chapter 18

Nursing Management of the Newborn

KeyTERMS

acrocyanosis
Apgar score
caput succedaneum
cephalhematoma
circumcision
Epstein's pearls
erythema toxicum
gestational age
Harlequin sign
infant abduction
immunizations
milia
molding
mongolian spots
nevus flammeus
nevus vasculosus
ophthalmia neonatorum
pseudomenstruation
phototherapy
stork bites
vernix caseosa

LearningOBJECTIVES

After studying the chapter content, the student should be able to accomplish the following:

1. Define the key terms.
2. Discuss the assessments performed during the immediate newborn period.
3. Describe the interventions appropriate to meet the immediate needs of the term newborn.
4. Explain the components of a typical physical examination of a newborn.
5. Identify common variations that can be noted during a newborn's physical examination.
6. Identify common concerns of the newborn and appropriate interventions.
7. Explain the importance of the newborn screening tests.
8. Describe the common interventions appropriate during the early newborn period.
9. Delineate the nurse's role in meeting the newborn's nutritional needs.
10. Outline discharge planning content and education needed for the family with a newborn.

WOW

You can send a more powerful message with your actions and behavior than merely with words.

Immediately after the birth of a newborn, parents are faced with the task of learning and understanding as much as possible about caring for this new family member—a reality even for parents who are not experiencing childbirth for the first time. In their new or expanded role as parents, they will face many demands and challenges. For most, this is a wonderful, exciting time filled with many new discoveries and much information.

Parents learn as they watch nurses interacting with their newborns. In addition, nurses play a major role in teaching parents about their newborn and normal characteristics, and about ways to foster optimal growth and development. This role is even more crucial today as a result of the limited time spent by the mother and newborn in the health care facility.

ConsiderTHIS!

Katie and Molly have been excited about having a new baby sister since they were told about their mother's pregnancy. They were anxiously looking out the front window, waiting for their parents to bring their new sister home. Both girls are now 6 years old and are big enough to help their mother care for their new sibling. For the past few months, both girls were involved in fixing up the new nursery and selecting baby clothes for "Jessica" to wear. They had practiced diapering their dolls and holding them correctly to feed them bottles. Their mother had been very specific about not using any powder or lotion on Jessica's bottom. Finally, their mother arrived home from the hospital with Jessica in her arms.

To both girls, their mother seemed to be very protective of Jessica by watching them carefully whenever they helped her care for their new sister. They would fight over the opportunity to hold her or feed her. What was special to both of them was the time their parents spent only with them. Although a new family member was added, both older girls felt loved and special to their parents.

Thoughts: Frequently, bringing a new baby into an established family unit can cause conflict and jealousy. What preparation did the older siblings have before the new family member was introduced? Why is it important for parents to spend time with each girl separate from the others?

HEALTHY PEOPLE 2010

National Health Goals Related to the Newborn Period

Objective	Significance
Increase the proportion of mothers who breastfeed their babies during the early postpartum period from a baseline of 64% to 75%.	Will help to emphasize the importance of breast milk as the most complete form of nutrition for infants
Increase the proportion of mothers who breastfeed at 6 months from a baseline of 29% to 50%.	Will help to promote infant health, growth, immunity and development throughout the newborn and infant periods
Increase the proportion of mothers who breastfeed at 1 year from a baseline of 16% to 25%.	
Ensure appropriate newborn bloodspot screening, newborn hearing screening, follow-up testing, and referral services.	Will help to foster early detection and prompt treatment for conditions, thereby lessening the incidence of illness, disability, and death associated with these conditions and their overall effects on the newborn, infant, and family
Ensure that all newborns are screened at birth for conditions mandated by their state-sponsored newborn screening programs.	
Ensure that follow-up diagnostic testing for screening positives is performed within an appropriate time period.	

Source: U.S. DHHS, 2000.

