>Xiphoid cartilage (lower end of sternum) may protrude</td>
<td>Hypotonia (no head control)</td>
</tr>
<tr>
<td></td>
<td>Symmetric respiratory movement</td>
<td>Supernumerary (extra) nipples</td>
<td>Intercostal and/or sternal retractions (ribs and/or sternum suck inward with inhalation due to use of accessory muscles during respiratory distress)</td>
</tr>
<tr>
<td></td>
<td>Well-formed, symmetric nipples</td>
<td>Breast enlargement (from maternal hormones)</td>
<td>Decreased or asymmetric breath sounds, especially with respiratory distress</td>
</tr>
<tr>
<td></td>
<td>Clear, bilateral breath sounds</td>
<td>“Witch’s milk” (milky substance from breast)</td>
<td></td>
</tr>
<tr>
<td><strong>Heart</strong> (see also Vital Signs section)</td>
<td>PMI (point of maximal impulse) heard lateral to midclavicular line at 3rd or 4th intercostal space</td>
<td>Rales normal first few hours of life</td>
<td>PMI shifted to right or left, especially if accompanied by respiratory distress (pneumothorax)</td>
</tr>
<tr>
<td></td>
<td>Regular rate and rhythm</td>
<td>Heart murmur without accompanying symptoms</td>
<td>Distant heart sounds</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Extra heart sound(s)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PMI on right side of chest (pneumothorax or dextrocardia)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Dysrhythmia (irregular rate), tachycardia, bradycardia</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Heart murmur with accompanying symptoms such as edema, irregular rate/rhythm, pallor or duskeness, respiratory distress, other anomalies</td>
</tr>
<tr>
<td><strong>Abdomen</strong></td>
<td>Cylindrical and protruding</td>
<td>Heart murmur with accompanying symptoms</td>
<td>Audible bowel sounds in chest, especially if accompanied by respiratory distress (diaphragmatic hernia)</td>
</tr>
<tr>
<td></td>
<td>Abdominal skin colour congruent with genetic background</td>
<td></td>
<td>Scaphoid (sunken) abdomen (diaphragmatic hernia)</td>
</tr>
<tr>
<td></td>
<td>Soft bowel sounds present 1 to 2 hours after birth</td>
<td></td>
<td>Bowel sounds in chest (diaphragmatic hernia)</td>
</tr>
<tr>
<td></td>
<td>No protrusion of umbilicus</td>
<td></td>
<td>Palpable masses or bulges front or back</td>
</tr>
<tr>
<td></td>
<td>(Note: palpation of liver and kidneys is not considered a nursing assessment activity in some settings.)</td>
<td></td>
<td>Marked distention, shiny appearance, or visible bowel loops</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inaudible bowel sounds</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Projectile vomiting</td>
</tr>
</tbody>
</table>

*(table continues on page 000)*
<table>
<thead>
<tr>
<th>ASSESSMENT AREA AND TECHNIQUE</th>
<th>NORMAL FINDINGS</th>
<th>NORMAL VARIATIONS</th>
<th>SIGNIFICANT DEVIATIONS*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Umbilicus</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No intestinal structures visible inside cord</td>
<td>Yellow-green staining of cord (from meconium-stained amniotic fluid)</td>
<td>Bilious (greenish) vomit, Failure to pass meconium in 48 hours, Hyperperistalsis or visible peristalsis (bowel obstruction), Absent or diminished femoral pulses (coarctation of aorta). Suspect coarctation if four-limb blood pressure demonstrates upper extremities systolic pressure is &gt; 20 points higher than systolic of lower extremities.</td>
</tr>
<tr>
<td></td>
<td>Drying without bleeding, odour</td>
<td></td>
<td>Two vessel umbilical cord (single artery), Bleeding around cord, Red or swollen umbilical area, Purulent drainage from umbilical area, Omphalocele (abdominal contents herniated into area of cord), Gastrostrosis (abdominal contents herniated through abdominal wall)</td>
</tr>
<tr>
<td><strong>Extremities</strong></td>
<td></td>
<td>Positional deformities (usually resolve), Polydactyly (extra digits) may be familial. Simian crease (single horizontal crease across palm) sometimes found in normal infants; also related to Down syndrome</td>
<td>Absent movement, Asymmetric movement, strength, or range of motion, Hypotonia, Hyperflexion, Limited range of motion, Hypermobility of joints, Polydactyly (extra digits) or syndactyly (webbed digits), especially if accompanied by additional anomalies, Short fingers, incurved little finger, low-set thumb, and a simian crease (suggests Down syndrome), Persistent cyanotic nail beds, Suspect dislocated or subluxated hip: Limited hip abduction, Unequal gluteal or leg folds, Unequal knee height, Positive Ortolani’s sign (audible clunk on hip abduction).</td>
</tr>
<tr>
<td></td>
<td>Term baby assumes in utero flexed positioning, Symmetric full range of motion, Extension limited, Muscle tone congruent with gestational age, Ten fingers, ten toes appropriately spaced, Dry flaky hands and feet, Flat sole of foot, Fingernails and toenails present, Fists clenched</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Genitalia</strong></td>
<td>First void within 24 hours (most babies) to 48 hours (all babies) of birth, Urine has mild odour</td>
<td>Rust-stained urine (uric acid crystals)</td>
<td>Ambiguous genitalia (sex not clearly discernible from visible anatomy), Failure to void within 48 hours of birth, Foul-smelling or bloody urine</td>
</tr>
<tr>
<td><strong>MALE</strong></td>
<td>Slender penis, 2.5 cm long, Urethral meatus at tip of penis, Voids within 24 hours with adequate stream and volume, Foreskin adheres to glans and tight 2–3 months, Erection possible because of erectile tissue, Scrotal skin can be loose or tight</td>
<td>Scrotal bruising and edema if breech birth, Epithelial pearls (small, firm, white lesion at tip of penis)</td>
<td>Undescended testes (may be in inguinal, femoral, perineal, or abdominal areas), Hydrocele (enlarged scrotum due to fluid), Discoloured testes, Hypospadias (urinary meatus on ventral surface of penis), Epispadias (urinary meatus on dorsal surface of penis), Fecal discharge from penis</td>
</tr>
</tbody>
</table>

*table continues on page 000
Adaptation to extrauterine life allows for wide swings in normal parameters. The newborn may be tachypneic (up to 80 breaths per minute) and tachycardic (up to 180 bpm). The nurse may observe mild to moderate chest wall retractions, nasal flaring, and expiratory grunting, and may hear crackles. The nurse may note periodic breathing (pauses in breathing of less than 15 seconds). Acrocyanosis (bluish hands and feet) is also normal (see Table 20.4, given later). Bowel sounds are active.

Abnormal transition may be manifested by any signs of increasing distress instead of steady resolution. Signs that require immediate intervention include central cyanosis; apnea greater than 15 seconds, especially if accompanied by pallor, cyanosis, or bradycardia; asymmetric chest wall movement; unequal breath sounds; excessive salivation or mucus; and hypotonia or lethargy.

**Period of Relative Inactivity**
This period occurs 2 to 3 hours after birth. The newborn becomes less interested in external stimuli and falls asleep for a few minutes to several hours. The baby becomes less responsive. During deep sleep, the baby is difficult to arouse. Feeding is difficult, if not impossible. Heart rate should stabilize at 120 to 140 bpm; respiratory rate...
### TABLE 20.2 Developmental Reflexes in the Newborn

<table>
<thead>
<tr>
<th>NAME OF REFLEX</th>
<th>FIGURE</th>
<th>TO ELICIT REFLEX</th>
<th>EXPECTED NEONATAL RESPONSE</th>
<th>DISAPPEARANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moro</td>
<td><img src="image" alt="Moro" /></td>
<td>Hold the infant supine with the head a few inches above the mattress. Remove the hand supporting the infant’s head and allow the head to fall back onto mattress.</td>
<td>Infant first extends and abducts the arms and opens the hands. Then the arms adduct with some flexion and closing of the fists. The infant may cry.</td>
<td>12 mo</td>
</tr>
<tr>
<td>Palmar grasp</td>
<td><img src="image" alt="Palmar grasp" /></td>
<td>Press the palmar surface of the infant’s hand with a finger.</td>
<td>Infant grasps the finger and holds tighter with attempts to withdraw. Full-term neonate can support full body weight if lifted slightly.</td>
<td>2 mo</td>
</tr>
<tr>
<td>Rooting</td>
<td><img src="image" alt="Rooting" /></td>
<td>Stroke the infant’s cheek and corner of the mouth.</td>
<td>The infant’s head turns toward the stimulus and the mouth opens.</td>
<td>3–4 mo</td>
</tr>
<tr>
<td>Stepping</td>
<td><img src="image" alt="Stepping" /></td>
<td>Hold the infant upright and touch the soles of the feet to a flat surface.</td>
<td>Infant makes alternating stepping movements.</td>
<td>3–4 mo</td>
</tr>
<tr>
<td>Sucking</td>
<td><img src="image" alt="Sucking" /></td>
<td>Touch or stroke the baby’s lips.</td>
<td>Mouth opens and sucking movements begin.</td>
<td>12 mo</td>
</tr>
<tr>
<td>Tonic neck</td>
<td><img src="image" alt="Tonic neck" /></td>
<td>Place infant supine and turn his or her head to one side.</td>
<td>Infant extends the arm on the side in which the head is turned and flexes the upper extremity on the opposite side (fencing position).</td>
<td>7 mo</td>
</tr>
<tr>
<td>Truncal incurvation (Galant)</td>
<td><img src="image" alt="Truncal incurvation" /></td>
<td>Hold infant prone, in suspended position, with palm of hand against infant’s chest. Apply firm pressure with the thumb or cotton swab parallel to the spine in the thoracic region.</td>
<td>The infant flexes the pelvis toward the side of the stimulus.</td>
<td>3–4 mo</td>
</tr>
</tbody>
</table>
This box describes one method of organizing the newborn physical examination reviewed in Table 20.1 as a guide for inexperienced examiners. With practice, each examiner develops a personal style. It is assumed that the infant is unclothed and supine under a radiant warmer.

**Observation**

It can be very difficult for a practitioner to just stand at the crib and observe an infant. The immediate inclination is to touch and talk to the infant. The practitioner must delay this natural response until later in the examination, however, because observation alone produces important information about every organ system. These initial observations allow the practitioner to develop a visual differential diagnosis before employing other assessment techniques.

If these multiple observations prove normal, the examiner is less likely to find a significant abnormality upon auscultation and palpation. Each observation of normality serves to reassure the examiner—just as an observation of abnormality should heighten the examiner’s suspicion that further inspection is necessary.

Observation is not an isolated technique for use only at the outset of the examination. Although spending a moment or two observing the infant at the bedside before touching him or her is important, observation of the infant’s responses takes place throughout the assessment. The examiner must learn to take advantage of every opportunity the infant’s behaviour offers for observation. If, for example, the infant awakens spontaneously during the examination, the practitioner should use that opportunity to examine the baby’s eyes.

Hands-on inspection includes measurements and tactile inspection of the skin. It also includes maneuvers to assess symmetry and reflexes.

**Auscultation**

After observing the infant closely, many examiners next auscultate the chest, heart, and abdomen. To separate the sounds of the heart from those of the lungs, concentration is important.

Listen first to one type of sound, then to the other. For example, listen first to the heart—its rate, rhythm, regularity, and any added sounds. Then listen to breath sounds, ignoring the cardiac sounds.

**Palpation**

Continue with palpation. Palpating certain parts of the body disturbs the infant more than others. An ordered approach keeps the infant calm through much of the process.

Because femoral pulses are difficult to assess in a crying infant, palpate them first. Then palpate the brachial pulses. Next palpate the abdomen, beginning with the more superficial liver and spleen. (Learning to palpate the liver and spleen with the tips of the fingers as well as the lateral edges of the index fingers facilitates examination from either side of the bassinet.) Palpate for abdominal masses; then use deeper palpation for the kidneys. At this point, the infant may be disturbed and crying, but this will not impede the remainder of the examination.

**The Integrated Examination**

The skilled examiner integrates examination tasks. For example, after palpating the head, neck, clavicles, arms, and hands, he or she can perform the pull-to-sit maneuver to assess palmar grasp, arm strength, and tone. At that point, the clinician is...
UNIT 5 Postpartum Period and Newborn Care

Again. Heart and respiratory rates may increase but should remain within normal limits. The newborn may pass urine and the first meconium.

**Behavioural States**
Assessment of infant state enables caregivers to measure the newborn’s response to external stimuli and to interpret physiologic and behavioural changes. The caregiver assesses infant state to evaluate the newborn’s ability to control it, move smoothly from one state to another and maintain alertness (Tappero & Honeyfield, 2003).

Brazelton’s Neonatal Behavioural Assessment Scale describes 2 sleep and 4 awake states (Brazelton, 1978): deep sleep, light sleep, drowsy, quiet alert, active alert, and crying. Table 20.3 describes characteristics of each state and the implications for caregiving and interaction. Full-term, healthy newborns should move easily from one state to another and eventually demonstrate a unique and organized pattern of control. The nurse assesses the state as an indicator of overall well-being and central nervous system integrity (Tappero & Honeyfield, 2003).

The nurse teaches parents these infant states to help them identify their newborn’s unique characteristics and to facilitate optimal interactions. For example, the parent should be able to recognize the light sleep state as one in which the infant is centrally pink with clear breath sounds and shows no signs of respiratory distress. The temperature may fall.

Second Period of Reactivity
The second period of reactivity lasts approximately 4 to 6 hours and begins when the newborn fully awakens from the first sleep and is alert and responsive once again. Heart and respiratory rates may increase but should remain within normal limits. The newborn may pass urine and the first meconium.

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**BOX 20.2** A Sample Approach to Newborn Physical Examination (continued)

holding the infant in an appropriate position to elicit the Moro reflex. The practitioner can examine the genitilia next, before progressing to the lower extremities. While positioning the infant prone on the practitioner’s hand to assess truncal tone and the truncal incuration reflex, the examiner also can check the baby’s back. These shortcuts facilitate multiple inspections and save time. Examination of the hips should be last because this procedure causes the most stress to the infant.

It is usually not necessary to assess reflexes separately. The examiner will most likely have observed root and suck by this point. He or she can incorporate Moro and palmar grasp into the upper extremity examination, as just explained.

Although an extremely cooperative infant may sleep through the entire process, the assessment is not complete until the infant has been observed through the various behavioural states. Facial asymmetry, for example, cannot be seen until the infant cries.

Ideally, the parents should observe the first complete examination. They appreciate demonstration of their infant’s normality and uniqueness as well as early identification of unusual or abnormal findings.


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**FIGURE 20.12** Maternal–infant bonding during a period of reactivity.

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**Tab. 3**

Left: Male newborn genitalia. Right: Female newborn genitalia.
<table>
<thead>
<tr>
<th>STATE</th>
<th>BODY ACTIVITY</th>
<th>EYE MOVEMENTS</th>
<th>FACIAL MOVEMENTS</th>
<th>BREATHING PATTERN</th>
<th>LEVEL OF RESPONSE</th>
<th>IMPLICATIONS FOR CAREGIVING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sleep States</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quiet (deep) sleep</td>
<td>Nearly still, except for occasional startle or twitch</td>
<td>None</td>
<td>Without facial movements, except for occasional sucking movement at regular intervals</td>
<td>Smooth and regular</td>
<td>Threshold to stimuli very high so that only very intense and disturbing stimuli will arouse</td>
<td>Caregivers trying to feed infants in quiet sleep will probably find the experience frustrating. Infants will be unresponsive, even if caregivers use disturbing stimuli to arouse infants. Infants may arouse only briefly and then become unresponsive as they return to quiet sleep. If caregivers wait until infants move to a higher, more responsive state, feeding or caregiving will be much more pleasant.</td>
</tr>
<tr>
<td>Active (light) sleep</td>
<td>Some body movements</td>
<td>Rapid eye movement (REM); fluttering of eyes beneath closed eyelids</td>
<td>May smile and make brief fussy or crying sounds</td>
<td>Irregular</td>
<td>More responsive to internal and external stimuli; when these stimuli occur, infants may remain in active sleep, return to quiet sleep, or arouse to drowsiness</td>
<td>Active sleep makes up the highest proportion of newborn sleep and usually precedes awakening. Because of brief fussy or crying sounds made during this state, caregivers who are not aware that these sounds occur normally may think it is time for feeding and may try to feed infants before they are ready to eat.</td>
</tr>
<tr>
<td><strong>Awake States</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drowsy</td>
<td>Activity level variable, with mild startles interspersed from time to time; movements usually smooth</td>
<td>Eyes open and close occasionally; are heavy lidded with dull, glazed appearance</td>
<td>May have some facial movements but often there are none and the face appears still</td>
<td>Irregular</td>
<td>Infants react to sensory stimuli, although responses are delayed; state change after stimulation frequently noted</td>
<td>From the drowsy state, infants may return to sleep or awaken further. To awaken, caregivers can provide something for infants to see, hear, or suck, as this may arouse them to a quiet alert state, a more responsive state. Infants who are left alone without stimuli may return to a sleep state.</td>
</tr>
<tr>
<td>Quiet alert</td>
<td>Minimal</td>
<td>Brightening and widening of eyes</td>
<td>Faces have bright, shining, sparkling looks</td>
<td>Regular</td>
<td>Infants attend most to the environment, focusing attention on any stimuli that are present</td>
<td>Infants in this state provide much pleasure and positive feedback for caregivers. Providing something for infants to see, hear, or suck will often maintain a quiet alert state. In the first few hours after birth, most newborns commonly experience a period of intense alertness before going into a long sleep period.</td>
</tr>
<tr>
<td>Active alert</td>
<td>Much body activity; may have periods of fussiness</td>
<td>Eyes open with less brightening</td>
<td>Much facial movement; faces not as bright as in quiet alert state.</td>
<td>Irregular</td>
<td>Increasingly sensitive to disturbing stimuli (hunger, fatigue, noise, excessive handling)</td>
<td>Crying is the infant’s communication signal. It is a response to unpleasant stimuli from the environment or within infants (eg, fatigue, hunger, discomfort). Crying says that infants’ limits have been reached. Sometimes infants can console themselves and return to lower states. At other times, they need help from caregivers.</td>
</tr>
<tr>
<td>Crying</td>
<td>Increased motor activity with colour changes</td>
<td>Eyes may be tightly closed or open</td>
<td>Grimaces</td>
<td></td>
<td>Extremely responsive to unpleasant external or internal stimuli</td>
<td>Caregivers may need to intervene at this state to console and bring the infant to a lower state.</td>
</tr>
</tbody>
</table>

which the newborn is asleep but may make brief fussy sounds. The parent who recognizes this state knows to wait until the infant is more fully awake before interpreting these sounds as meaning that the baby is ready to interact or feed. The parent who does not recognize light sleep may awaken the newborn prematurely and try to feed the child when he or she is not ready.