The newborn has come from a dark, small, enclosed space within the mother's uterus into the bright, cold extrauterine environment. In day-to-day routines, nurses can easily forget that a small human being is experiencing his or her first taste of human interaction outside the uterus. The newborn period is an extremely important one. Subsequently, two specific National Health Goals have been developed to address this critical period (see Healthy People 2010: National Health Goals Related to the Newborn Period).

It is also easy to overlook the intensity with which that small human being's parents are watching nurses to learn how to care for their new family member, and easier still to be completely unaware of being observed by visitors, including siblings and other family members. Therefore, all nurses need to model nurturing care to all newborns. This chapter provides information about assessment and interventions in the period immediately following the birth of a newborn and during the early newborn period.

Nursing Management During the Immediate Newborn Period

The period of transition from intrauterine to extrauterine life occurs during the first several hours after birth. During this time, the newborn is undergoing numerous changes and adaptations, many of which are occurring simultaneously (see Chapter 17 for more information on the newborn's adaptation). It is a time of stabilization for the neonate's temperature, respiration, and cardiovascular dynamics. Close observation of the newborn's status is essential. Careful examination of the newborn at birth can detect anomalies, birth injuries, and disorders that can compromise successful adaptation to extrauterine life. Problems occurring during this critical time can dictate the quality of life for the newborn.

Assessment

The initial newborn assessment is completed in the birthing area to determine whether the newborn is stable enough to stay with the parents or whether resuscitation or immediate interventions are necessary. A second assessment is done within the first 2 to 4 hours when the newborn is admitted to the nursery. A third assessment is completed before discharge. The purpose of all three assessments is to confirm normality, to provide reassurance to the parents, and to identify apparent physical abnormalities (Lumsden, 2002).

During the initial newborn assessment, look for signs that might indicate a problem, including

- Nasal flaring
- Chest retractions
- Grunting on exhalation
- Labored breathing
- Generalized cyanosis
- Abnormal breath sounds: rhonchi, crackles (rales), wheezing, stridor
- Abnormal respiratory rates (tachypnea, > 60 breaths/minute; bradypnea, < 25 breaths/minute)
- Flaccid body posture
- Abnormal heart rates (tachycardia, > 160 bpm; bradycardia, < 100 bpm)
- Abnormal newborn size: small or large for **gestational age**

If any of these findings are noted, medical intervention may be necessary.

Apgar Scoring

The **Apgar score,** first proposed in 1952 by Dr. Virginia Apgar, is used to evaluate newborns at 1 minute and 5 minutes after birth. An additional Apgar assessment is done at 10 minutes if the 5-minute score is less than 7 points (Littleton & Engebretson, 2005). Assessment of the newborn at 1 minute provides data indicating the newborn's initial adaptation to extrauterine life. Assessment at 5 minutes provides a clearer indication of the newborn's overall central nervous system status.

Five parameters are assessed with Apgar scoring. A quick way to remember the parameters of Apgar scoring is as follows:

A = appearance (color)
P = pulse (heart rate)
G = grimace (reflex irritability)
A = activity (muscle tone)
R = respiratory (respiratory effort)

Each parameter is assigned a score ranging from 0 to 2 points, with 2 points being the maximum score. A score of 0 points indicates an absent or poor response; a score of 2 points indicates a normal response (Table 18-1). For a normal newborn, the score should be somewhere in the range of 8 to 10 points. The higher the score, the better the condition of the newborn. If the Apgar score is 8 points or higher, no intervention is needed other than supporting normal respiratory efforts and maintaining thermoregulation. Scores of 4 to 7 points signify moderate difficulty and scores of 0 to 3 points represent severe distress in adjusting to extrauterine life. The Apgar score is influenced by the presence of infection, congenital anomalies, physiologic immaturity, maternal sedation via medications, and neuromuscular disorders (Hockenberry, 2005).

When the newborn experiences depression, the Apgar score characteristics disappear in a predictable manner: First the pink coloration is lost, next the respiratory effort, and then the tone, followed by reflex irritability and, finally, heart rate (Verklan & Walden, 2004).