**Behavioural Cues**

Full-term newborns respond physiologically and emotionally to environmental stimuli. In this way, they learn to control the effects of their surroundings. They begin to display various cues to meet their needs. Caregivers who respond appropriately develop reciprocity with newborns and reinforce behavioural organization (Tappero & Honeyfield, 2003).

Behavioural cues consist of approach and avoidance cues (Box 20.3). **Approach cues** indicate a readiness to interact with the environment. **Avoidance cues** (time-out signals) indicate that the newborn is tired or overstimulated and needs a break from interaction. The caregiver who proceeds with interaction may exceed the infant’s sensory threshold, meaning that the infant cannot respond appropriately and displays signs of stress and fatigue (Tappero & Honeyfield, 2003).

Parents who learn how to interpret their infant’s behaviour have stronger parent–infant interaction during the first year of life. The newborn whose parents respond to behavioural cues can better control and respond to the environment (Tappero & Honeyfield, 2003).

**Neonatal Sensory Abilities**

**Vision**

Healthy term newborns have adequate visual abilities at birth, but eye structures continue to mature over the first 6 months. At birth, newborns can fix on an object and track its movement. They can see objects up to 5 cm away but prefer high-contrast or highly contoured objects 20–30 cm away (Blackburn, 2007). It is interesting to note that the traditional cradle hold positions a newborn perfectly for focusing on the adult’s face.

**Hearing**

Healthy term newborns hear best in the low and mid-range frequencies, but prefer high intonation and rhythmic vocalizations. They can recognize and will turn the head in response to the mother’s voice. They react negatively to loud or offensive noises (Blackburn, 2007). Newborn hearing loss is the most common diagnosable defect at birth (Hyde, 2005). Auditory screening before hospital discharge is discussed later.

**Smell**

Sense of smell is fairly well developed in healthy term newborns, enabling them to detect and identify various odours. Breastfed newborns can differentiate the odour of their mother’s breast pad from pads soaked in water or other substances (Blackburn, 2007; Tappero & Honeyfield, 2003). Newborns grimace, sniff, or startle in response to strong odours (eg, anise, mint) (Tappero & Honeyfield, 2003).

**Touch**

The fetus responds to touch as early as 2 months’ gestational age: by birth, the sense of touch is well-developed (Vanhatalo & van Nieuwenhuizen, 2000). Tactile stimulation, such as rubbing the baby’s back, trunk, or extremities with a towel or flicking the soles of the feet helps initiate respirations at birth (Kattwinkel, 2006).

**Taste**

The fetus has taste receptors by 16 weeks’ gestation and a full complement of taste receptors by term. Newborns can discriminate among different tastes; for example, they prefer glucose water over sterile water (Lecanuet & Schaal, 1996).

---

**Box 20.3 Approach and Avoidance Cues**

<table>
<thead>
<tr>
<th>Signs of Attention (Approach)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dilated pupils</td>
</tr>
<tr>
<td>Focused gaze</td>
</tr>
<tr>
<td>Hand-to-mouth movements</td>
</tr>
<tr>
<td>Quiet alert state</td>
</tr>
<tr>
<td>Reaching or grasping</td>
</tr>
<tr>
<td>Regular heart rate</td>
</tr>
<tr>
<td>Regular respirations</td>
</tr>
<tr>
<td>Rhythmic sucking</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signs of Overstimulation (Time-Out)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apnea</td>
</tr>
<tr>
<td>Arching</td>
</tr>
<tr>
<td>Finger splaying</td>
</tr>
<tr>
<td>Frowning</td>
</tr>
<tr>
<td>Fussing, crying</td>
</tr>
<tr>
<td>Gaze aversion</td>
</tr>
<tr>
<td>Heart rate changes</td>
</tr>
<tr>
<td>Hiccuping</td>
</tr>
<tr>
<td>Increased oxygen requirement</td>
</tr>
<tr>
<td>Irregular respirations</td>
</tr>
<tr>
<td>Mottled skin</td>
</tr>
<tr>
<td>Sneezing</td>
</tr>
<tr>
<td>Stiffening</td>
</tr>
<tr>
<td>Vomiting</td>
</tr>
<tr>
<td>Yawning</td>
</tr>
</tbody>
</table>

Physiologic Adaptations
During the stabilization–transition period (AAP & ACOG, 2002), the newborn makes dramatic adaptations to extraterrestrial life. Thorough assessment is required to monitor progress and identify abnormalities. In this section we present the adaptations made in several body systems and an explanation of collaborative care.

Thermoregulation
The uterine environment maintains fetal body temperature approximately 0.5°C higher than maternal body temperature. At birth, the newborn may lose heat through evaporation at a rate of 0.25°C per minute (skin temperature) (Blackburn, 2007). Maintenance of normal body temperature is critical to survival. A large ratio of surface area to body mass and decreased insulating subcutaneous fat make newborns more vulnerable to temperature variations than adults. This vulnerability increases with decreasing gestational age (Blackburn, 2007).

The nurse strives to maintain a neutral thermal environment for every newborn, that is, the ambient temperature at which oxygen consumption and energy expenditure are at the minimum to sustain vital activities (McGuire et al., 2004).

Range of Normal Temperature. Neonatal body temperature has a fairly broad range of normal (MacDonald et al., 2006):

- Axillary: 36.5°C–37.3°C
- Skin:
  - Full-term infant: 36.0°C–36.5°C
  - Preterm infant: 36.2°C–37.2°C
- Rectal: 36.5°C–37.5°C

The AAP cites normal axillary temperature for a full-term infant as 36.1°C to 37.0°C in an open crib with appropriate clothing (AAP & ACOG, 2002).

Methods of Taking Newborn Temperatures. The nurse can assess newborn temperature as follows (Blackburn, 2007; Rosenthal & Leslie, 2006):

- Axillary: This method is safe and approximates core temperature.
- Skin: This method may be used for continuous assessment of the skin temperature of preterm infants or those at risk for temperature instability. Healthy newborn skin temperature is displayed when the radiant warmer is used anytime the infant must be unclothed and exposed for more than a short period. A thermistor probe is placed on the surface of the skin and displays temperature electronically. The optimal location for the thermistor probe is not known (Blackburn, 2007). It is usually recommended to place the probe over the liver or abdomen, or on the back of a prone infant. The nurse should make sure that the probe is in full contact with the skin and covered with a foil reflector to avoid radiant or convective cooling of the thermistor probe (see Chap. 22).

- Tympanic: Infrared tympanic thermometry is safe and noninvasive. However, because of unproven accuracy in newborns, it is not yet recommended for use (El-Radhi & Barry, 2006).
- Rectal: This method is no longer recommended because of the risk of trauma, perforation, and cross-contamination (Blackburn, 2007).

How Newborns Lose and Gain Heat. Newborns transfer heat to and from the body surface in four ways (Blackburn, 2007; Knobel & Holditch-Davis, 2007) (Fig. 20.13).

- Evaporation
  - Heat is lost when moisture from the skin and respiratory tract converts to vapor. Example: A warm, wet newborn is exposed to cool air in the delivery room.
- Conduction
  - Heat is lost from the body surface to a cooler solid surface touching the newborn. Example: Newborn is placed on the surface of a cold scale for weighing.
  - Heat is gained from a surface warmer than the infant. Example: Newborn is placed on a warm blanket or chemical thermal mattress.
- Convection
  - Heat is lost from the body surface to the surrounding air. Example: An exposed newborn is placed in a bassinette near a door that is opened and closed frequently.
  - Heat is gained if the surrounding air temperature is higher than the infant’s skin temperature. Example: An infant is placed in an incubator with circulating air at a temperature higher than the temperature of the infant’s skin.
- Radiation
  - Heat is lost from the body surface to a cooler solid surface not touching the newborn. Example: A newborn is placed near a cold window on an exterior wall.
  - Heat is gained when the solid surface is warmer than the infant’s skin temperature. Example: A cool infant is placed under an infant warmer (radiant heat source).

Newborns make heat in four ways (Blackburn, 2007; Knobel & Holditch-Davis, 2007):

- Metabolic processes: The amount of heat this method produces varies with activity, state, health status, and
Environmental temperature. The brain, heart, and liver produce the most metabolic energy by oxidative metabolism of glucose, fat, and protein (Blackburn, 2007).

- **Voluntary muscle activity:** Increased muscle activity during restlessness and crying generates some heat. In addition, the newborn may attempt to conserve heat by assuming a flexed position to decrease surface area. Shivering, the most important method to generate heat in adults, is less important in newborns. Most likely, this is because the shivering threshold is lower in newborns than in adults and occurs as a very late response associated with decreased spinal cord temperature after prolonged exposure (Blackburn, 2007).

- **Peripheral vasoconstriction:** In response to cooling, peripheral vasoconstriction reduces blood flow to the skin and therefore decreases loss of heat from the skin’s surface (Blackburn, 2007; Knobel & Holditch-Davis, 2007).

**FIGURE 20.13** Heat loss in newborns occurs in four ways: (A) conduction, (B) convection, (C) evaporation, (D) radiation.
Nonshivering thermogenesis: This mechanism is the main source of heat production in the newborn triggered at a mean skin temperature of 35°–36°C (Blackburn, 2007). Thermal receptors transmit impulses to the hypothalamus, which stimulates the sympathetic nervous system and causes norepinephrine release in brown adipose tissue, or brown fat. Found around the scapulae, kidneys, adrenal glands, head, neck, heart, great vessels, and axillary regions, brown fat is highly vascular and accounts for 2% to 7% of the newborn’s weight. It generates more energy than any other body tissue (Knobel & Holditch-Davis, 2007; Philip & Silverman, 2004). Norepinephrine in brown fat activates lipase, which results in lipolysis and fatty acid oxidation. This chemical process generates heat, which is transferred to the perfusing blood and tissues near the brown fat. This increases local temperature and eventually results in increased axillary temperature.

Cold Stress. When heat loss overwhelms the newborn’s ability to compensate, cold stress occurs (Fig. 20.14). Clinical signs include peripheral vasoconstriction, resulting in acrocyanosis and cool, mottled, or pale skin. The

term newborn may become restless, agitated, or hypoglycemic. Signs of increased oxygen consumption include clinical signs of respiratory distress such as tachypnea, grunting, or lethargy (MedLine Plus, 2007). The compensatory mechanisms of the newborn with cold stress initiate a chain of metabolic events that can result in hypoxemia, metabolic acidosis, glycogen depletion, hypoglycemia, and altered surfactant production.

Heat Stress. The newborn is equally vulnerable to overheating. Hyperthermia (temperature above 37.5°C) can result from overheating (Blackburn, 2007). Consequences include increased heart, respiratory, and metabolic rates (increased oxygen consumption); dehydration from insensible water loss; and peripheral vasodilation that may cause hypotension (Blackburn, 2007). Clinical signs may include warm extremities, increased activity, flushing, irritability, and sweating (in term and older preterm newborns) (Blackburn, 2007).

Glucose Metabolism

Maintenance of normal blood glucose concentration can be a major problem for sick or low-birthweight infants; however, the nurse caring for healthy full-term newborns should be aware that hypoglycemia is always possible. Because untreated hypoglycemia may result in long-term neurologic complications, immediate identification of and intervention for it are essential. See Research Highlight 20.2.

Definitions of neonatal hypoglycemia have been controversial over the years; no uniform standard exists. At present, a plasma glucose concentration less than 2.6 mmol/L appears to be abnormal for term and preterm infants and requires intervention (CPS, 2004). Newborns at risk for hypoglycemia include those who are small for gestational age, large for gestational age, born to mothers with diabetes (IDM), premature, or stressed by sepsis, shock, asphyxia, or hypothermia (CPS, 2004; Karlsen, 2007).

At birth, the steady glucose supply from maternal circulation terminates. Plasma glucose declines to its lowest levels by 1 hour after a term, uncomplicated birth from 66% of maternal serum glucose concentration to approximately 1.8 mmol/L (CPS, 2004). Liver glycogen stores, the source of the most immediately available glucose during newborn transition, are usually depleted in 3 to 12 hours. The lowest point occurs at 60 to 90 minutes of age (CPS, 2004).

Diminished hepatic glucose production causes most neonatal hypoglycemia. In these infants, hypoglycemia is associated with decreased availability of glycogen,
Timing of Cord Clamping. Researchers who did a meta-analysis of studies on the timing of cord clamping indicated that in full-term neonates, delaying cord clamping for a minimum of 2 minutes following birth was beneficial to the newborn, with the benefit extending into infancy. Although there was an increase in polycythemia among infants where cord clamping was delayed, the condition appeared to be benign (Hutton & Hassan, 2007).

Blood Components. Blood components begin to form as early as 2 to 3 weeks’ gestation. By term, blood volume averages 80 to 100 mL/kg of fetal weight (Blackburn, 2007). The transition from fetal to neonatal hematologic system involves numerous changes in the structure and function of blood components, particularly those of the red blood cells (RBCs).

Red Blood Cells. Hemoglobin molecules have binding sites for oxygen molecules. When oxygen fills all the binding sites, the hemoglobin is said to be 100% saturated.

Fetal hemoglobin (HbF) differs from adult hemoglobin (HbA). HbF is saturated more readily with oxygen molecules than HbA, which is essential to fetal survival because of the low-oxygen intrauterine environment. This high affinity for oxygen molecules exists because HbF does not have binding sites for a substance called 2,3-DPG, which enables HbF to attract and hold oxygen molecules more readily than HbA. The increased affinity for oxygen molecules facilitates oxygen transfer across the placenta but reduces oxygen release to the tissues. Thus, at any given oxygen content, the oxygen saturation of the hemoglobin molecule is greater with HbF than with HbA (Blackburn, 2007).

At term, newborn cord blood contains 50% to 80% HbF and 15% to 40% HbA (Blackburn, 2007). The more preterm the newborn, the more HbF remains. This works against preterm infants, whose HbF results in a diminished ability to respond to hypoxia by releasing oxygen molecules into the tissues. The higher proportion of HbA in term newborns compared with preterm newborns makes an efficient response to oxygen needs a less significant problem. Conversion from HbF to HbA continues over the first 6 months of life, as HbA production takes over and reaches 90% (Blackburn, 2007).

Because intrauterine oxygen exchange is less efficient than extraterine oxygen exchange through the lungs, fetuses and newborns have a higher RBC count and hemoglobin level than children and adults. Hemoglobin levels average approximately 166–175 g/L; the RBC count is 4.6–5.2 million/mm³ (Blackburn, 2007). Hemoglobin can increase up to 60 g/L in the first hours of life, resulting from the decrease in plasma volume and the net increase in RBCs. Hematocrit ranges from .51 to .56, with the aforementioned increase in the first few hours of life. Hemoglobin and hematocrit fall again to levels near the cord blood values by the end of the first week (Blackburn, 2007).

White Blood Cells. The white blood cell (WBC) count is approximately 10,000 to 26,000/mm³ in term infants and less in preterm infants (Blackburn, 2007). It increases on the first day of life, perhaps as a result of the stress of birth, and decreases to approximately 12,000/mm³ by 4 or 5 days in both term and preterm newborns (Blackburn, 2007). Immature forms of WBCs (eg, neutrophils, eosinophils) can be elevated in the first 2–3 days of life (Blackburn, 2007). Intense crying may increase the WBC count by 146% and result in a left shift in the differential (more immature cells present, which indicates mobilization of WBCs to fight infection) (Christensen, 2000). A complete blood count (CBC) with differential is not routine for a healthy newborn, so additional diagnostic procedures, such as chest radiography, and initiation of IV therapy may occur in the same period. The infant’s behavioural state just before and during a CBC with differential is helpful to note on the medical record, especially if...
the blood draw is difficult, stressful, or prolonged. Personnel performing neonatal laboratory tests should be proficient and comfort newborns as much as possible during procedures by holding or swaddling them or providing a pacifier for sucking.

**Platelets.** Platelet counts range from 150,000 to 450,000/mm³, which is similar to adult counts. Platelet counts below 150,000/mm³ are abnormal in newborns (Blackburn, 2007). Platelet function may be hypoplastic in the first few days of life, which is protective because of increased risk for thrombosis; however, this increases the risk for bleeding and bleeding disorders for preterm and compromised newborns (Blackburn, 2007). Platelet count also may be used to look for infection.

**Blood Sampling.** Venous sampling (blood drawn from a vein) will yield lower hemoglobin, hematocrit, and RBC values than a capillary (heelstick) sample (Blackburn, 2007). The nurse can minimize differences between capillary and venous results by pre-warming the heel before drawing a capillary sample, obtaining a brisk blood flow, and discarding the first few drops of blood (Blackburn, 2007). The nurse also should document the site of the sample.

**Hepatic System**

The liver accounts for 5% of the newborn’s weight (Blackburn, 2007). The maternal liver handles fetal metabolic functions, but after birth, liver function becomes essential to neonatal survival (Blackburn, 2007).

**Functions of the Liver.** In late gestation, the fetal liver increases glycogen storage in preparation for the newborn transition. Glycogen maintains glucose homeostasis immediately after birth. With the loss of the maternal glucose supply at birth, neonatal blood glucose level falls. The baby uses approximately 90% of liver glycogen stores in the first 24 hours as a result of rapid glycogenolysis (the release of glucose from glycogen). Neonatal blood glucose usually reaches its lowest level 60 to 90 minutes after birth. Steady hepatic release of glucose occurs by 3 to 4 hours of life. As glycogen levels fall, the healthy term infant mobilizes free fatty acids and ketones to stabilize blood glucose. In the first several days, blood glucose homeostasis is glucose dominant; thereafter, it becomes insulin dominant, as in adults (Blackburn, 2007).

**Bilirubin Metabolism.** In newborns, the liver plays a major role in the metabolism of bilirubin, a yellow pigment formed from hemoglobin as a byproduct of RBC breakdown. In high concentrations, bilirubin is toxic to the brain (CPS, 2007b). Bilirubin production is almost twice as much in newborns as in adults because of the high volume of circulating RBCs and their shorter life span (Blackburn, 2007). These factors place newborns at risk for hyperbilirubinemia.

Cord blood bilirubin levels are approximately 34 µmol/L (Blackburn, 2007). Clamping of the umbilical cord decreases circulation to the liver. Preterm or sick newborns also may experience intermittent patency of the ductus venosus, resulting in shunting of the blood past the liver sinusoids, which interferes with bilirubin removal from the plasma (Blackburn, 2007).

Unconjugated bilirubin, also called indirect bilirubin, is bound to circulating albumin in the bloodstream and has not yet been metabolized by the liver. Each gram of albumin binds approximately 8.5 to 10 mg of bilirubin. As bilirubin production increases, all the albumin sites may be taken up, and the free (unbound) bilirubin can move into fatty tissue, such as the skin, where it causes jaundice, or into the brain, where it can cause neurologic damage (Blackburn, 2007).

The liver removes unconjugated (indirect) bilirubin from the albumin and “conjugates” it. The conversion of indirect bilirubin to conjugated bilirubin depends on glucose and oxygen. This process involves an important enzyme called glucuronyl transferase, in which unconjugated (indirect) bilirubin interacts with glucose and glucuronic acid to produce direct bilirubin, which is water soluble. Next, direct bilirubin is excreted into the small intestine, which processes bilirubin into urobilinogen. When oxidized, urobilinogen forms orange urobilin, giving the stool its characteristic color. Most urobilinogen is excreted in stool, whereas some is reabsorbed in the colon and excreted in urine (Blackburn, 2007).

It is possible for urobilinogen to be converted back into indirect bilirubin, a process known as enterohepatic shunting. In this process, unconjugated (indirect) bilirubin is absorbed across the intestinal mucosa, reenters the circulation, and ends up back in the liver. Any delay in intestinal movement or decrease in intestinal flora increases the risk of direct bilirubin to convert to indirect bilirubin, thus necessitating reentry to the liver and begin the excretion process again (Blackburn, 2007). Serum bilirubin levels are expressed as three values: total, indirect, and direct. Total bilirubin is simply the sum of the indirect and direct values.

Newborn jaundice progresses from head to toe. In babies with light skin, jaundice is easily seen, whereas in babies with dark skin, it can be made more evident by pressing a finger on their skin and seeing the yellow color before capillary refill occurs. A newborn becomes visibly jaundiced as blood levels reach a total serum bilirubin (direct plus indirect) value of 85–120 µmol/L in the first few days after birth. This normal event is called physiologic jaundice and occurs in approximately 60% of term newborns, peaking at 3–5 days, after most newborns have been discharged from hospital (CPS, 2007b). Visual assessment of jaundice is inadequate for diagnosing hyperbilirubinemia, since the level of bilirubin at which jaundice is evident varies considerably. Only
50% of babies with a total serum bilirubin concentration greater than 128 µmol/L will appear jaundiced (CPS, 2007b). See Chapters 21 and 22 for detailed discussions of other types of jaundice and their treatment.

Gastrointestinal System

Oral Feeding. The beginning of oral feeding is critical to the development of immature gastrointestinal function, because it causes surges in plasma concentrations of gastric hormones and enteric neuropeptides. Human milk is rich in these factors, as well as being the preferred source of energy and fluid (Blackburn, 2007). Healthy term babies may be breastfed as soon as possible after birth and 8 to 12 times per day thereafter (AAP & ACOG, 2002). Formula-fed babies should eat within 6 to 8 hours of birth or sooner if indicated by hunger cues or risk for hypoglycemia (see Chap. 21). The term newborn’s gastric capacity is approximately 6 mL/kg body weight, which means that a newborn weighing 3400 g has a gastric capacity of approximately 20 mL of fluid (Blackburn, 2007). See Chapter 21.

Meconium

"On the second day, meconium came from my baby like a lava flow. I found it unnerving, but my nurse reassured me, saying that the more stool the baby passed, the less problem he would have with jaundice.”

From a mom

Meconium, the newborn’s first stool, begins to form at approximately 16 weeks’ gestation (Blackburn, 2007). This black, sticky substance consists of vernix caseosa, lanugo, squamous epithelial cells, occult blood, bile, and other intestinal secretions. Bacteria appear in meconium by 24 hours of life. Almost all newborns pass meconium by 24 to 48 hours. Failure to pass meconium is a sign of intestinal obstruction and places the newborn at high risk for hyperbilirubinemia (Blackburn, 2007).

Immunologic System

Susceptibility to Infection. Immature immunologic responses make the newborn susceptible to infection. In addition, lack of exposure to common organisms results in a delayed or decreased immune response. Preterm infants, especially those born before 32 to 33 weeks’ gestation, are especially susceptible to infection because of a markedly immature immune response (Blackburn, 2007).

Newborns can become infected while in utero (through transplacental passage of an organism from mother to fetus), during labour (through contact or aspiration of organisms in the birth canal), or after birth (from organisms in the environment or, less commonly, breast milk) (Remington & Klein, 2006). The nurse should be aware of prenatal, intrapartal, and neonatal risk factors for infection, use standard precautions and excellent hand washing technique, and teach parents basic preventive hygiene procedures.

Departure from the sterile uterine environment exposes the newborn to a host of potential pathogens. The birth process, hospital environment, and ingested and inhaled substances expose the skin, respiratory system, and gastrointestinal tract. Skin flora increase immediately after birth; in term healthy newborns, the skin achieves a balance of colonized bacteria that protects them from invading pathogens. Gastric acidity initially protects the gut from gram-positive and gram-negative bacteria; breastfeeding infants receive the added benefit of antimicrobial substances in human milk (Blackburn, 2007).

Term newborns have temporary passive immunity from transplacental transfer of maternal immunoglobulins, especially immunoglobulin G (IgG). IgA levels are decreased, however, and place them at risk for viral and gram-negative bacteria (Blackburn, 2007). The inexperienced immune system fails to produce detectable type-specific antibodies. Newborns cannot localize infection because of their inability to produce adequate neutrophils and other phagocytes and transport them to infection sites. For this reason, signs of sepsis can be diffuse and nonspecific instead of localized; for example, temperature instability is a more common sign of neonatal sepsis than is fever (Blackburn, 2007) (see Chap. 22).

Infection Prevention Strategies. The best strategy for preventing nosocomial infections is thorough hand washing. The nurse’s work shift begins with a 3-minute scrub of the hands and arms above the elbow with an antiseptic soap and brush. Thereafter, the nurse should wash her hands for at least 10 seconds with bactericidal soap before and after contact with the infant and after touching objects. This rule applies regardless of whether the nurse wears gloves. The nurse should remove rings, watches, and bracelets and trim fingernails short. No false fingernails or opaque nail polishes should be permitted, because they increase the likelihood of inadequate cleansing. Alcohol-based foams or gels, although not appropriate when hands are soiled, kill bacteria when applied to clean hands and given sufficient contact time (follow manufacturer’s guidelines) (AAP & ACOG, 2002).

Nursery personnel managing healthy term newborns do not need to wear cover gowns as long as hand washing is strictly enforced. People with respiratory, gastrointestinal, or skin infections should not have contact with newborns. In addition, any staff member with a skin condition or appliance that prevents or impairs hand washing should not have contact with newborns (AAP & ACOG, 2002).

Hospitals vary in their approach to staff members with herpes simplex virus. Transmission from infected personnel to infants is rare. If an infected staff member is allowed to work with newborns, he or she should...
cover lesions and perform meticulous hand washing. Nevertheless, any staff member with herpetic hand infections (herpes whitlow) may not have contact with any client until the infection has resolved (AAP & ACOG, 2002).

Ideally, each newborn has individual supplies, such as a digital thermometer and stethoscope, in his or her bassinette. If these supplies travel from baby to baby, staff members must follow strict procedures for cleaning after each use to prevent infection (AAP & ACOG, 2002).

Parents also share responsibility for protecting infants. They must wash their hands thoroughly before providing newborn care, before preparing formula, and, of course, after using the bathroom. Siblings with fever, symptoms of acute illness, or recent exposure to a known communicable disease (eg, chickenpox) should not be allowed to visit the newborn at the hospital (AAP & ACOG, 2002).

Integumentary System

Skin Functions. Newborn skin has three functions: to limit transepidermal water loss, to prevent absorption of chemicals, and to protect against pathogens (Polin & Fox, 2004). The epidermal thickness of the term newborn is as well-developed as in an adult; however, the more preterm the infant, the more immature the barrier born is as well-developed as in an adult; however, the more preterm the infant, the more immature the barrier (Blackburn, 2007).

Transepidermal water loss is not a significant risk factor for healthy term infants. Term infants lose 4–8 g/m²/h, slightly lower than in adults (Blackburn, 2007). Transepidermal water loss in term infants requires consideration when their care requires a radiant warmer, an incubator, or phototherapy (Blackburn, 2007).

Skin Characteristics. A newborn’s skin is more permeable than an adult’s to substances such as drugs and chemicals. Skin permeability increases with decreasing gestational age. Obviously, skin disease and injury increase the risk for permeability. The historical practice of bathing newborns with hexachlorophene to prevent colonization with staphylococci has been found to increase the risk for neurologic damage (Kopelman, 1973). Side effects from absorption and toxicity of chemicals from topical compounds can be devastating. Povidone iodine may cause hypothyroidism and goiter, and neomycin can lead to neural deafness (Schwayder & Akland, 2005). Isopropyl alcohol, depending on its concentration, duration of exposure, condition of the skin, pressure to the skin, and quality of skin perfusion, can cause drying, irritation, and burns (Blackburn, 2007). Any topical preparations should be used with care, and should be removed from the skin as soon as possible (Schwayder & Akland, 2005).

Table 20.4 depicts various skin findings in newborns.

The skin’s acid mantle has a surface pH lower than 5 and acts as a bacteriostatic barrier. After birth, colonization of the skin begins immediately, and “friendly” bacteria grow in balance to protect against infectious pathogens. If the skin pH shifts toward alkaline, for example, following bathing with an alkaline soap, there may be an increase in bacteria and changes in skin permeability leading to increased transepidermal water loss (Lund et al., 1999).

Renal System

Fetal Development. At birth, the kidneys must take over from the placenta fluid and electrolyte balance, metabolic excretion, and other functions. Although the newborn has the same number of nephrons by 34 to 35 weeks’ gestation as an adult, the kidneys are less functional and do not approach full maturation until the second year of life (Blackburn, 2007).

Newborn Kidney Function. Glomerular filtration rate (GFR) is low in comparison to an adult’s. This means that the newborn’s kidneys favour resorption of sodium and cannot dispose of water rapidly when necessary. The newborn is therefore at risk for water retention and edema (Blackburn, 2007).

Tubular function is altered, so that the kidneys have less ability to concentrate urine, putting newborns at risk for dehydration. Limited ability to concentrate urine also puts the newborn at risk for acid–base abnormalities, hyperkalemia, hypocalcemia, and hypoglycemia (Blackburn, 2007).

With advancing gestational age, extracellular water and total body water decrease, and intracellular water increases. Diuresis occurs shortly after birth and accounts for the loss of 5% to 10% of birthweight in the term infant’s first week of life (Blackburn, 2007).

Urine. Healthy term infants urinate 15 to 60 mL/kg/day (Blackburn, 2007). The initial void occurs in the delivery room for 13% to 21% of newborns; 95% of all newborns void in the first 24 hours, and all newborns should have voided by 48 hours (Clark, 1977). A newborn who has not voided by 24 hours requires further evaluation (AAP & ACOG, 2002).

The urine is usually straw coloured, but may be cloudy with mucus. Specific gravity is low (1.008 to 1.012) (Martin et al., 2006). Female infants sometimes have small amounts of bloody mucus from pseudomenstruation, resulting from the withdrawal of maternal hormones (Tappero & Honeyfield, 2003). Pink stains (brick dust spots) may appear in the urine of both males and females; they result from uric acid crystals and are not a cause for concern (Blackburn, 2007).

Promoting Normal Transition

No one knows exactly what the experience of birth is like for the baby. He or she likely feels the mother’s muscular uterine contractions. Each contraction may lead
**TABLE 20.4** Common Skin Manifestations of the Normal Newborn

<table>
<thead>
<tr>
<th>SKIN MANIFESTATION</th>
<th>FAMILY TEACHING TIPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrocyanosis</td>
<td>A bluish colour to the hands and feet of the newborn is normal in the first 6 to 12 hours after birth. Acrocyanosis results from slow circulation in the extremities.</td>
</tr>
<tr>
<td>Milia</td>
<td>Small white spots on the newborn’s face, nose, and chin that resemble pimples are an expected observation. Do not attempt to pick or squeeze them. They will subside spontaneously in a few days.</td>
</tr>
<tr>
<td>Erythema toxicum</td>
<td>The so-called newborn rash commonly appears on the chest, abdomen, back, and buttocks of the newborn. It is harmless and will disappear.</td>
</tr>
<tr>
<td>Mongolian spot</td>
<td>These bluish black areas of discolouration are commonly seen on the back, buttocks, or extremities of African American, Hispanic, Mediterranean, or other dark-skinned newborns. These spots should not be mistaken for bruises or mistreatment and gradually fade during the first year or two of life.</td>
</tr>
<tr>
<td>Telangiectatic nevi</td>
<td>These pale pink or red marks (&quot;stork bites&quot;) are sometimes found on the nape of the neck, eyelids, or nose of fair-skinned newborns. Stork bites blanch when pressed and generally fade as the child grows.</td>
</tr>
<tr>
<td>Nevus flammeus or port-wine stain</td>
<td>A port-wine stain is a dark reddish purple birthmark that most commonly appears on the face. It is caused by a group of dilated blood vessels. It does not blanch with pressure or fade with time. There are cosmetics available that help cover the stain if it is disfiguring. Laser therapy has been successfully used to fade port-wine stains.</td>
</tr>
</tbody>
</table>
to mild hypoxia and a transient drop in blood pressure (Blackburn, 2007). During vaginal birth, contractions and maternal pushing efforts propel the baby through the narrow birth canal and out the vaginal opening. Cesarean birth abruptly exposes the newborn to handling and light as the baby is pulled from the uterus into the extrauterine environment. For the first time, the newborn experiences cool room temperature, tactile stimulation, bright light, loud noises, and new feelings of gravity and proprioception. He or she discovers what may be a surprising ability to extend the head, arms, and legs, and reacts to this startling lack of containment around the body.

The incredible forces of the birth process may be evident during physical examination. The newborn’s eyes may be puffy and bruised and the skull moulded into an elongated shape. Boggy areas of fluid may be palpable under the scalp. In some instances, the nose is flattened or pushed to one side. A large baby may even suffer a fractured clavicle as the shoulders make the tight fit through the vaginal opening.

Experienced and thoughtful neonatal nurses recognize that transition is more likely to be successful if unnecessary stressors are eliminated. Nurses who handle the newborn gently, protect the baby from unnecessary and invasive procedures, and treat him or her in accordance with developmental abilities promote successful extrauterine transitions, model excellent caregiving skills to parents, and promote parent–infant attachment. Strategies for a “gentle” newborn transition include the following:

- **Gentle handling**: Move newborns calmly and gently. Do not twist the extremities or change resting position abruptly. Speak to babies before touching them, and while providing care.

- **Use of containment**: Newborns are accustomed to containment within the uterus and are comforted by boundaries on the extremities, top of the head, and feet and legs. Swaddling is an example of containment; however, newborns can be comforted in other ways, if swaddling is not feasible. Examples include “nesting” the newborn if radiant warmer use is required, asking the mother’s partner or support person to gently hold the newborn’s arms across its chest during the vitamin K injection, and quieting a newborn who is escalating from an active alert state to a crying state.

- **Avoidance of gastric suction**: Vigorous or deep suctioning, especially with a suction catheter, may elicit a vagal response, slowing heart rate and causing apnea, bradycardia, and resultant hypoxia. Nurses can remove secretions at birth with a towel, bulb syringe, or suction catheter. Thereafter, in a healthy newborn, the bulb syringe is usually the only suction device needed to clear the mouth or nares, and then only to remove visible vomitus or mucus. Sick newborns may require gastric suctioning to remove gastric contents to facilitate assisted ventilation and prevent aspiration; however, routine gastric suctioning for healthy newborns is unnecessary and invasive (Zaichkin, 2006).

- **Use of ambient or dim light**: Newborns are accustomed to a dark intramembranous environment. Physical examination is best performed when newborns are in a quiet alert state. A bright overhead light causes infants to close the eyes, grimace, and become uncomfortable. Transient bright light may be required to check a blink reflex or to better visualize an aspect of anatomy. The nurse should prevent continuous bright light from shining in the baby’s face.

- **Use of axillary temperature**: Routine rectal temperature measurement is now rare. Axillary temperature measurement is noninvasive and approximates core temperature (Blackburn, 2007). Placement of a thermometer in the newborn’s rectum does not prove rectal patency, because anal stenosis or atresia may occur at any point along the anorectal canal (Tappero & Honeyfield, 2003). Rectal temperature can be uncomfortable and requires removal of blankets and the diaper, exposing the newborn to chilling. Most important, rectal temperatures place newborns at risk for trauma, perforation, and cross-contamination (Blackburn, 2007).

If the baby is term, stable, and in good condition, and in accordance with the mother’s birth plan, health care providers should separate mother and baby as little as possible. The nurse may take the baby’s axillary temperature while the mother or partner is holding the child. The nurse also can assess heart rate and breath sounds easily while parents hold the baby. Some nurses instill prophylactic eye medication and give the IM injection of vitamin K with the baby in a parent’s arms.