Although Apgar scoring is completed at 1 and 5 minutes, it also can be used as a guide during the immediate newborn period to evaluate the newborn's status for any changes because it focuses on critical parameters that must be assessed throughout the early transition period.

Length and Weight

Parents are anxious to know their newborn's size, such as length and weight. These measurements are taken soon after birth. A disposable tape measure or a built-in measurement board located on the side of the scale can be used. Length is measured from the head of the newborn to the heel with the newborn unclothed (Fig. 18-1). Because of the flexed position of the newborn after birth, it is essential to place the newborn in a supine position and extend the leg completely when measuring the length. The expected findings for length in full-term newborns usually ranges from 48 to 53 cm (19–21 inches). Molding can affect measurement (Dillon, 2003).

Most often, newborns are weighed using a digital scale that reads the weight in grams. Typically, in the

Table 18-1 Apgar Scoring for Newborns

Parameter (Assessment Technique)	0 Point	1 Point	2 Points
Heart rate (auscultation of apical heart rate for 1 full minute)	Absent	Slow (<100 bpm)	>100 bpm
Respiratory effort (observation of the volume and vigor of the newborn's cry; auscultation of depth and rate of respirations)	Apneic	Slow, irregular, shallow	Regular respirations (usually 30–60 breaths/minute), strong, good cry
Muscle tone (observation of extent of flexion in the newborn's extremities and newborn's resistance when the extremities are pulled away from the body)	Limp, flaccid	Some flexion, limited resistance to extension	Tight flexion, good resistance to extension with quick return to flexed position after extension
Reflex irritability (flicking of the soles of the feet or suctioning of the nose with a bulb syringe)	No response	Grimace or frown when irritated	Sneeze, cough, or vigorous cry
Skin color (inspection of trunk and extremities with the appropriate color (based on ethnicity) appearing within minutes after birth)	Cyanotic or pale	Body-appropriate ethnic color; blue extremities (acrocyanosis)	Completely appropriate color (pink on both trunk and extremities)

term newborn, weight ranges from 2700 to 4000 g (6–9 lb; Fig. 18-2). Birth weights less than 10% or more than 90% on a growth chart are outside the normal range and need further investigation. Subsequent weights taken at later times are compared with previous weights and are documented with regard to gain or loss on a nursing flow sheet. Newborns typically lose approximately 10% of their initial birth weight by 3 to 4 days of age secondary to loss of meconium, extracellular fluid, and limited food intake. This weight loss is usually regained by the 10th day of life (Hockenberry, 2005).

Newborns can be classified by their birth weight regardless of their gestational age (AAP/ACOG, 2002) as follows:

- Low birth weight: <2500 g (<5.5 lb)
- Very low birth weight: <1500 g (<3.5 lb)
- Extremely low birth weight: <1000 g (<2.5 lb)

● Figure 18-1 Measuring a newborn's length. (**A**) The nurse extends the newborn's leg and marks the pad at the heel. (**B**) The nurse measures from the newborn's head to the heel mark.

● Figure 18-2 Weighing a newborn. Note how the nurse guards the newborn from above to prevent injury.

Vital Signs

Heart rate and respiratory rate are assessed immediately after birth with Apgar scoring. Heart rate, obtained by taking an apical pulse for 1 full minute, typically ranges between 120 to 160 bpm. Newborns' respirations are assessed when they are quiet or sleeping. Place a stethoscope on the right side of the chest and count the breaths for 1 full minute to identify any irregularities. The newborn respiratory rate ranges from 30 to 60 breaths/minute with symmetric chest movement. Heart and respiratory rates are assessed every 30 minutes until stable for 2 hours after birth. Once stable, the heart rate and respiratory rate is checked every 8 hours (AAP/ACOG, 2002).

Axillary temperature is typically not assessed immediately after birth, but on admission to the nursery or when the initial newborn assessment is carried out (for example, LDR room). The normal axillary temperature range for a term newborn is 36.5 to 37.5°C (97.9–99.7°F). Rectal temperatures are no longer taken because of the risk of perforation (Blackburn, 2003). The thermometer or temperature probe is held in the midaxillary space according to manufacture's directions and hospital protocol. Temperature is reassessed every 30 minutes until it is stable for 2 hours, then every 8 hours until discharge (AAP/ACOG, 2002).

Measurement of a newborn's blood pressure is not usually assessed as part of a normal newborn examination unless there is a clinical indication or low Apgar scores. If assessed, an oscillometer (Dinamap) is used. The typical range is between 50 to 75 mmHg (systolic) and 30 to 45 mmHg (diastolic). Crying, moving, and late clamping of the umbilical cord will increase systolic pressure (Dillon, 2003).

Gestational Age Assessment

To determine a newborn's gestational age (the stage of maturity), physical signs and neurologic characteristics are assessed. Typically, gestational age is determined by using a tool, most commonly the Dubowitz/Ballard or New Ballard Score system (Fig. 18-3). This scoring system provides an objective estimate of gestational age by scoring the specific parameters of physical and neuromuscular maturity. Points are given for each assessment parameter, with a low score of –1 point or –2 points for extreme immaturity to as high a score as 4 or 5 points for postmaturity. The scores from each section are added together to correspond to a specific gestational age in weeks.

The physical maturity section of the examination is done during the first 2 hours after birth. The physical maturity assessment section of the Ballard exam evaluates physical characteristics that appear different at different stages depending on a newborn's gestational maturity. Newborns who are physically mature have higher scores than those who are not. The areas assessed on the physical maturity exam are

- Skin texture—typically ranges from sticky and transparent to smooth, with varying degrees of peeling and cracking, to parchment-like or leathery with significant cracking and wrinkling
- Lanugo—soft downy hair on the newborn's body, which is absent in preterm newborns, appears with maturity, and then disappears again with postmaturity
- Plantar creases—creases on the soles of the feet, which range from absent to covering the entire foot, depending on maturity (the greater the number of creases, the greater the newborn's maturity)
- Breast tissue—the thickness and size of breast tissue and areola (the darkened ring around each nipple), which range from being imperceptible to full and budding
- Eyes and ears—eyelids can be fused or open and ear cartilage and stiffness determine the degree of maturity (the greater the amount of ear cartilage with stiffness, the greater the newborn's maturity)
- Genitals—in males, evidence of testicular descent and appearance of scrotum (which can range from smooth to covered with rugae) determine maturity; in females, appearance and size of clitoris and labia determine maturity (a prominent clitoris with flat labia suggests prematurity whereas a clitoris covered by labia suggests greater maturity)

The neuromuscular maturity section typically is completed within 24 hours after birth. Six activities or maneuvers that the newborn performs with various body parts are evaluated to determine the newborn's degree of maturity. These six maneuvers include

NEUROMUSCULAR MATURITY

NEUROMUSCULAR MATURITY SIGN	SCORE –1	0	1	2	3	4	5	RECORD SCORE HERE
POSTURE								
SQUARE WINDOW (Wrist)	>90°	90°	60°	45°	30°	0°		
ARM RECOIL		180°	140°–180°	110°–140°	90°–110°	<90°		
POPLITEAL ANGLE	180°	160°	140°	120°	100°	90°	<90°	
SCARF SIGN								
HEEL TO EAR								
							TOTAL NEUROMUSCULAR MATURITY SCORE	

SCORE
Neuromuscular ____
Physical ____
Total ____

MATURITY RATING

Score	Weeks
–10	20
–5	22
0	24
5	26
10	28
15	30
20	32
25	34
30	36
35	38
40	40
45	42
50	44