### Collaborative Care: The Transitional Period

Transition goes well for 85% to 90% of newborns, and these infants emerge from the first 4 to 6 hours of life healthy and ready to interact with the environment. The remaining 10% to 15% develop potentially life-threatening complications that require immediate identification and intervention (Askin, 2002). The nurse caring for the infant in transition must be alert for signs of abnormal transition, and the experienced nurse can assess the differences between an infant experiencing a “rocky” transition and an infant who is truly ill.

The newborn can be classified as well, at risk, or sick (Perinatal Continuing Education Program [PCEP], 1999):

- **The well newborn** is term and AGA with no history of prenatal or intrapartal risk factors. The nurse would anticipate a smooth transition for this infant.

- **The at-risk newborn** is near term or term and has one or more risk factors relating to size for gestation,
prenatal and intrapartum risk factors, or both. The nurse is alert for problems that may develop in transition. With appropriate nursing support and minimal interventions, the at-risk newborn may overcome initial challenges and become a well newborn. Conversely, the at-risk newborn may develop problems that require special care for a sick newborn.

- The **sick newborn** has clear risk factors relating to gestational age, size for gestation, and prenatal or intrapartum history. The nurse anticipates care of a sick newborn who will require evaluation and support in a special care nursery environment.

Because of the incredible complexity of adaptation necessary for the transition to extrauterine life, the term healthy newborn is allowed a short period to resolve initial challenges during transition. The nurse must know the prenatal and intrapartum risk factors that could place the newborn at risk. If such factors are present, the nurse anticipates potential neonatal implications and prepares to intervene during transition, as necessary. For the at-risk newborn, the nurse delays stressful procedures such as bathing until the newborn is stable. For a sick newborn, the nurse delays both bathing and feeding (see Chap. 22).

Duration and severity of symptoms differentiate normal from abnormal transition. Respiratory distress is the most common manifestation of abnormal transition (Askin, 2002). If present, signs of respiratory distress (expiratory grunting, nasal flaring, and retracting) should be mild and intermittent, unaccompanied by additional problems (e.g., pallor, heart murmur, lethargy), and steadily resolve in the first 30 to 60 minutes of life (Thureen et al., 2005). It is not uncommon for near-term newborns or those born by cesarean to exhibit mild to moderate respiratory distress for several hours after birth. With appropriate nursing care to ensure adequate oxygenation, thermoregulation, and blood glucose levels, most of these infants improve over the course of a few hours (Askin, 2002). Any newborn with moderate or severe respiratory distress requires immediate evaluation in a setting prepared to support his or her thermal, pulmonary, cardiovascular, and metabolic requirements (see Chap. 22). See Box 20.4.

**Assessment**

The nurse assesses axillary temperature every 30 minutes after birth until the newborn’s condition has remained stable for 2 hours (AAP & ACOG, 2002). Thereafter, the temperature should be taken during routine assessments every 3 to 4 hours, preferably when the newborn is awake for care and feeding. The nurse assesses temperature more often if the newborn is at increased risk for heat loss from prematurity or a central nervous system anomaly, if temperature is unstable, or if the newborn shows other signs of distress related to temperature instability, such as cool or mottled skin, respiratory distress, jitteriness, or sweating (in term and postterm babies).

The nurse caring for the infant should check the prenatal and intrapartum history to identify risk factors for hypoglycemia and follow the hospital’s screening protocol. Blood glucose screening is part of the assessment for any infant showing signs of hypoglycemia or respiratory or central nervous system distress. Bedside glucose monitoring is not a routine part of admission for healthy newborns with no known risk factors or symptoms (AAP & ACOG, 2002).

Inspection of colour is part of routine newborn assessment and provides information about blood volume and perfusion. Colour variations should be congruent with the newborn’s genetic makeup; however, a newborn with persistently pale mucous membranes or one who is plethoric, that is, a deep-red colour, requires further evaluation. Heel-stick or venous blood sampling of the hemoglobin and hematocrit is indicated for these newborns to rule out anemia and polycythemia.

The nurse assesses for jaundice by pressing the newborn’s skin firmly with a finger and evaluating how much jaundice appears where the skin blanches. Many settings use a transcutaneous bilirubin meter for screening. Bilirubin advances from head to foot, so a baby with jaundice to the knees has a higher bilirubin level than a baby with jaundice to the nipples. The newborn who appears slightly jaundiced by day 2 or 3 may require a laboratory evaluation of bilirubin, especially if being discharged. Follow-up examination and/or laboratory testing are indicated; the nurse may make necessary arrangements before discharge. The newborn with jaundice in the first 24 hours...
requires immediate evaluation by a pediatric provider. The newborn at risk for pathologic jaundice requires more intensive blood work, such as blood typing and Coombs testing (see Chap. 22). A baby whose bilirubin level rises faster than his or her capacity to metabolize it may require phototherapy (see Chap. 22).

The newborn has audible bowel sounds in the first few hours of life. The nurse should observe and assess ability to suck, swallow, and breathe, to ensure effective feeding every 2 to 4 hours and adequate fluid intake. The newborn should pass stool by 48 hours (AAP & ACOG, 2002).

The nurse routinely and periodically assesses vital signs, appearance, feeding, and activity. Signs of infection may be nonspecific and subtle. If the nurse suspects signs of developing infection, he or she should perform more frequent assessments.

The healthy newborn voids by 24 hours (AAP & ACOG, 2002). The nurse documents assessment of urine output and instructs parents to report the number of wet diapers they change. The nurse should notify the pediatric provider of delayed or abnormal urination (AAP & ACOG, 2002).

Potential Nursing Diagnoses
The following nursing diagnoses may be appropriate:

- **Risk for Imbalanced Body Temperature** related to large body surface in relationship to mass and decreased subcutaneous fat
- **Risk for Injury** related to hypoglycemia
- **Risk for Injury** related to blood volume excess or deficit
- **Risk for Injury** related to excess by-products of RBC breakdown and concurrent hepatic immaturity
- **Risk for Injury** related to delayed or abnormal GI function secondary to immaturity or pathology
- **Risk for Infection** related to immature immunologic defenses and environmental exposure
- **Risk for Impaired Skin Integrity** related to immature skin structure and environmental exposure
- **Risk for Deficient/Excess Fluid Volume** related to immature renal physiology

Planning/Intervention
No health care team member should ever leave a newborn exposed after unwrapping or undressing the baby for a physical examination or procedure, such as drawing blood. Parents who naturally unwrap the newborn to count fingers and toes, to look for familial characteristics, or to make sure that “everything is there” should be allowed this important examination, but encouraged to make it brief. To avoid hyperthermia, staff must be educated in correct use of warming interventions, such as radiant warmers, chemical warmers, heat lamps, and incubators. Strategies to promote thermoregulation include drying the newborn immediately after birth; dressing the newborn in clothing, blankets, and a hat to conserve body temperature; ensuring that linen, blankets, and clothing are dry; placing the newborn in a draft-free area; and using necessary warming interventions, such as the radiant warmer, appropriately and safely.

Clear and complete communication among team members is essential to identify newborns at risk for hypoglycemia. The nurse caring for the mother should notify nursery personnel, the pediatric care provider, or both when she admits a labouring woman at risk for giving birth to a baby predisposed to blood glucose instability. Risk factors include prematurity, maternal diabetes, SGA newborn, or intrapartal fetal stress. Laboratory confirmation of aberrant bedside glucose screening test results should occur quickly. Interventions vary depending on the etiology and degree of hypoglycemia. Feeding by breast, nipple, or gavage is effective in most cases. Newborns in distress, those with acute hypoglycemia, and infants born before 35 to 36 weeks’ gestation are managed with IV therapy. Thermal and oxygen support are important adjuncts, because thermal stress and respiratory distress increase glucose metabolism (Blackburn, 2007).

The nurse caring for the newborn should be aware of risk factors for anemia or polycythemia and communicate them to the pediatric provider. Communication with labour and delivery staff is important to obtain late intrapartum information, such as suspected partial placenta previa or placenta abruptio, which places the newborn at risk for decreased blood volume and anemia. Evidence of discordant placental circulation may explain anemia or polycythemia in twins. Laboratory blood work to ascertain the newborn’s hemoglobin, hematocrit, or CBC and differential is not required routinely; however, any infant at risk for or showing evidence of anemia, polycythemia, or infection requires evaluation. The pale or plethoric newborn also requires support to ensure thermal stability and adequate perfusion and oxygenation.

Because healthy newborns and mothers are usually discharged by day 1 or 2, collaborative efforts are necessary to identify those babies who require treatment for hyperbilirubinemia. The nurse should teach parents when to call the health care provider, that is, when the baby is jaundiced head to toe, or when lethargy, poor feeding, or both accompany jaundice. The nurse should recommend a system of follow-up examination, either in the home or clinic, within 48 hours of discharge, especially for those infants discharged before 48 hours of age (AAP & ACOG, 2002). Early and effective feeding promotes excretion of bilirubin; therefore, the baby should stay with the mother as much as possible so that feeding can occur at the first opportunity.

The nurse documents bowel sounds, feeding activity, feeding tolerance, and bowel activities and instructs
parents about observing and documenting infant feeding and bowel movements. The nurse should notify the pediatric provider of delayed or abnormal bowel movements, abdominal distention, or bilious vomiting (AAP & ACOG, 2002). Early and effective feeding helps promote intestinal motility. The nurse should alert the pediatric provider of abnormalities, and, when appropriate, stop feeding until medical evaluation is complete.

The infant’s medical records should be complete and identify all factors that could lead to infection. Examples include foul-smelling amniotic fluid or maternal fever late in labour. The nurse communicates such information verbally and in the infant’s care record. All team members, including the baby’s parents, should practice meticulous hand washing and protect the newborn from exposure to pathogens. A newborn with developing sepsis can become critically ill within hours. A CBC with differential is necessary for those at high risk or with abnormal transition or clinical signs of infection (see Chap. 22). In addition, the plan of care usually includes IV antibiotics and support of thermoregulation, oxygenation, perfusion, and glucose metabolism. Parents of a sick newborn require information and support during this stressful time (see Chap. 22).

Every team member works to protect the newborn’s skin from damage and chemical exposure. The nurse reports skin abnormalities or breaks to the pediatric care provider in a timely manner, and points out skin characteristics to parents. The nurse washes off any soap used for bathing to prevent absorption of chemicals through the skin and discourages use of perfumed baby products. Early and effective feeding helps promote adequate voiding. Accurate documentation ensures adequate assessment of renal activity and prevents unnecessary interventions and diagnostic tests. The nurse should notify the pediatric provider of delayed or abnormal voiding.

**Evaluation**

Standards for normal newborn temperature vary regionally; however, axillary temperature should be stable and between 36.5° and 37.3° C. The newborn should be wrapped in dry clothing and blankets in a warm, draft-free environment. The nurse documents temperature and any interventions to adjust it and periodically re-evaluates the temperature to ensure stability or to identify instability that requires additional assessment and intervention.

Blood glucose level should be at least 2.5 mmol/L while weaning IV fluids or advancing oral feedings (Cowett & Loughead, 2002). The nurse documents results of bedside screening and laboratory tests and symptoms of hypoglycemia, such as jitteriness or lethargy.

The healthy term newborn has no apparent risk factors for alterations in quantity or function of blood components, is pink and well perfused, and shows no signs of sepsis. RBC (including hemoglobin and hematocrit), WBC, and platelet counts vary considerably among newborns, depending on gestational age and environmental factors; however, laboratory values should be within normal limits.

Physiologic jaundice should resolve in the first week of life. Evidence of resolution includes disappearance of visible jaundice and serum bilirubin levels decreasing to normal limits.

The healthy term infant can coordinate sucking, swallowing, and breathing to feed effectively 8 to 12 times per day. He or she has audible bowel sounds, a soft protruding abdomen, no bilious vomiting, and passes meconium by 12 to 24 hours after birth.

The nurse should evaluate blood work for diagnostic confirmation of infection. An infant responding positively to interventions has stable vital signs within normal limits, adequate oxygenation and perfusion, normal laboratory blood test results, and normal voiding and bowel movements. He or she also tolerates feedings when appropriate.

The skin should be dry and flaking in a term newborn by the second or third day of life. The newborn should have voided straw-coloured urine. Female infants may have small amounts of bloody mucus from pseudomenses. The nurse should document each wet diaper and weigh the newborn daily. A loss of 5% to 10% of birthweight is expected in the first week of life from normal diuresis.
Basic nursing care of the healthy newborn usually differs little from care that parents render after discharge. In most cases, the healthy mother and newborn are separated as little as possible during the hospital stay; therefore, basic newborn care that the nurse performs is an opportunity to teach parents these skills (Nursing Care Plan 20.1). Hospital length of stay may be less than 48 hours, so it is important for the mother and her partner or support person to provide newborn care, calling on the nurse to answer questions and assist as necessary. (For newborn feeding and nutrition information, see Chap. 21.)

Cultural Aspects
The nurse should consider cultural aspects of newborn care while teaching parents relevant skills. It is helpful to know how ethnic practices may differ from standard hospital practices. It is not safe to assume that the hospital protocol or pediatric provider’s orders will be congruent with the family’s cultural practices. Neither is it safe to stereotype the behaviour of ethnic groups by assuming that literature about cultural practices applies to everyone within each culture. The nurse should observe parental responses to teaching and ask if they have a different preference. For example, the nurse who teaches umbilical cord care to a woman who has emigrated from another country may approach the situation by saying, “The way I just showed you is how many mothers in Canada do this. Is this what you expected? Would you like to talk about other methods?”

No health care professional can assume that information related to culture or ethnicity applies to each specific client just because she comes from that background. For more information about caring for clients of different cultures and ethnicities, see the following:


Care of the Newborn Following Home Birth
Newborn care for an infant born at home follows the same principles applied to care provided in the hospital. A multidisciplinary team provides care, with the nurse coordinating the plan. The scope of nursing practice “is limited to practices deemed safe and appropriate to be carried out in an environment that is physically separated from a health care institution and its resources” (Association of Women’s Health, Obstetric, and Neonatal Nurses [AWHONN], 1998, p. 36). Concepts important to home care of the newborn include the following:

- Women and newborns receive the same level of nursing care and expertise in the home as would be expected in a licensed birth setting.
- The nurse, health care provider, and family members develop the plan of care collaboratively with the client, with consideration of various aspects of the home life.
- Nursing practice in a home care setting is consistent with regulations that direct practice. Standards of newborn care are the same in the home setting as in the hospital setting. For example, vitamin K administration, eye prophylaxis, administration of hepatitis B immunoglobulin and hepatitis B vaccine, if appropriate, and newborn metabolic screening should be offered to parents in the home birth setting. The nurse should document timely assessments, the plan of care, interventions, evaluation, and outcomes.

The primary focus of home care is safety. Appropriate client selection, sound clinical judgement, and prompt transfer to a receptive environment when necessary, help ensure good perinatal outcomes (American College of Nurse-Midwives [ACNM], 2003).

Infant Security
Infant abduction from hospital settings is uncommon but not outside the realm of possibility (CTV.ca, 2007a). Hospital personnel need education regarding abductor profiles (Box 20.5), abductor behaviour, means of abduction, and their facility’s emergency plan in the event of abduction. Obstetric units should have policies and procedures in place to reduce the risk for abduction (Shogan, 2002). Policies may include:

- Only those family members or support people who bear an identification bracelet matching the newborn’s may transport the newborn.
- The newborn is described accurately in the newborn record.
- All hospital personnel wear photo identification above the waist.
- Client names are visible only to hospital personnel, not to visitors.
- All newborns are transported in their cribs. Anyone walking with a newborn in their arms is stopped and questioned.
- Unit access is controlled, unit and stairway exits have alarms, and video cameras record the faces of people leaving the unit (Shogan, 2002).

Parents play a major role in ensuring their infant’s security. They must learn the basics of hospital security

(UNIT 5 Postpartum Period and Newborn Care)

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**Box 5**

**Hospital Length of Stay**

Women and newborns receive the same level of nursing care and expertise in the home as would be expected in a licensed birth setting. Hospital personnel need education regarding abductor profiles, abductor behaviour, means of abduction, and their facility’s emergency plan in the event of abduction. Obstetric units should have policies and procedures in place to reduce the risk for abduction (Shogan, 2002). Policies may include:

- Only those family members or support people who bear an identification bracelet matching the newborn’s may transport the newborn.
- The newborn is described accurately in the newborn record.
- All hospital personnel wear photo identification above the waist.
- Client names are visible only to hospital personnel, not to visitors.
- All newborns are transported in their cribs. Anyone walking with a newborn in their arms is stopped and questioned.
- Unit access is controlled, unit and stairway exits have alarms, and video cameras record the faces of people leaving the unit (Shogan, 2002).
NURSING CARE PLAN 20.1  

The Healthy Newborn and Family

Recall Thomas, the 8-hour-old newborn from the beginning of this chapter. Further assessment reveals the following: weight, 3700 g; pink colour; alert and active; axillary temperature, 36.2°C; heart rate, 148 bpm and steady with appropriate PMI and no audible murmur; respirations 52 breaths/min, with no grunting, nasal flaring, or retractions; clear and equal bilateral breath sounds. Bowel sounds are present. Thomas voided at birth and has passed his first meconium stool. The nurse notes a small red puncture mark on the occipital part of the scalp from a fetal monitor electrode. He was lying on the bed when the nurse arrived.

NURSING DIAGNOSES

- Ineffective Airway Clearance related to excess mucus, gagging, and choking
- Deficient Knowledge (Maternal) related to newborn care and airway maintenance

EXPECTED OUTCOMES

1. The newborn will maintain a patent airway.
2. The newborn will exhibit no signs of continuing respiratory distress.
3. The mother will demonstrate beginning skill with use of the bulb syringe.