PHYSICAL MATURITY

PHYSICAL MATURITY SIGN	SCORE –1	0	1	2	3	4	5	RECORD SCORE HERE
SKIN	sticky, friable, transparent	gelatinous, red, translucent	smooth, pink, visible veins	superficial peeling and/or rash, few veins	cracking pale areas, rare veins	parchment, deep cracking, no vessels	leathery, cracked, wrinkled	
LANUGO	none	sparse	abundant	thinning	bald areas	mostly bald		
PLANTAR SURFACE	heel-toe 40–50 mm: –1 <40 mm: –2	>50 mm no crease	faint red marks	anterior transverse crease only	creases ant. 2/3	creases over entire sole		
BREAST	imperceptible	barely perceptible	flat areola no bud	stippled areola 1–2 mm bud	raised areola 3–4 mm bud	full areola 5–10 mm bud		
EYE-EAR	lids fused loosely: –1 tightly: –2	lids open pinna flat stays folded	sl. curved pinna; soft; slow recoil	well-curved pinna; soft but ready recoil	formed and firm instant recoil	thick cartilage, ear stiff		
GENITALS (Male)	scrotum flat, smooth	scrotum empty, faint rugae	testes in upper canal, rare rugae	testes descending, few rugae	testes down, good rugae	testes pendulous, deep rugae		
GENITALS (Female)	clitoris prominent and labia flat	prominent clitoris and small labia minora	prominent clitoris and enlarging minora	majora and minora equally prominent	majora large, minora small	majora cover clitoris and minora		
							TOTAL PHYSICAL MATURITY SCORE	

● Figure 18-3 Gestational age assessment tool. (Ballard, J. L., Khoury, J. C., Wedig, K., et al. [1991]. New Ballard Score, expanded to include extremely premature infants. *Journal of Pediatrics, 119*[3], 417–423.)

1. Posture—How does the newborn hold his or her extremities in relation to the trunk? The greater the degree of flexion indicates greater maturity. For example, extension of arms and legs is scored as 0 point; full flexion of arms and legs is scored as 4 points.
2. Square window—How far can the newborn's hands can be flexed toward the wrist? The angle is measured and scored from more than 90 degrees to 0 degrees to determine maturity rating. As the angle decreases, the newborn's maturity increases. For example, an angle of

more than 90 degrees is scored as –1 point; an angle of 0 degrees is scored as 4 points.

3. Arm recoil—How far do the newborn's arms "spring back" to a flexed position? This measure evaluates the degree of arm flexion and the strength of recoil. The reaction of the arm is then scored from 0 to 4 points based on the degree of flexion as the arms are returned to their normal flexed position. The higher the points assigned, the greater the neuromuscular maturity (for example, recoil less than a 90-degree angle is scored as 4 points).
4. Popliteal angle—How far will the newborn's knees extend? The angle created when the knee is extended is measured. An angle less than 90 degrees indicates greater maturity. For example, an angle of 180 degrees is scored as –1 point; an angle of less than 90 degree is scored as 5 points.
5. Scarf sign—How far can the elbows be moved across the newborn's chest? An elbow that does not reach midline indicates greater maturity. For example, if the elbow reaches or nears the level of the opposite shoulder, this is scored as –1 point; if the elbow does not cross the proximate axillary line, it is scored as 4 points.
6. Heel to ear—How close can the newborn's feet be moved to the ears? This maneuver assesses hip flexibility, such that the lesser the flexibility, the greater the newborn's maturity. The heel-to-ear assessment is scored in the same manner as the scarf sign.

After the scoring is completed, the 12 scores are totaled and then compared with standardized values to determine the appropriate gestational age in weeks. Scores range from very low in preterm newborns to very high for mature and postmature newborns.

Typically newborns are also classified according to gestational age as

- Preterm or premature—born before 37 weeks' gestation, regardless of birth weight
- Term—born between 38 weeks and 42 weeks' gestation
- Postterm or postdate—born after completion of week 42 of gestation
- Postmature—born after 42 weeks and demonstrating signs of placental aging

Using the information about gestational age and then considering birth weight, newborns can also be classified as follows:

- Small for gestational age (SGA)—weight less than the 10th percentile on standard growth charts (usually < 5.5 lb)
- Appropriate for gestational age (AGA)—weight between 10th and 90th percentiles
- Large for gestational age (LGA)—weight more than the 90th percentile on standard growth charts (usually > 9 lb)

Chapter 23 describes these variations in birth weight and gestational age in greater detail.

Gestational age assessment is important because it allows the nurse to plot growth parameters, and to anticipate potential problems related to prematurity, postmaturity, and growth abnormalities such as SGA or LGA newborns.

Nursing Interventions

During the immediate newborn period, care focuses on facilitating the newborn's transition to extrauterine life. The nursing interventions include maintaining airway patency, ensuring proper identification, administering prescribed medications, and maintaining thermoregulation.

Maintaining Airway Patency

Immediately after birth, a newborn is suctioned to remove fluids and mucus from the mouth and nose. Typically, the newborn's mouth is suctioned first with a bulb syringe to remove debris. Then the nose is suctioned. Suctioning in this manner helps to prevent aspiration of fluid into the lungs by an unexpected gasp.

When suctioning a newborn with a bulb syringe, compress the bulb before placing it into the oral or nasal cavity. Release bulb compression slowly, making sure the tip is placed properly away from the mucous membranes to draw up the excess secretions. Remove the bulb syringe from the mouth or nose, and then, while holding the bulb syringe tip over an emesis basin lined with paper towel or tissue, compress the bulb to expel the secretions. Repeat the procedure several times until all secretions are removed. Always keep a bulb syringe near the newborn in case he or she develops sudden choking or a blockage in the nose.

Ensuring Proper Identification

Before the newborn and family leave the birthing area, be sure that agency policy dictating identification is followed. Typically, mother and newborn, and possibly father, receive matching identification (ID) bracelets. The newborn commonly receives two ID bracelets: one placed on a wrist and one placed on an ankle. The mother receives a matching one, usually placed on her wrist. The ID bands usually include name, gender, date and time of birth, and identification number. The imprinted identification number is identical to the other bracelet wearers.

These ID bracelets provide for the safety of the newborn and must be secured before the mother and newborn leave the birthing area. The ID bracelets are checked by all nurses to validate the correct newborn is brought to the right mother if they are separated for any period of time (Fig. 18-4). They also serve as the official newborn identification and are checked prior to initiating any procedure on that newborn and on discharge from the unit (Lowdermilk & Perry, 2004). Taking the newborn's picture within 2 hours after birth with a color camera or color video/digital image also assists in protecting against mix-ups and abduction. In some facilities, electronic devices

● Figure 18-4 The nurse checks the identification bands of the newborn with the mother.

may be used. These devices sound an alarm if the newborn is removed from the area.

Newborns are also footprinted by using a form that includes the mother's fingerprint, name, and date and time of the birth (Fig. 18-5). Some states require footprints of the newborn, although many studies point out that birthing room staff members do not take consistently legible footprints suitable for identification purposes (Kenner & Lott, 2004). Many states have stopped requiring newborn footprints, and thus other means of identification are needed, such as collecting cord blood at the time of birth for DNA testing and live scans to capture digital forensic-quality prints electronically that are suitable for identification purposes (Rabun, 2003).

● Figure 18-5 The nurse obtains footprints on the newborn.

Administering Prescribed Medications

During the immediate newborn period, two medications are commonly ordered to be given. These medications are vitamin K and eye prophylaxis with either erythromycin or tetracycline ophthalmic ointment (see Drug Guide 18-1).

Vitamin K

Vitamin K, a fat-soluble vitamin, promotes blood clotting by increasing the synthesis of prothrombin by the liver. A deficiency of this vitamin would delay clotting and might lead to hemorrhage.