<table>
<thead>
<tr>
<th>INTERVENTIONS</th>
<th>RATIONALES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn the newborn on his side.</td>
<td>This position promotes fluid drainage from the nose and mouth to prevent aspiration.</td>
</tr>
<tr>
<td>Suction the mouth first, then the nares with the bulb syringe.</td>
<td>Gentle suctioning promotes a patent airway. The baby may gasp upon placement of the bulb syringe in the nares; therefore, suctioning the mouth first prevents aspiration.</td>
</tr>
<tr>
<td>Assess for signs and symptoms of respiratory distress, such as nasal flaring or grunting respirations. Auscultate the lungs after any choking episode.</td>
<td>Assessment provides information to determine the effect of and recovery from choking episodes.</td>
</tr>
<tr>
<td>Replace the bulb syringe in the bassinet where it is visible.</td>
<td>The syringe should be available for immediate use as necessary.</td>
</tr>
<tr>
<td>Continue to assess the newborn’s respiratory status frequently.</td>
<td>Continued assessment is necessary to allow for early identification of and prompt intervention for any additional problems.</td>
</tr>
<tr>
<td>Instruct the mother in how to use the bulb syringe; have her identify situations in which she may need the bulb syringe; have her return-demonstrate the procedure; offer praise and positive reinforcement.</td>
<td>Teaching assists the mother to gain necessary skills to care for her son. Return demonstration indicates the effectiveness of teaching. Positive reinforcement and praise promote feelings of confidence.</td>
</tr>
</tbody>
</table>

(Continued)
EVALUATION

1. The newborn experiences full recovery.
2. The newborn maintains a patent airway with minimal to no mucus present.
3. The mother demonstrates the ability to use the bulb syringe appropriately and correctly.

NURSING DIAGNOSIS

Risk for Imbalanced Body Temperature related to immature temperature control, change in environmental temperature, and large body surface in relation to mass

EXPECTED OUTCOME

The newborn will maintain an axillary temperature of 36.5° to 37.0°C clothed in a shirt, diaper, and two blankets.

INTERVENTIONS RATIONALES

Assess the newborn’s temperature as per agency policy. Assessment provides a baseline from which to make future comparisons. Thomas’s current axillary temperature is at the low end of the normal range.

Institute measures to conserve the newborn’s heat; use warmed blankets and the overhead radiant warmer. Double-wrap the infant in a blanket and place a thermally insulated hat on his head. Newborns need additional measures to conserve heat because of their immature ability to regulate body temperature.

Avoid situations that may promote heat loss; dry skin thoroughly, avoid placing bassinette near doorways or drafts, and avoid placing newborn on cold surfaces. Heat is lost through conduction, convection, radiation, and evaporation.

Continue to monitor temperature as indicated; recheck temperature 30 minutes after instituting warming measures. Temperature should respond to warming measures and stabilize.

EVALUATION

The newborn maintains an axillary temperature within expected parameters.

NURSING DIAGNOSIS

Deficient Knowledge (Maternal) related to care of healthy newborn

EXPECTED OUTCOMES

1. The mother will demonstrate safe caregiving practices for her newborn.
2. The mother will demonstrate how to use the bulb syringe during choking episodes.
3. The mother will identify strategies to protect the infant from infection and injury.
4. The mother will demonstrate beginning confidence in caring for her newborn.
**EVALUATION**

1. The mother demonstrates measures to provide safe newborn care.
2. The mother demonstrates calm and efficient use of the bulb syringe, identifying situations when use is necessary.
3. The mother implements appropriate measures to protect the newborn from infection and injury.
4. The mother states that she feels more confident when providing care to her newborn.
UNIT 5 Postpartum Period and Newborn Care

**UNIT 5 Postpartum Period and Newborn Care**

for their infant to help prevent abduction. See Teaching Tips 20.2 for a sample instruction sheet.

**Temperature Assessment**

Once the term newborn has been discharged, parents will have no reason to take his or her temperature at home unless they suspect illness. Because the nurse models the axillary method of temperature assessment, the parent usually learns this procedure. To reduce the potential for trauma and injury to the newborn during rectal assessment, nurses may advise parents to use the axillary method as their initial screen. If parents determine that the axillary temperature is abnormal and their pediatric provider wants a rectal temperature, parents can proceed cautiously with a rectal temperature.

The nurse should take the axillary temperature by placing the thermometer deep into the baby’s axilla and holding the arm down gently against the baby’s chest (Fig. 20.15). The reading will be inaccurate if the thermometer tip extends past the axilla (exposed to air) or if the thermometer touches clothing instead of skin.

**Use of the Bulb Syringe**

The bulb syringe clears the upper airways of mucus and gastric secretions. Personnel first use it at birth to clear the mouth and nose to facilitate initial respirations. The bulb syringe then stays in the bassinet for use in the event of emesis. Healthy newborns have an active gag reflex and are adept at clearing their upper airways, however, and the bulb syringe may not be needed after the transitional period.

The nurse should teach parents to use the bulb syringe when secretions are visible in the baby’s nose or mouth or if the newborn is gagging or gurgling through oral fluids. Because the baby is likely to gasp when the syringe is placed into the nares, parents should suction the mouth before the nose to prevent aspiration (Kattwinkel, 2006). See Nursing Procedure 20.5.

**BOX 20.5 Abductor Profile**

**Characteristics**

- Female between the ages of 12 and 50 years
- Large build or overweight for height
- Married or involved in a failing relationship
- May have experienced a pregnancy loss (miscarriage, stillbirth, adoption)
- Lives in the community where the abduction takes place
- Often emotionally immature, compulsive, with low self-esteem
- May be feigning a pregnancy and have told acquaintances that she is pregnant

**Typical Abduction Strategies**

- Visits birthing centres asking detailed questions about procedures and unit layout
- Plans the abduction and then acts quickly when opportunity arises
- Impersonates medical, nursing, laboratory, volunteer, social work, or photography personnel
- With an accomplice or alone, may create a disturbance, such as pulling fire alarm or starting a fire, to distract staff
- Calls mother by her first name, learned from crib card or unsecured medical record
- Befriends the mother and stays for several hours to establish her trust
- Removes the newborn from the baby mother’s room by saying the baby needs lab tests, vital signs, photographs, weight, etc.
- Removes the baby from the unit in a sport bag or under a coat
- Once the abduction has occurred, considers the baby to be her own


**TEACHING TIPS 20.2 Instructions for Keeping Your Baby Safe in the Hospital**

- Give the baby only to hospital personnel wearing a hospital photo name tag.
- Go with any staff person who takes the baby from your room, if you wish.
- Never let the baby out of sight or leave him or her alone. Call the staff to take the baby when you shower, need to close the bathroom door, or plan to nap.
- Keep the baby on the far side of the room away from the door. This will help prevent people from moving the baby without your notice.
- Question any stranger who enters the room if the reason for the visit is unclear or strange.
- Call the nurse’s station immediately to report a stranger or to check the identity of anyone who claims to work at the hospital.

During a gagging or choking episode, a calm but swift response is required. Parents gain confidence in their ability to handle this situation if the nurse can talk them through the skill, or, if necessary for a more timely intervention, demonstrate efficient use of the syringe. After the baby has recovered, the entire family may require comforting and reassurance.

**Urine and Stool**

Urine output may be low for the first 2 days of life. The baby should void by 24 hours of age. By the third or fourth day, parents should note a wet diaper with every feeding—about 6 to 8 wet diapers per day.

The appearance of the first stool, called meconium, may surprise parents. This sticky black substance usually passes in the first 24 hours, although some infants do not pass meconium until 48 hours. Meconium stools persist for up to 3 days, then gradually change to the seedy yellowish colour of normal newborn stool (Fig. 20.16). Breastfed babies have softer, more liquid stools than formula-fed infants. Breastfed babies’ stools are also less malodorous than stools from formula-fed babies.

**NURSING PROCEDURE 20.5**

**Suctioning with a Bulb Syringe**

**PURPOSE**

To remove visible mucus, secretions, and vomitus from the newborn’s mouth or nares

**ASSESSMENT AND PLANNING**

- Review the newborn’s medical record for a history of antepartal or intrapartal problems.
- Assess the newborn’s gag reflex; assess for gagging and gurgling with oral feedings.
- Auscultate the newborn’s lungs to evaluate for evidence of crackles and wheezes.
- Inspect the newborn’s mouth and nose for visible secretions or vomitus.
- Explain the procedure and its rationale to the parents.
- Gather the necessary equipment:
  - Bulb syringe (in newborn’s bassinette)
  - Receptacle or tissue for discarding secretions
  - Clean gloves

**IMPLEMENTATION**

1. Wash hands and put on gloves.
2. Position the newborn on the side with the head slightly lower than the rest of the body to facilitate drainage by gravity.
3. Compress the bulb before insertion to prevent injury to the newborn’s oral mucosa.
4. Gently insert the tip of the bulb syringe into the dependent side of the newborn’s mouth to collect drainage.
5. Release the compression on the bulb to allow for re-expansion and the collection of secretions.

Continued
NURSING PROCEDURE 20.5 CONTINUED
Suctioning with a Bulb Syringe

6. Remove the bulb syringe from the newborn’s mouth and gently squeeze the bulb to release the collected drainage into the appropriate receptacle or onto a tissue.

7. Turn the newborn to the other side and repeat the steps to suction the other side of the newborn’s mouth; if necessary, repeat the steps to suction each nares.

8. Discard the collected secretions and clean the receptacle as necessary.

9. Wash the bulb syringe in warm soapy water and rinse. Place the bulb syringe back in the newborn’s bassinet for future use. Remove gloves and wash hands.

10. Reassess the newborn’s lungs; provide reassurance and comforting to the parents and the newborn.

EVALUATION

• Newborn tolerated the procedure without difficulty.
• Excess secretions are removed and no longer evident.
• Lungs remained clear on auscultation.

AREAS FOR CONSIDERATION AND ADAPTATION

Lifespan Considerations

• As an alternative to positioning the newborn on the side during suctioning, use the football hold with the newborn positioned on the side.
• Always suction the newborn’s mouth before the nose to prevent possible aspiration of secretions as the newborn gasps when the nostril is touched.
• Never insert the bulb syringe into the middle of the newborn’s mouth, toward the back of the mouth, or toward the roof of the mouth to prevent stimulating the gag reflex.
• Teach the parents how to perform suctioning with bulb syringe and signs and symptoms observed that indicate the need for suctioning; have the parents return demonstrate the procedure.
• If suctioning with bulb syringe is ineffective, anticipate the need for additional suction measures.
• Keep in mind that use of the bulb syringe is typically not necessary after the newborn’s transitional period.

Community-Based Considerations

• Have the parents return-demonstrate the procedure for using the bulb syringe.
• If the infant has copious or tenacious nasal secretions, teach the parents how to instill normal saline to help loosen the secretions and aid in their removal.
• If the parents are using a humidifier in the home, review the procedure for cleaning the device to prevent growth of microorganisms.
Bowel movement patterns vary depending on whether the infant is breastfed or formula fed. Some breastfed infants pass stool at every feeding. Parents need to be concerned only if their baby’s stool is malodorous and liquid (diarrhea stool) or if it contains mucus or blood. Newborns are rarely constipated, but parents should consult their care provider if the newborn seems to strain or cry during bowel movements or produces hard, pellet-like stools.

**Diapering**

Cloth or disposable diapers may be used for newborn care. Parents should check the diaper when the infant awakens for a feeding. Bowel movements may occur during feeding, especially in the breastfeeding baby, which may necessitate a diaper change after feeding as well. Parents can prevent diaper rash by keeping the diaper area clean and dry. They should wash the buttocks and perianal region with plain or soapy water as necessary. Stool and skin secretions can hide in vaginal folds and under the scrotum, so nurses should teach parents to wipe the vaginal area from front to back with a clean cloth, or to clean under and around the scrotal sac. Commercial diaper wipes are an unnecessary added expense; if parents use them, however, they should choose a brand...
without alcohol or added fragrance. They should fold
the diaper down to keep the umbilicus exposed to air
until after the cord falls off and the umbilical site heals
(Fig. 20.17). With practice, parents will be able to secure
a diaper that is not so tight as to press into the baby’s
abdomen, and not so loose as to allow the diaper to leak
or fall off during handling.

Cord Care
Cord care practices vary by institution and region and
include no care, isopropyl alcohol, triple dye, and anti-
microbial ointments. No one method has been proven
superior in preventing colonization and disease (AAP
& ACOG, 2002). The nurse should teach parents the
method at his or her institution, with consideration for
cultural differences. He or she should tell parents that
the cord may become gooey before separation and ad-
vise parents to call the health care provider if the um-
bilical site becomes red or swollen, or has purulent or
malodorous discharge.

Clothing
While in the hospital, the newborn is usually clothed in a
cotton T-shirt, diaper, and two blankets. The newborn’s
head is poorly insulated and accounts for significant heat
loss; therefore, a hat protects vulnerable newborns from
heat loss (Blackburn, 2007). The stockinette hats com-
monly used in hospitals are poor insulators. Preferred
fabrics include insulated fabrics, wool, or polyolefin, or
hats lined with a plastic liner (Blackburn, 2007).

Parents often worry that the newborn will become
chilled at home and therefore tend to overheat the house
and overdress their newborn. The healthy newborn re-
quires about one layer more of clothing than the parent,
in a house heated or cooled for the parent’s comfort.

Wrapping
Swaddling provides containment, security, and warmth.
Parents need not worry that their swaddling technique
is less neat or efficient than that of the hospital staff.
The nurse teaches parents how to swaddle, allowing the
newborn’s hands to be in close proximity to the mouth
(Fig. 20.18). Hand-to-mouth behaviour is calming and
an important developmental activity.

Parents can swaddle by following these steps:

- Place a blanket on a flat surface with one corner of the
  blanket pointing away. Fold that corner down a few
  inches.
- Place the baby face up on the blanket, with the neck
  on the top folded edge of the blanket.
- Fold the left corner over the baby’s body and tuck it
  under the back.
- Fold the bottom corner up over the feet and chest.
  Fold down any excess over the chest.
- Fold the right corner around the infant’s body.

The nurse should remind parents that the baby’s
legs need to be free of swaddling when placed in a car
seat. The infant must wear an outfit that allows the
crotch strap to separate the legs (not a sleeping-bag
style outfit). Some outfits have a slit that allows par-
ents to push the buckle through. If needed, parents can
place blankets over the baby once he or she is secured
in the car seat.

Holding
There are two basic ways to hold a baby:

- Cradle hold: The baby is held supine across the adult’s
chest, with one arm supporting the head and neck, and
the other supporting the back and lower body.
- Football hold: The baby is held supine along the inner
aspect of the adult’s forearm. The adult’s hand and
wrist support the baby’s head and neck, and the rest of
the forearm supports the baby’s back and lower body.
The baby is tucked securely against the adult’s body,
but not squeezed tightly. The football hold leaves the
adult’s other hand free.
Variations on these holds include the following:

- **The one-handed cradle hold:** The baby is held prone on the adult’s arm, cradled against the adult’s body.
- **Against the shoulder:** The baby is held upright, prone against the adult’s chest, while the adult supports the baby’s head and bottom.

The nurse can reassure parents that any holding position that supports the infant’s head, neck, and back and prevents dangling or dropping the infant, is acceptable.

**Comforting Quote 20–4**

“My baby was crying hard in his bassinette, and I felt like crying, too. The nurse came in, picked the baby up and positioned him up against my shoulder. I said, “What now?” and the nurse said, “Hold him close and talk softly in his ear.” I didn’t quite know what to say, but I murmured something and the baby immediately quieted and turned to look at me. It was amazing. I felt like his mother.”

*From a mom*

A baby’s cry is a communicative signal to elicit caregiving (Hofer, 2001). Acoustical spectrometry reveals distinct signature cries for boredom (in term infants), hunger, pain, stress, fatigue, and maternal separation (Christensson et al., 1995). Most parents can distinguish these different cries within 2 weeks of birth (Ludington-Hoe et al., 2002).

There is a longstanding debate about parenting practices in response to a baby’s cry. Some parents practice “infant-demand” care, that is, high levels of responsiveness, breastfeeding on demand, “co-sleeping,” and holding the baby. Other parents believe in routine-based or structured care. The best research evidence that has emerged from comparative studies and randomized trials is that neither of these parenting approaches is better overall; rather, there are different benefits and costs to each approach. Structured care results in babies who develop the ability to remain settled at night by 3 weeks of age. “Infant-demand” care leads to a substantial reduction in crying in the first 2 months, but to nighttime wakefulness beyond 3 months of age (St. James-Roberts, 2007).

In the “infant-demand” approach, parents can be encouraged to incorporate touching, holding, talking, and being within the newborn’s field of vision when answering the cry (Ludington-Hoe et al., 2002). Skin-to-skin holding (kangaroo care) is effective (McCain et al., 2005). Many books have been written to help parents soothe a crying baby. Suggestions include speaking softly, massaging the baby, singing, walking, or rocking (Brazelton & Sparrow, 2003).

The newborn who is especially sensitive to environmental stimuli may escalate crying in response to too many simultaneous quieting attempts. He or she may be overwhelmed when confronted all at once by the visual stimulation of the mother’s face, as well as her voice, touch, and rocking and patting. For these newborns, the parent can experiment with a softer approach, such as briefly looking at and speaking to the newborn, then swaddling the infant or holding him or her skin to skin against her shoulder in a quiet environment. Avoiding simultaneous talking, rocking, and patting may help the newborn regain control.

Current evidence suggests (but does not confirm) that unsoothable crying bouts are common and specific to early infancy and may be the result of neurodevelopmental changes that are a normal part of development. In a small number of cases, prolonged crying in the first 3 months may be caused by food intolerance and other organic disturbances (St. James-Roberts, 2007).

**Parental Stress**

Parents should know that a baby’s constant demands are stressful for them. Sometimes parents may feel angry and at risk for losing their temper. The nurse should acknowledge that these feelings are normal on a tough day and a signal that the parent requires some time away. He or she should help parents plan for these times by encouraging them to arrange for a trusted friend or family member to take over baby care for a few hours, as needed. A walk around the block, warm bath, or nap can be restorative.

If no such respite care is available when the parent is losing control, the nurse should teach the parent to put the infant safely in the crib and move to another room. It is better to allow the infant to cry in the crib than to strike or shake the baby, which can cause fatalities. A parent with a fussy baby and few support systems is at risk for neglecting or abusing the newborn. The nurse is responsible for providing the parent with information about community resources to assist after discharge, such as parent support groups, parenting classes, and mother-to-mother mentoring programs.

**Sleep Positioning and Sudden Infant Death Syndrome**

Sudden infant death syndrome (SIDS) is defined as “the sudden death of an infant under 1 year old that is unexpected by history and unexplained after a thorough postmortem examination, including a complete autopsy, investigation of the scene of death and review of the medical history” (Hunt & Hauck, 2006). Although the rate of SIDS in Canada, the United States, and many other countries has declined by more than 50% over the past two decades, SIDS continues to be the leading cause of infant death, accounting for about 25% of all deaths between 1 month and 1 year of age (Hunt & Hauck, 2006). The cause is unknown. Risk factors for SIDS include prone sleep position, sleeping on a soft surface, maternal smoking during pregnancy, overheating, late or no prenatal care, young maternal age, prematurity or low birthweight, and male sex. First Nations infants have a higher rate of
infant mortality than non-First Nations infants, with the higher mortality rate related to causes including Sudden Infant Death Syndrome, infection, and other external causes (Statistics Canada, 2004).

In 1992, the AAP recommended that infants be placed supine for sleeping to reduce the risk for SIDS (Fig. 20.19). Because prone sleep positioning was a modifiable risk factor, the Back to Sleep campaign was initiated in Canada and the United States in 1994. The campaign disseminates information to hospital nurseries and physicians, to child care education programs, and through public media campaigns.

Recommendations for parents to reduce risk of SIDS include the following (Public Health Agency of Canada, 2002):

- **Sleeping:** Put your baby to sleep on his or her back on a firm, flat surface. Avoid soft mattresses, fluffy pillows, comforters, stuffed toys, and bumper pads in the baby’s crib, as these could prevent proper air circulation around your baby’s face. Plastics, such as the manufacturer’s mattress wrapping, may also prevent air circulation, and should be removed to reduce the risk of SIDS. Bed sharing with the baby is a common practice for many families, but does not necessarily reduce the risk for SIDS. The risk increases if the baby sleeps with a person who smokes. The baby is also at risk if the person has been drinking alcohol or taking drugs that may make them less able to respond to the baby.

- **A Smoke- and Drug-Free Environment:** Create a smoke- and drug-free environment for the baby before and after birth.

#### Additional Parent Education

**Circumcision**

Circumcision is the surgical removal of the foreskin from the end of the penis. Since ancient times in Egypt, a rationale for circumcision has been maintenance of penile hygiene; however, data fail to support this association. Jewish circumcision traditionally takes place on the eighth day of the male child’s life, and is practiced as a religious ritual, not for health (Bank, 2002). Religious circumcision is also performed for Islamic boys.

The circumcision of male infants has been a subject of debate for many years, with different benefits and risks quoted in the literature. The overall complication rate is unknown, but in North America is estimated to be between 0.2 to 2% (Hirji et al., 2005). Most complica-
tions are minor, such as bleeding and infection, but occasionally serious complications occur (CPS, 1996).

Box 20.6

Although circumcision remains common in the United States, it is less common in Canada and uncommon in Asia, South America, Central America, and northern Europe (AAP, 1999). Figures from 1970 indicate that 48% of Canadian men were circumcised, compared with 69–97% of U.S. males (Leitch, 1970). By 1999, the rate of circumcision had declined in Canada to 16.9%; in 2003, the rate was 13.9%, with wide variations across the country, for example, a high of 29.5% in Prince Edward Island to a low of 0% in Newfoundland and Labrador (Association for Genital Integrity, 2006).

In 1975, the American Academy of Pediatrics recommended against circumcision, and in 1975, the Canadian Paediatric Society supported this position. In 1982 and 1996, the CPS stated: “The overall evidence of the benefits and harms of circumcision is so evenly balanced that it does not support recommending circumcision as a routine procedure for newborns... when parents are making a decision about circumcision, they should be advised of the present state of medical knowledge about its benefits and harms. Their decision may ultimately be based on personal, religious or cultural factors.” (CPS, 1996. Under review, 2007)

Cultural or religious beliefs, the circumcision status of the infant’s father and male siblings, and the opinions of the care provider all influence the decision of parents. Health care professionals should give parents unbiased information, a chance to ask questions, and an opportunity to discuss their decision. Surgical consent is required. Until recently, many physicians performed circumcision without considering pain management (Geyer et al., 2002). Several interventions may be used for pain; however, acetaminophen, a sucrose pacifier, and swaddling are not recommended as sole agents for managing operative pain (AAP & ACOG, 2002). The AAP recommends the provision of anaesthesia (a dorsal penile block or ring block) to the infant undergoing circumcision (AAP & ACOG, 2002). Additional analgesic interventions are listed below (Geyer et al., 2002):

- Acetaminophen: Administer 40 mg 1 hour before circumcision and every 4 to 6 hours for 24 hours following circumcision with no more than 5 doses given in a 24 hour period.
- EMLA cream (eutectic mixture of local anaesthetic): Apply topical cream made of a 1:1 oil emulsion of lidocaine and prilocaine 1 hour before surgery.
- Sucrose pacifier: Dip a pacifier in 25% oral sucrose and give to the neonate during the circumcision procedure. Sweet tasting substances provide opioid-mediated analgesia.
- Swaddling and padding: Swaddle the newborn’s upper body for warmth and containment. Place him on a padded circumcision board to help decrease discomfort during circumcision. Postoperative care includes observing the site for bleeding and greenish exudate and documenting the first postoperative void. The nurse should teach parents the postoperative care practices that their pediatric care provider recommends. Nursing Care Plan 20.2 provides more information. See also Figure 20.20.

William’s father is concerned about having his son experience trauma during the upcoming circumcision. What interventions would be essential in this situation?

**Immunizations**

Immunizations saved millions of lives in the 20th century and are an important health practice today (Table 20.5). Without immunizations, now rare diseases will return and infect infants and children (Atkinson & Wolfe, 2002). Immunizations are safe, but not risk-free. Most side effects are mild, such as pain or soreness at the injection site. Anaphylaxis is rare, occurring approximately once in every 500,000 doses (Atkinson & Wolfe, 2002).

In Canada the schedule of immunizations is determined by each province. While there are national recommendations and ongoing efforts to harmonize both timing and financial coverage for vaccines, differences between provinces still exist (Fig. 20.21). Up-to-date...
**NURSING CARE PLAN 20.2**

**The Newborn Undergoing Circumcision**

Remember baby William from the beginning of the chapter. After more discussions with the nurse, the family continues with its plan to circumcise him.

**NURSING DIAGNOSES**
- **Pain** related to the surgical procedure
- **Risk for Injury** related to the invasive surgical procedure and potential for hemorrhage
- **Deficient Knowledge (Parental)** related to care of the circumcision site

**EXPECTED OUTCOMES**
1. The newborn will undergo a circumcision without any complications.
2. The newborn will experience minimal to no pain during and after the circumcision.
3. The parents will identify appropriate measures to care for the circumcision site.

**INTERVENTIONS**

<table>
<thead>
<tr>
<th>INTERVENTIONS</th>
<th>RATIONALES</th>
</tr>
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<tbody>
<tr>
<td>Check the circumcision clamps for mismatch and expired sterility.</td>
<td>Mismatched equipment can cause injury and disfigurement to the penis. Sterilized equipment is required to maintain surgical asepsis of the surgical field and to prevent infection of the surgical wound.</td>
</tr>
</tbody>
</table>
| Support and facilitate the chosen method of anesthesia.  
- Dorsal penile nerve block (DPNB) and local anesthesia and a subcutaneous ring block.  
- A subcutaneous ring block alone.  
- Apply local anesthesia according to agency policy. (EMLA is recommended as a local anesthetic cream applied 60–90 minutes before the surgery.) | DPNB is the injection of two local anesthetics into the base of the penis, which effectively blocks pain impulses. The infant is pain free during the circumcision. Subcutaneous ring block is the injection of 1% lidocaine into the midshaft of the penis. This procedure blocks pain impulses and is more effective than EMLA. EMLA is used to inhibit conduction of nerve impulses; however, it is ineffective for pain during circumcision and has been implicated in causing methemoglobinemia in several cases (AAP Circumcision Policy). |
| Check the newborn’s chart for administration of vitamin K. | Administration of vitamin K is given to all newborns to reduce the risk for bleeding. This is especially important because hemorrhage is an associated risk with circumcision. |
| Check the newborn’s identity with orders for circumcision, medical record number on the chart, and the signed consent. | Checking identity is essential to ensure that the procedure is performed on the correct newborn. |
| Position the infant on a padded surface in preparation for circumcision. | A padded surface promotes comfort and that no bony prominences are exposed to a hard surface, preventing loss of blood flow and oxygenation to the tissues over them. |

(Continued)
### Nursing Care Plan 20.2: The Newborn Undergoing Circumcision (Continued)

<table>
<thead>
<tr>
<th>INTERVENTIONS</th>
<th>RATIONALES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide a sucrose pacifier.</td>
<td>The sucrose pacifier serves as a distraction, which is an alternative pain-relieving strategy.</td>
</tr>
<tr>
<td>Provide emotional support to the parents during the procedure; keep them informed about how their newborn is doing.</td>
<td>Support helps to allay parents’ anxiety.</td>
</tr>
<tr>
<td>If ordered, apply light pressure on the penis for 3–5 minutes after circumcision.</td>
<td>This measure provides hemostasis and permits efficient clotting with minimal bleeding.</td>
</tr>
<tr>
<td>Administer acetaminophen before and after the procedure as ordered.</td>
<td>Acetaminophen produces peripherally acting analgesia by raising the pain threshold. It is intended for simple pain of short duration and is especially recommended for infants and children.</td>
</tr>
<tr>
<td>Apply a topical anesthetic cream to the penis postoperatively, according to agency policy.</td>
<td>Topical anesthesia agents relieve pain by stabilizing neurons and inhibiting the conduction of impulses.</td>
</tr>
<tr>
<td>Assess vital signs and for signs and symptoms of hemorrhage every 15 minutes for the first hour after the procedure.</td>
<td>Frequent postprocedure assessment is essential for early detection of possible hemorrhage or infection.</td>
</tr>
<tr>
<td>Allow the parents to hold and comfort the newborn after the procedure.</td>
<td>Bonding and attachment help allay the parents’ anxieties and fears and promote the newborn’s feelings of comfort and security.</td>
</tr>
<tr>
<td>Follow agency policy for daily care of the site. Note that most agency policies do not permit wrapping of the penis with Vaseline gauze.</td>
<td>Site care is recommended to reduce harmful bacterial flora. A circumferential wrap with Vaseline gauze could become a tourniquet if the penis becomes edematous.</td>
</tr>
<tr>
<td>Monitor the newborn’s vital signs after the procedure as ordered; assess time and amount of first voiding after the circumcision.</td>
<td>Monitoring provides information about the possible development of complications. The local anesthetic and surgical trauma to the penis and perineal area may interfere with voiding. It is extremely important to ensure patency of the urethra. Significant urinary output also provides an indication of adequate hydration.</td>
</tr>
<tr>
<td>Check the penis and perineal area frequently postoperatively for swelling and colour.</td>
<td>Excessive redness and edema in the perineal area or penis may indicate beginning infection. Bluish colour and swelling may indicate a hematoma formation from the DPNB.</td>
</tr>
<tr>
<td>Ensure that the newborn has sufficient fluids.</td>
<td>Hydration is necessary to maintain fluid balance and to produce dilute urine, minimizing irritation to penis.</td>
</tr>
</tbody>
</table>

(Continued)
NURSING CARE PLAN 20.2  ● The Newborn Undergoing Circumcision (Continued)

<table>
<thead>
<tr>
<th>INTERVENTIONS</th>
<th>RATIONALES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teach the parents how to care for the circumcision at home:</td>
<td>Teaching empowers parents and increases confidence in caring for their newborn. Providing appropriate care reduces the risk for infection, dehydration, pain, and other complications.</td>
</tr>
<tr>
<td>● Cleanse the penis with warm saline or follow the agency’s policy for site care.</td>
<td></td>
</tr>
<tr>
<td>● Apply anesthetic creams as directed.</td>
<td></td>
</tr>
<tr>
<td>● Give acetaminophen as directed.</td>
<td></td>
</tr>
<tr>
<td>● Monitor voiding and report any fever, bleeding, swelling, urinary retention, or bruising to the health care provider.</td>
<td></td>
</tr>
<tr>
<td>● Provide adequate fluids according to the feeding hydration schedule developed for the infant preoperatively.</td>
<td></td>
</tr>
</tbody>
</table>

EVALUATION

1. The newborn undergoes a circumcision without any difficulty.
2. The newborn demonstrates vital signs within age-acceptable parameters, feeds well, and sleeps undisturbed.
3. The newborn shows no evidence of bleeding or infection from the circumcision site; the penile area is red but without any odour or discharge.
4. The newborn voids adequate urine within 5 hours of the procedure.
5. The parents demonstrate measures to properly care for the circumcision site.

FIGURE 20.20 Circumcision using the Gomco (Yellen) clamp. (A) The baby’s upper body is swaddled, while his legs are strapped to the circumcision board. (B) The nurse gives the baby a sucrose pacifier to provide pain relief during the procedure.

Continued

Prenatal blood testing for hepatitis B status is the obstetrical standard of care (SOGC, 2007b). Women who are hepatitis B surface antigen (HBsAg) negative may be immunized safely during pregnancy. Women not tested during pregnancy, those at high risk for infection, and those with clinical hepatitis should be tested on hospital admission (AAP & ACOG, 2002). Trans-
mission of hepatitis B virus (HBV) from an HBsAg-positive mother to her newborn occurs primarily during childbirth. Approximately 70% to 90% of babies who become infected become chronic carriers of HBV. Preventing transmission from mother to infant, however, is possible. Perinatal HBV infection can be prevented in approximately 95% of exposed newborns who receive hepatitis B immune globulin (HBIG) within 12 hours of birth. HBIG is made of antibodies that protect against the HBV, therefore providing passive immunity and immediate, although not long-term, protection. For lasting protection against HBV, the newborn must complete the three-dose immunization series (AAP & ACOG, 2002). The baby may receive HBIG and HBV vaccine at the same time but at different sites (eg, in anterolateral thigh muscle of the right and left leg). Maternal blood should be removed from the infant’s skin before injection to prevent inoculation of the virus on the skin.

Parental informed consent is required before administration of HBIG or hepatitis B vaccine. Like any vaccine or medication, an adverse or allergic reaction may result.

![FIGURE 20.21 Childhood immunization schedule. For more information contact Public Health Agency of Canada. Source: Canadian Paediatric Society. (2006). Your child’s best shot: A parent’s guide to vaccination (3rd ed.). Canadian Paediatric Society.](image-url)
Nevertheless, HBIG and hepatitis B vaccine are very safe. Contraindications for administration include:

- The child or family has a severe allergy to baker’s yeast.
- The child has had a life-threatening reaction in response to a previous dose.
- The child has a moderate or severe illness on the day the vaccination is scheduled.

Parents should be provided with information on immunizations and their consent obtained prior to the administration of any immunization. Parents have the right to refuse immunization and may do so based on religious objections, a belief in homeopathy (natural health), or a belief that immunizations are ineffective or may cause harm. A study of parents’ attitudes towards childhood immunizations revealed that parents want written information on immunizations and want health care providers to be aware of, and discuss, vaccine issues (Gellin et al., 2000).

Parents may voice specific concerns that vaccinations cause autism, a chronic developmental disorder usually identified between 18 and 30 months. This concern resulted from information in the media in the late 1990s regarding a possible link between the measles, mumps, rubella (MMR) vaccine and autism. Because vaccines, including MMR, are administered just before the peak age of onset for autism, a temporal relationship between diagnosis of autism and vaccination may be seen. At this point, health care professionals can assure parents that no convincing evidence has been found that any vaccine causes autism. This genetically based disorder has not been linked to vaccinations (Demicheli et al., 2005).

**Signs of Newborn Illness**

Many pediatric providers give parents a list of circumstances that merit a phone call or office visit. Parents need to recognize and evaluate signs of illness in a newborn immediately because newborns can develop life-threatening complications quickly. The nurse should instruct parents to call their pediatric provider immediately if their baby exhibits:

- Respiratory distress, including fast breathing (more than 60 breaths/min), grunting, nasal flaring, retracting, or cyanosis
- Abdominal distention, especially if the belly is hard, or if distention is accompanied by vomiting, or there is no bowel movement for more than 1 day
- Forceful vomiting that shoots out several inches
- Diarrhea (watery stools up to eight times per day)
- Fever (more than 37.8°C)
- Lethargy and poor feeding
- Muscle weakness
- Jitters of the whole body
- Blue colour of face, tongue, and lips
- Persistent coughing or choking during feedings
- Excessive crying
- Watery, white, or mucous discharge from the eyes; sticky eyelashes from eye discharge
- Head-to-foot jaundice
- Umbilical cord that is red or exuding pus at the base, or that elicits a cry from the baby when touched
- Umbilicus that swells and does not dry after the umbilical cord has fallen off (Trubo et al., 2004)

**Car Seats**

All provinces and territories require use of a car seat or infant safety seat (Transport Canada, 2007) during any motor vehicle trip with a baby. Unfortunately, it is estimated that 4 out of 5 children are not correctly restrained in motor vehicles (Canada Safety Council, 2006).

The nurse should become familiar with his or her institution’s policy regarding the role of staff members in car seat safety. Some facilities require that nurses play an active role in placing infants in car seats and placing car seats in vehicles. Others take a “hands-off” approach—the nurse may give verbal instructions and printed pamphlets, but parents are responsible for securing children and seats into cars. In any case, the nurse’s role is to offer advice that he or she is qualified to give, and to serve as a resource for additional information.

Basic rules for car seat use apply in every case. See Figure 20.22 for correct car seat use and Teaching Tips 20.3 for written information for parents about car safety seat basics. Comprehensive information about car seats and their correct use can be found on Transport Canada’s website, http://www.tc.gc.ca/roadsafety/childsafety/menu.htm.

**Siblings**

Reactions of siblings to a new baby depend on age and development level (Trubo et al., 2004):

- Toddlers are likely to be upset by the change in their routine when their mother is hospitalized. They may be
frightened by the unfamiliarity of the hospital environment and confused at seeing their mother in a hospital bed. Toddlers will probably be jealous of and feel displaced by the new baby. They may seek attention by misbehaving or displaying regressive behaviours, such as soiling themselves after having been successfully toilet-trained or sucking the baby’s pacifier. Toddlers need extra loving attention and reassurance that they maintain their special place in the family.

- Preschoolers may feel jealousy and resentment, but discussion before the baby is born may help assuage these feelings. Parents should include preschoolers in preparations for the newborn, such as readying the crib and helping choose an outfit for the baby to wear home. If preschoolers are reassured that their status as “big sister or brother” benefits the entire family, and if they receive some special alone time with parents, they will cope more readily with changes.

- School-age children and adolescents should not feel overly threatened by the new baby. Many older children and teens are interested in the processes of pregnancy and birth and enjoy assuming the role of older sibling. They probably will like helping with caregiving by feeding, holding, and playing with the newborn (Fig. 20.23). Parents should ensure special time alone with older siblings, and reassure them that plenty of love and attention for everyone are available.

Pet Safety

Parents can attempt to prepare pets for a new baby’s arrival, although knowing whether such preparation actually works is impossible. Every pet’s reaction to a new baby is unique, although knowing the pet’s temperament (eg, high-strung, demanding, easy-going, moody) before the baby comes home yields many clues as to how the pet may react. Parents can bring a blanket to the hospital and use it to wrap the newborn for a period,
then bring the blanket home to the pet and “introduce” the baby’s scent to the animal. In any event, if the pet is used to being the centre of attention in the household, the pet may feel jealous and misbehave or act aggressively toward other pets, family members, or the newborn.

Parents are usually eager to introduce the new baby to the family pet. This process should be gradual, and adults must closely supervise the behaviour of a pet that could potentially bite or injure the baby. They should never leave the animal alone with the baby. The animal usually grows accustomed to the newborn in 2 to 3 weeks; however, parents must be observant and cautious whenever the animal is around the baby.

**Dangers of Secondhand Smoke**

Passive smoking is harmful to children’s respiratory health. Children exposed to secondhand tobacco smoke have increased rates of pneumonia, bronchitis, croup, middle ear effusion, asthma, SIDS, and cognition deficiencies later in life (Health Canada, 2006).

If the baby is in an environment with smokers, certain precautions can help protect the baby’s health:

- No one should smoke in any area where the baby is living. The smoker must smoke outside the baby’s living environment.
- If the smoker takes care of the baby, the smoker should cover his or her clothing while smoking. The smoker may use a designated shirt or jacket, which he or she wears only while outside smoking.
- No one should smoke in a car that the baby rides in, even when the baby is not in the car. In 2007, Nova Scotia became the first province to make it illegal to smoke in a car in which a child is riding (CTV.ca, 2007b).

The nurse caring for infants or new mothers plays a vital role in identifying families at risk from tobacco exposure. His or her role is to motivate, advise, and assist parents in starting a smoking cessation program.

**Household Safety**

The parent of a newborn may not be thinking yet of “child-proofing” the home. Nevertheless, it is never too early to begin to identify potential safety hazards. Even a young infant can grasp a dangerous object or roll off a bed or changing table (Table 20.6).

**Readiness for Hospital Discharge**

When planning for discharge from hospital, it is important to take into consideration the physical, psychological, and social well-being of both mother and baby. As well, studies have found that community-based support programs and post-discharge follow-up are effective in decreasing neonatal mortality, morbidity, and readmissions (SOGC, 2007a). Criteria for early discharge following an uncomplicated term birth are outlined in Table 20.7.

**Newborn Metabolic Screening**

Each province regulates newborn metabolic screening tests. The purpose of a metabolic screening program is to prevent complications of genetic diseases through early identification and treatment. Metabolic and genetic testing in Canada is not mandated by law, and the number of diseases included in screening programs varies from 3 to 28 (Hanley, 2005). With evolving technology, the number of genetic metabolic illnesses for which screening can be done is growing constantly, and new variants of disease conditions continue to be found. The March of Dimes recommends that all babies receive screening for at least nine metabolic disorders for which proven treatments are available (Table 20.8). (March of Dimes, 2003).

Nurses should understand that metabolic screening tests simply identify infants whose results indicate a need for further testing and diagnostic evaluation (Kenner & Moran, 2005). Each hospital has established procedures to ensure that newborn metabolic screening tests are performed before hospital discharge.

Umbilical cord blood is not adequate for testing disorders that exhibit metabolite accumulation after birth or after feeding (AAP & ACOG, 2002). Ideally, the blood sample is collected between 48 and 72 hours of age; however, some healthy term newborns are discharged from the hospital before this time. Babies tested earlier than 24 hours of age (and, in some provinces, all babies) are usually retested by a pediatric care provider by 2 weeks of age to ensure detection of phenylketonuria (PKU) and congenital hypothyroidism. A heel-stick sample is usually obtained. See Nursing Procedure 20.6 for an example of the heel-stick technique.

**Auditory Screening**

Permanent childhood hearing loss occurs in 2 to 3 of every 1000 healthy newborns (Hyde, 2005); the risk for premature, low birthweight infants is 10 to 12 times that of term infants (Merritt et al., 2003). If hearing loss is detected and appropriate interventions are made by 6 months of age, normal development can be expected. If diagnosis or treatment is delayed for longer than 6 months, however, permanent developmental delays can occur in otherwise normal babies (Joint Committee on Infant Hearing, 2000).

Although in the United States newborn hearing screening is becoming the hospital standard of care, in Canada the implementation of hearing screening is variable. Some hospitals screen all newborns, while others have developed a risk-based screening program. Nurses

(text continues on page 000)
<table>
<thead>
<tr>
<th>TYPE OF INJURY</th>
<th>PREVENTION MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airway obstruction</td>
<td><em>Never prop the baby’s bottle.</em></td>
</tr>
<tr>
<td></td>
<td>Use only one-piece pacifiers; <em>do not</em> “make” a pacifier from a baby bottle nipple.</td>
</tr>
<tr>
<td></td>
<td>Keep small objects out of the baby’s reach (this includes such items as button eyes glued or sewn onto stuffed animals that may be pulled off).</td>
</tr>
<tr>
<td></td>
<td>Learn first aid for a choking baby.</td>
</tr>
<tr>
<td>Choking</td>
<td><em>Do not place the crib close to window drapery cords; gather cords up and out of reach on hooks.</em></td>
</tr>
<tr>
<td></td>
<td><em>Never tie pacifiers or other items (eg, jewelry) around the baby’s neck.</em></td>
</tr>
<tr>
<td></td>
<td>Remove drawstrings from the baby’s clothing.</td>
</tr>
<tr>
<td>Strangulation</td>
<td><em>Do not place electrical cords or extension cords where infants or children can become entangled in them.</em></td>
</tr>
<tr>
<td></td>
<td>Learn infant CPR (or pediatric basic life support).</td>
</tr>
<tr>
<td>Suffocation</td>
<td><em>Do not place pillows or other soft objects in the baby’s crib (especially large stuffed animals).</em></td>
</tr>
<tr>
<td></td>
<td><em>Do not place the baby on a water bed or a beanbag chair.</em></td>
</tr>
<tr>
<td></td>
<td>Store and dispose of plastic bags safely.</td>
</tr>
<tr>
<td>Car crash related</td>
<td>Follow instructions on proper use of car seats.</td>
</tr>
<tr>
<td></td>
<td>“The back is where it’s at!” <em>All infants and children under the age of 12 should be placed in the back seat whenever possible as long as the back seat permits them to be secured with a restraint that is appropriate for their age and size.</em></td>
</tr>
<tr>
<td>Crib related</td>
<td><em>Never leave the baby in a crib with the side rail lowered.</em></td>
</tr>
<tr>
<td></td>
<td>Cornerposts should not extend above the crib end panels because older infants can use them to climb up and over the railing.</td>
</tr>
<tr>
<td></td>
<td>The headboard and footboard should <em>not</em> have cutouts.</td>
</tr>
<tr>
<td></td>
<td>Spacing between crib slats should not exceed 6 cm.</td>
</tr>
<tr>
<td></td>
<td>Crib hardware should be secure.</td>
</tr>
<tr>
<td></td>
<td>The mattress should be firm and snug fitting (<em>no</em> gaps between the frame and mattress to entrap the infant).</td>
</tr>
<tr>
<td></td>
<td>Remove mobiles, crib gyms, and bumper pads from crib rails as soon as the infant can crawl or kneel.</td>
</tr>
<tr>
<td></td>
<td>Check for peeling paint and rough edges or splinters.</td>
</tr>
<tr>
<td>Drowning</td>
<td><em>Never leave the baby alone in the bath or any body of water.</em></td>
</tr>
<tr>
<td></td>
<td>Empty buckets or containers of fluid immediately after use; <em>never</em> leave them unattended.</td>
</tr>
<tr>
<td></td>
<td>Keep the bathroom door closed; use doorlock covers.</td>
</tr>
<tr>
<td></td>
<td>Use lid-locks for toilets.</td>
</tr>
<tr>
<td></td>
<td>Install a barrier between the swimming pool and house.</td>
</tr>
<tr>
<td>Falls</td>
<td><em>Do not</em> use a baby walker unless it has a label stating that it meets the new safety standard.</td>
</tr>
<tr>
<td></td>
<td>When your baby is on a high surface (eg, changing table, couch, bed), always place one hand on the baby, and <em>never</em> leave her unattended.</td>
</tr>
<tr>
<td></td>
<td>Use gates at the top and bottom of stairways.</td>
</tr>
<tr>
<td></td>
<td>Use window guards.</td>
</tr>
<tr>
<td></td>
<td><em>Never put a crib or playpen near a window.</em></td>
</tr>
<tr>
<td></td>
<td>Use nonslip area rugs.</td>
</tr>
<tr>
<td></td>
<td>Use a rubber mat or another nonslip device in the bathtub.</td>
</tr>
<tr>
<td></td>
<td>Remove coffee tables with sharp edges from the centre of the room as soon as the child pulls to stand.</td>
</tr>
<tr>
<td></td>
<td>Stabilize or remove from tables or shelves heavy items that a child could pull down on herself—such as lamps, TV sets, VCRs.</td>
</tr>
<tr>
<td>Fire, scald burns, and electrical injuries</td>
<td><em>Do not</em> carry the baby and hot items at the same time.</td>
</tr>
<tr>
<td></td>
<td>Keep hot beverages out of the baby’s reach.</td>
</tr>
<tr>
<td></td>
<td><em>Do not</em> use placemats or tablecloths—infants and children can tug on them.</td>
</tr>
<tr>
<td></td>
<td>Keep the baby in a safe place while you are cooking.</td>
</tr>
<tr>
<td></td>
<td>Turn pot handles to the stove’s back or side so the child can’t pull down pots.</td>
</tr>
<tr>
<td></td>
<td>Keep small appliances out of reach and unplugged.</td>
</tr>
<tr>
<td></td>
<td>Have a fire extinguisher handy.</td>
</tr>
<tr>
<td></td>
<td>Have working smoke detectors in your home.</td>
</tr>
<tr>
<td></td>
<td>Maintain the hot-water heater temperature at 48°C.</td>
</tr>
<tr>
<td></td>
<td>When preparing a bath, turn cold water on first, and then add hot water.</td>
</tr>
<tr>
<td></td>
<td>Block fireplaces, space heaters, and kerosene lamps with gates or another barrier.</td>
</tr>
<tr>
<td></td>
<td>Keep lighters and matches out of children’s reach.</td>
</tr>
<tr>
<td></td>
<td>Use safety plugs on all outlets.</td>
</tr>
<tr>
<td></td>
<td>Install ground fault circuit interrupters in electrical outlets in bathrooms, kitchens, and laundry rooms.</td>
</tr>
<tr>
<td></td>
<td><em>Do not</em> place electrical cords or extension cords where infants or children can bite or chew on them.</td>
</tr>
</tbody>
</table>
### TABLE 20.6 Newborn Injury Prevention (continued)

<table>
<thead>
<tr>
<th>TYPE OF INJURY</th>
<th>PREVENTION MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poisoning</td>
<td>Store household cleaners, medicines, cosmetics, toiletries, and chemicals in high, locked cabinets. Do not store these items near food. Keep all of these items in their original containers (do not transfer to soda or other food bottles). Use child-protective caps whenever possible. Flush old medicines down the toilet. Keep syrup of ipecac out of reach in your medicine cabinet (used to induce vomiting when appropriate—check with your local poison control centre first). You can reach the nearest Poison Control Centre with the phone number provided on the first page of your local phone book or by dialing 9-1-1. Place household plants out of reach—some are poisonous (check with your local poison control centre). Keep the local poison control centre phone number by your phones. Install carbon monoxide detectors in your home. Keep handguns locked up and out of reach of children of all ages (preferably out of the house). Install safety latches on cabinets, particularly those containing sharp utensils and poisons. Make basements, utility rooms, and garages off limits.</td>
</tr>
<tr>
<td>Other injuries</td>
<td>Keep household cleaners, medicines, cosmetics, toiletries, and chemicals in high, locked cabinets. Do not store these items near food. Keep all of these items in their original containers (do not transfer to soda or other food bottles). Use child-protective caps whenever possible. Flush old medicines down the toilet. Keep syrup of ipecac out of reach in your medicine cabinet (used to induce vomiting when appropriate—check with your local poison control centre first). You can reach the nearest Poison Control Centre with the phone number provided on the first page of your local phone book or by dialing 9-1-1. Place household plants out of reach—some are poisonous (check with your local poison control centre). Keep the local poison control centre phone number by your phones. Install carbon monoxide detectors in your home. Keep handguns locked up and out of reach of children of all ages (preferably out of the house). Install safety latches on cabinets, particularly those containing sharp utensils and poisons. Make basements, utility rooms, and garages off limits.</td>
</tr>
</tbody>
</table>

Courtesy of Kathleen Southerton, RNC, PhD, University Hospital, Stony Brook, New York. Adapted by permission.

### TABLE 20.7 Criteria for Discharge Less Than 48 h After Birth

**MATERNAL**

- **PURPOSE:** To ensure postpartum mothers are safely discharged following the birth of their baby, they should meet basic criteria and have appropriate arrangements for ongoing care. Prior to discharge, the following criteria should be met.
  - Vaginal delivery
  - Care for the perineum will be ensured
  - No intrapartum or postpartum complications that require ongoing medical treatment or observation*
  - Mother is mobile with adequate pain control
  - Bladder and bowel functions are adequate
  - Receipt of Rh immune globulin and/or rubella vaccine, if eligible
  - Demonstrated ability to feed the baby properly; if breast-feeding, the baby has achieved adequate “latch”
  - Advice regarding contraception is provided
  - Physician who will provide ongoing care is identified and, where necessary, notified
  - Family is accessible for follow up and the mother understands necessity for, and is aware of the timing for, any health checks for baby or herself
  - If home environment (safety, shelter, support, communication) is not adequate, measures have been taken to provide help (eg, homemaking help, social services)
  - Mother is aware of, understands, and will be able to access community and hospital support resources

*Mothers should NOT be discharged until stable, if they have had:
  - significant postpartum hemorrhage or ongoing bleeding greater than normal;
  - temperature of 38°C (taken on two occasions at least 1 hour apart) at any time during labour and after birth;
  - other complications requiring ongoing care.

**NEWBORN**

- **PURPOSE:** To ensure newborn infants are safely discharged, they should meet basic criteria and have appropriate arrangements for ongoing care. The baby should be healthy in the clinical judgement of the physician, and the mother should have demonstrated a reasonable ability to care for the child.
  - Full-term infant (37–42 weeks) with size appropriate for gestational age
  - Normal cardiorespiratory adaptation to extrauterine life†
  - No evidence of sepsis†
  - Temperature stable in cot (axillary temperature of 36.1°C to 37°C)
  - No apparent feeding problems (at least two successful feedings documented)
  - Physical examination of the baby by physician or other qualified health professional within 12 hours prior to discharge indicates no need for additional observation and/or therapy in hospital
  - Baby has urinated
  - No bleeding at least 2 hours after the circumcision, if this procedure has been performed
  - Receipt of necessary medications and immunization (eg, hepatitis B)
  - Metabolic screen completed (at >24 hours of age) or satisfactory arrangements made
  - Mother is able to provide routine infant care (eg, of the cord) and recognizes signs of illness and other infant problems
  - Arrangements are made for the mother and baby to be evaluated within 48 hours of discharge
  - Physician responsible for continuing care is identified with arrangements made for follow-up within 1 week of discharge

<table>
<thead>
<tr>
<th>TEST/DISORDER SCREENED</th>
<th>INCIDENCE</th>
<th>CHARACTERISTICS</th>
<th>TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium-chain acyl-CoA dehydrogenase (MCAD) deficiency</td>
<td>1 in 15,000</td>
<td>An inherited disorder of fatty acid metabolism caused by lack of an enzyme required to convert fat to energy. Seemingly well infants or children can suddenly develop seizures, respiratory failure, cardiac arrest, coma, and death. Identifying affected children before they become ill is vital to preventing a crisis and averting these consequences.</td>
<td>Steady food or glucose intake and avoidance of fasting</td>
</tr>
<tr>
<td>Phenylketonuria (PKU)</td>
<td>1 in 12,000</td>
<td>An inability to properly process the essential amino acid phenylalanine, which then accumulates and damages the brain. PKU can cause severe mental retardation unless detected soon after birth and treated with a special formula.</td>
<td>A low phenylalanine diet at least throughout childhood and adolescence and, for females, during pregnancy</td>
</tr>
<tr>
<td>Congenital hypothyroidism</td>
<td>1 in 4000</td>
<td>Thyroid hormone deficiency that severely retards both growth and brain development</td>
<td>Oral doses of thyroid hormone</td>
</tr>
<tr>
<td>Congenital adrenal hyperplasia</td>
<td>1 in 5000</td>
<td>A set of inherited disorders resulting from defects in the synthesis of hormones produced by the adrenal gland. Certain severe forms can cause life-threatening salt loss from the body.</td>
<td>Salt and hormone replacement</td>
</tr>
<tr>
<td>Biotinidase deficiency</td>
<td>1 in 70,000</td>
<td>Deficiency of biotinidase, an enzyme that recycles the B vitamin biotin. Complications include frequent infections, uncoordinated movement, hearing loss, seizures, mental retardation, coma, and death.</td>
<td>Extra biotin</td>
</tr>
<tr>
<td>Maple syrup urine disease</td>
<td>1 in 250,000</td>
<td>Rare inborn error of metabolism that ranges from mild to severe. Severely affected babies rarely survive for more than 1 month; those who do survive usually have irreversible mental retardation. Early detection and treatment are vital for normal outcomes.</td>
<td>A special diet that requires frequent monitoring and must be continued indefinitely</td>
</tr>
<tr>
<td>Galactosemia</td>
<td>1 in 50,000</td>
<td>Lack of the liver enzyme needed to convert galactose into glucose. Galactose accumulates in and damages vital organs, leading to blindness, mental retardation, infection, and death.</td>
<td>Elimination of milk and other dairy products from diet</td>
</tr>
<tr>
<td>Homocysteinuria</td>
<td>1 in 275,000</td>
<td>Deficiency of the enzyme that converts homocysteine into cystathionine, needed by the brain for normal development. Can lead to mental retardation, eye problems, skeletal abnormalities, and stroke.</td>
<td>Special diet with high doses of vitamin B6 or B12</td>
</tr>
<tr>
<td>Sickle cell anemia</td>
<td>1 in 400 African Americans</td>
<td>Blood disease that can cause severe pain, damage to vital organs, stroke, and early death.</td>
<td>Vigilant medical care, treatment with penicillin</td>
</tr>
</tbody>
</table>
NURSING PROCEDURE 20.6
Performing a Heel Stick on a Newborn

PURPOSE
To obtain a blood specimen for analysis

ASSESSMENT AND PLANNING
- Check the medical record to ensure that the newborn has received vitamin K.
- Assess the lower extremities for colour and warmth; if necessary, apply a warm moist pack or compress to the heel area for several minutes to promote vasodilation.
- Review the order for type of testing to be performed; ensure that an appropriate laboratory request form has been completed.
- Explain the reason for the procedure to the parents if appropriate.
- Gather the necessary equipment.
  - Alcohol wipes
  - Clean gloves
  - Specimen container
  - Lancet or skin puncturing device
  - Sterile gauze pads
  - Tape

IMPLEMENTATION
1. Wash hands and put on clean gloves.
2. Remove the warm moist pack if applied.
3. Inspect the lateral aspects of the newborn’s foot to select a site that is free of nerves and major arteries.
4. Support the foot with one hand covering the palmar aspect to prevent inadvertent puncture to an area rich in nerves and major blood vessels.
5. Palpate the selected site to ensure that adequate padding is over the bone.
6. Clean the site with an alcohol wipe or according to agency policy; allow to air dry.
7. Holding the lancet device, quickly insert the device into the intended site to a depth no greater than 2 mm to prevent puncturing the bone. Discard the lancet device in the sharps container.

Application of a warming pad to the newborn’s heel.

Step 3. Areas of the heel and foot with nerves and arteries.

Step 7. Inserting the lancet device.

Continued
NURSING PROCEDURE 20.6 CONTINUED
Performing a Heel Stick on a Newborn

8. Obtain the first drop of blood and wipe away with a dry gauze pad to prevent contaminating or diluting the specimen. Obtain a second drop of blood and, if necessary, gently milk the foot instead of squeezing to obtain this drop of blood to ensure accuracy of the results.

9. Collect the specimen as indicated and send to the laboratory or process the specimen at the bedside, depending on agency policy.

10. Apply a pressure dressing of gauze and tape to the puncture site to ensure hemostasis.

11. Remove gloves and wash hands; document procedure and disposition of the specimen.

12. Provide comfort to the newborn after the procedure.

EVALUATION
- Specimen is obtained without undue pain or discomfort to the newborn and sent to the laboratory.
- Newborn tolerates the procedure well.

AREAS FOR CONSIDERATION AND ADAPTATION

Lifespan Considerations
- If a pressure dressing is unavailable, use an alternate means of ensuring hemostasis by applying direct pressure to the site for several minutes until the bleeding has ceased; then apply an adhesive bandage to the site.
- When applying a warm moist pack to the newborn’s heel area, check the temperature of the pack to prevent thermal injury.
- Substitute a warm washcloth, towel, or diaper for the warm moist pack if a commercial pack is unavailable.
- If the infant is somewhat older, anticipate the need to gently immobilize the lower leg temporarily to prevent sudden movements during the procedure, which may cause injury.

Community-Based Considerations
- Heel sticks may be used in the home setting to obtain blood specimens in newborns and infants. Always check with the laboratory for any specific requirements or modifications that may be necessary.
- Instruct the parents to apply topical anesthetic if ordered at the specified time before the procedure to minimize pain.

should be familiar with the risks of congenital hearing loss and the hearing screening policies in their institution.

Hearing loss detected in the neonatal period results from various causes:
- Heredity
- Perinatal factors, such as congenital malformations of the head and neck
- Very low birthweight (VLBW) (below 1500 g)
- Congenital infections (eg, cytomegalovirus, rubella, herpes, syphilis, toxoplasmosis)
- Hyperbilirubinemia requiring exchange transfusion
- Apgar score of 0 to 4 at 1 minute, or 0 to 6 at 5 minutes
- Mechanical ventilation lasting 5 days or longer
- Any syndrome known to include hearing loss
- Bacterial meningitis
- Ototoxic drugs (eg, gentamicin, furosemide)
Hearing loss ranges in degree from minimal to profound. Two types are possible. If a problem lies in the outer or middle ear, the hearing loss is termed conductive, which can be corrected medically or surgically. If the problem is detected in the cochlea, the hearing loss is called sensorineural. To date, sensorineural hearing loss cannot be reversed, but it may be possible to enhance hearing through amplification. Hearing loss may also be a mix of the two types (Knott, 2001).

Hospital-based screening is not diagnostic and should be followed up with reevaluation and referral to specialists.

Postdischarge Follow-Up
Any newborn discharged before 48 hours of age should be examined again within 48 hours of discharge. For healthy term newborns, the frequency of subsequent visits varies by region but should follow the Canadian Taskforce Guidelines for Preventive Health Care (http://www.ctf-phc.org/). Early visits include important assessments of growth (weight gain, occipital-frontal circumference, and length), general health, and attainment of developmental milestones. Immunizations should be administered according to the Childhood Immunization schedule (see Fig. 20.21). Pediatric visits also give providers an opportunity to assess parent–infant attachment; parenting skills, including breastfeeding; any remarkable stressors such as postpartum depression, intimate-partner violence, or substance abuse; and any evidence of child neglect or abuse. Every province mandates health care professionals to report cases of suspected child abuse.

Questions to Ponder

1. Laurie was born by scheduled repeat cesarean section to a 32-year-old woman, G3P2. The mother had a healthy, uneventful pregnancy of 38 weeks’ gestation by ultrasound. Apgar scores were 7 at 1 minute and 8 at 5 minutes. Laurie required less than 1 minute of free-flow oxygen for central cyanosis after delivery. Free-flow oxygen gradually was withdrawn, and her lips and mucous membranes remained pink in room air. Laurie appeared to be in good condition and was wrapped in a warm blanket, given to her father to hold in the operating room, and viewed and touched by her mother.

Laurie is now 15 minutes old. She is lying supine on the radiant warmer with the thermistor probe in place. Her axillary temperature is 36.5°C, heart rate is 152 bpm without murmur, respiratory rate is 80 breaths per minute with mild intermittent expiratory grunting, nasal flaring, and intercostal retracting. She has bilateral breath sounds and crackles. She has active bowel sounds. She is active and alert, with symmetric movement and good muscle tone.

2. Ms. Chung comes to the nurses’ station with her baby in her arms. You are not familiar with the Chung family. Ms. Chung asks for a warm blanket for her baby, because he is shivering. You accompany Ms. Chung back to her room and assess the infant. The baby is mottled, cool to the touch, and jittery. His cry is high-pitched. His T-shirt is wet in a large area on the front. He appears to weigh about 2500 g.

- How do you explain Baby Chung’s “shivering” to his mother?
- What are Baby Chung’s possible problems?
- What is your assessment of Sierra’s behavioral state and cues?
- What are immediate nursing interventions for Baby Chung?

3. Ms. Taylor is 19 years old, a single woman with an uncomplicated pregnancy and delivery of her first baby.

- How do you explain Baby Chung’s “shivering” to his mother?
- What are Baby Chung’s possible problems?
- What is your assessment of Sierra’s behavioral state and cues?
- What are immediate nursing interventions for Baby Chung?

SUMMARY

- Fetal lungs are filled with fluid, not with air.
- Fetal circulation involves two important cardiac shunts, the ductus arteriosus and the foramen ovale. These
shunts divert oxygenated blood to the brain and other vital organs, away from fetal lungs.

- Blood vessels in the fetal lungs are tightly constricted, and blood pressure is high (high pulmonary vascular resistance). The systemic blood pressure in the fetus is low (low systemic vascular resistance). With the newborn’s first strong breaths, oxygen entering the lungs causes the vessels in the lungs to relax and allows blood to perfuse the newborn’s lungs, and blood pressure in the baby’s body increases. This rise in systemic vascular resistance closes the cardiac shunts and establishes newborn circulation.

- Pulmonary alveolar surfactant is a fatty substance produced by cells in the lungs. Surfactant is essential to lung function because it allows the alveoli to remain open, instead of collapsing during exhalation. Surfactant production peaks at about 35 weeks’ gestation, which is why babies born before this time are likely to have surfactant deficiency, resulting in respiratory distress syndrome.

- A baby at birth whose skin is clear of meconium, breathes or cries, demonstrates good muscle tone, becomes pink, and appears to be at term gestation requires little resuscitative assistance. The nurse need only provide warmth, clear the airway with a bulb syringe if necessary, and dry the baby to prevent cold stress.

- The Apgar score is a system used to evaluate the newborn at 1 and 5 minutes of age by assigning 0 to 2 points to each of five components: colour, heart rate, reflex irritability, muscle tone, and respiratory effort. Most healthy, term newborns receive a score between 7 and 9.

- The Apgar score reflects the newborn’s response to extraterine transition and resuscitative efforts, but is not used to determine the need for resuscitation. The Apgar score is not predictive of neurologic outcome.

- A newborn is term, preterm, or postterm, depending on gestational age. In addition, the newborn is small for gestational age (SGA), appropriate for gestational age (AGA), or large for gestational age (LGA), depending on weight, head circumference, and length in relation to the gestational age.

- A physical assessment should proceed with observation, auscultation, and palpation, in that order.

- The nurse can quickly approximate gestational age by assessing maturational characteristics of the infant’s ear pinna, nipples, genitalia, and sole creases.

- The newborn has two sleep and four awake states: deep sleep, light sleep, drowsy, quiet alert, active alert, and crying. Each state has implications for caregiving.

- The newborn learns to control his or her environment by displaying approach cues, indicating a readiness to interact, and avoidance cues, indicating the need to disengage from interaction.

- Some newborns exhibit signs of respiratory distress immediately after birth, but a healthy newborn steadily improves and stabilizes over a short time.

- A newborn with abnormal transition shows signs of distress and does not improve or deteriorates. Signs of abnormal transition include respiratory distress, poor perfusion, hypotonia, marked jitteriness, temperature instability, abdominal distention, vomiting of bilious material, and frequent choking accompanied by apnea or cyanosis.

- The newborn transfers heat to and from the body surface in four ways: evaporation, conduction, convection, and radiation.

- The ill or the low-birthweight newborn is at risk for hypoglycemia.

- Signs of neonatal hypoglycemia include jitteriness, hypothermia, lethargy, hypotonia, high-pitched or weak cry, apnea, respiratory distress, poor suck, vomiting, cyanosis, and seizures. A hypoglycemic newborn may be asymptomatic.

- Forty-five to 60% of term newborns become jaundiced in the first week of life owing to RBC hemolysis and immature liver function. Jaundice in the first 24 hours of life is never normal.

- The newborn is susceptible to infection due to immature immunologic responses to infection and because of delayed or decreased immune response due to the newborn’s lack of exposure to common organisms.

- The best infection prevention strategy is thorough hand washing.

- The nurse promotes normal transition by avoiding mother–infant separation, handling the newborn gently, using containment, avoiding frequent and deep suction, avoiding bright light in the infant’s face, and avoiding rectal temperature assessment.

- Acrocyanosis is normal in the few days of life, especially if the baby is exposed to cool temperatures; central cyanosis indicates hypoxia and an emergent need for supplemental oxygen.

- A healthy newborn has pink lips and mucous membranes, an axillary temperature in the range of 36.5°C to 37.3°C, a heart rate of 120 to 160 bpm, and a respiratory rate of 40 to 60 breaths per minute. The healthy newborn urinates by 24 hours of age and passes meconium by 48 hours of age.

- The cause of SIDS is unknown. Risk factors for SIDS include prone sleep position, sleeping on a soft surface, maternal smoking during pregnancy, overheating, late or no prenatal care, young maternal age, prematurity or low birthweight, and male sex.

- The health care provider must assess the cultural and spiritual beliefs of the client. It is not safe to stereotype the behaviour or beliefs of a person from a designated ethnic group by assuming that literature about cultural practices applies to everyone within the specified ethnic group.
● Parent education before discharge includes temperature taking, use of the bulb syringe, normal amounts of urine and stool, diapering, dressing, and bathing, cord care, sleep position, car seat use, dangers of secondhand smoke, circumcision care, and signs of newborn illness.

REVIEW QUESTIONS

1. The nurse educator is teaching a group of student nurses the differences between fetal and newborn circulation. Which statement about fetal circulation would indicate that the educator’s teaching plan has been successful?
   A. “Fetal circulation is characterized by high pulmonary vascular resistance and high systemic vascular resistance.”
   B. “Fetal circulation is characterized by low pulmonary vascular resistance and low systemic vascular resistance.”
   C. “Fetal circulation is characterized by high pulmonary vascular resistance and low systemic vascular resistance.”
   D. “Fetal circulation is characterized by low pulmonary vascular resistance and high systemic vascular resistance.”

2. When performing an initial newborn assessment, which parameters would be most important to assess in the first minute of life?
   A. Colour, respirations, heart rate
   B. Gestational age, sex, muscle tone
   C. Weight, length, head circumference
   D. Colour, respirations, temperature

3. Oxygen administration would most likely be required 90 seconds after birth in a newborn with:
   A. Acrocyanosis
   B. Jaundice
   C. Central cyanosis
   D. Circumoral cyanosis

4. The nurse is reporting a newborn’s Apgar scores to the baby’s parents. The father asks what the information means. Which response, if made by the nurse, would be most appropriate?
   A. “Apgar scores help determine which steps of resuscitation are required.”
   B. “Apgar scores reflect the newborn’s response to extrauterine transition and resuscitation efforts.”
   C. “Apgar scores are assessed at 1, 3, and 5 minutes of age.”
   D. “Apgar scores are the best predictor of neurologic outcome.”

5. A nurse is collecting data for a baby with suspected neonatal hypoglycemia. Which set of findings would support this diagnosis?
   A. Jitteriness, high-pitched cry, lethargy
   B. Plethoric, excess mucus production, dysrhythmia
   C. Blood glucose level of 2.7 mmol/L, no crying, fever
   D. Apnea, bradycardia, fever

6. Which of the following scenarios most clearly depicts abnormal newborn transition?
   A. Term baby; vaginal birth; Apgar scores 5 (1 minute), 8 (5 minutes); required brief free-flow oxygen for central cyanosis after birth; now 20 minutes old and pink in room air; respiratory rate 68 breaths per minute; bilateral crackles heard with auscultation.
   B. Term baby; vaginal birth; Apgar scores 8 (1 minute), 9 (5 minutes); now 10 minutes old; pink when active and crying; dusky when quiet.
   C. Term baby; scheduled repeat cesarean birth; now 15 minutes old; pink with marked acrocyanosis; respiratory rate 72 breaths per minute; intermittent expiratory grunting and nasal flaring.
   D. Term baby; emergency cesarean birth for fetal distress; Apgar scores 6 (1 minute), 8 (5 minutes); required free flow oxygen until 3 minutes of age, now 25 minutes old; pale pink and quiet alert; respiratory rate 68 breaths per minute with periodic breathing noted.

7. When educating parents of a newborn regarding when to contact the newborn’s care provider, the best statement by the nurse would be:
   A. Contact the provider if the newborn has not voided within 24 hours and passed meconium within 48 hours of birth.
   B. Contact the provider if the newborn has not voided within 12 hours and passed meconium within 24 hours of birth.
   C. Contact the provider if the newborn has not voided and passed meconium within 4 hours after the first feeding.
   D. Contact the provider if the newborn has not voided and passed meconium at least once every 8 hours times three.

8. Which statement by the father of a newborn diagnosed with physiologic jaundice indicates that teaching has been effective?
   A. “Physiologic jaundice is a normal result of immature liver function.”
   B. “Physiologic jaundice is uncommon in term infants like my baby.”
   C. “I should have noticed the jaundice in the baby’s first 24 hours.”
   D. “The baby will have ongoing problems with his skin colouring.”

9. When providing anticipatory guidance to a group of expectant parents, the nurse correctly identifies the preferred sleeping position for a term, healthy newborn as:
   A. Prone
   B. Supine
   C. Dorsal recumbent
   D. Side-lying with a blanket roll for support

10. The nurse is teaching a new mother about common signs of newborn illness. Which of the following sets
of findings would the nurse alert the mother to look for and to report?
A. Respiratory distress and temperature instability
B. Fever and soft frequent stools
C. Sweating and shivering
D. Periodic breathing and neus simplex

REFERENCES

Chapter 20—Author Queries

1. Please provide more author names. APA requires 6 author names before et al. in the Reference List.
2. Please supply place of publication for Brazelton & Sparrow (2003).
3. Please provide initials for Hassan in Hutton & Hassan (2007)?
4. Please supply page #s for Philip and Silverman (2004).