Generally, the bacteria of the intestine produce vitamin K in quantities that are adequate. However, the newborn's bowel is sterile and thus vitamin K is not produced in the intestine until after microorganisms are introduced, such as with the first feeding. Usually, it takes about a week for the newborn to produce vitamin K in sufficient quantities to prevent vitamin K deficiency bleeding (VKDB) (Miller, 2003).

The efficacy of newborn vitamin K prophylaxis in the prevention of early VKDB is firmly established. It has been the standard of care since the AAP recommended it in the early 1960s. Their recommendation is for vitamin K to be administered to all newborns as a single intramuscular dose of 0.5 to 1 mg soon after birth (AAP, 2003d) (Fig. 18-6). They suggest that additional research is needed to validate the efficacy and safety of oral forms of vitamin K, which have been utilized in many parts of the world, but currently are not recommended in the United States.

Eye Prophylaxis

It is recommended that all newborns in the United States, whether delivered vaginally or by cesarean birth, receive an instillation of a prophylactic agent, such as erythromycin or tetracycline ophthalmic ointment, in their eyes within an hour or two of being born. This is mandated in all 50 states to prevent **ophthalmia neonatorum,** which can cause neonatal blindness (CDC, 2002).

Ophthalmia neonatorum is a hyperacute purulent conjunctivitis occurring during the first 10 days of life, usually contracted during birth from infected vaginal discharge of the mother (O'Toole, 2003). Most often both eyelids become swollen and red with purulent discharge.

Prophylactic agents that are currently recommended include erythromycin 0.5% ophthalmic ointment or tetracycline 1% ophthalmic ointment in a single application. Once recommended in the past, silver nitrate solution has little efficacy in preventing chlamydial eye disease (CDC, 2002).

Regardless of which agent is used, instillation should be accomplished as soon as possible after birth (Fig. 18-7). If instillation is delayed after birth to allow visualization and bonding, the nursery staff should make sure the agent

Drug Guide 18-1 Drugs for the Newborn

Drug	Action/Indication	Nursing Implications
Phytonadione (vitamin K (Aqua-MEPHYTON, Konakion, Mephyton))	Provides the newborn with vitamin K (necessary for production of adequate clotting factors II, VII, IX, and X by the liver) during the first week of birth until they can manufacture it themselves Prevents vitamin K deficiency bleeding (VKDB) of the newborn	Administer within 1 to 2 hours after birth. Give as an intramuscular injection at a 90-degree angle into the middle third of the vastus lateralis muscle. Use a 25-gauge, 5/8-in needle for injection. Hold the leg firmly and inject medication slowly after aspirating. Adhere to standard precautions. Assess for bleeding at injection site after administration.
Erythromycin ophthalmic ointment 0.5% or tetracycline ophthalmic ointment 1%	Provides bactericidal and bacteriostatic actions to prevent *Neisseria gonorrhoeae* and *Chlamydia trachomatis* conjunctivitis Prevents ophthalmia neonatorum	Be alert for possible chemical conjunctivitis for 1–2 days. Wear gloves, and open eyes by placing thumb and finger above and below the eye. Gently squeeze the tube or ampulla to apply medication into the conjunctival sac from the inner canthus to the outer canthus of each eye. Do not touch the tip to the eye. Close the eye to make sure the medication permeates. Wipe off excess ointment after 1 minute.

Sources: Hodgson & Kizior, 2004; Spratto & Woods, 2005.

is administered when the newborn reaches the nursery for observation and assessment.

Inform all parents about the eye treatment, including why the treatment is recommended, what advantages should be anticipated from the treatment, what problems may arise if the treatment is not given, and what side effects may arise from the treatment. Parents do have the right to refuse this treatment, but if the parents received adequate teaching about the treatment and understand the need for it, they usually will consent to it.

● Figure 18-6 The nurse administers vitamin K IM to the newborn.

Maintaining Thermoregulation

Newborns have temperature regulation problems, especially during the first few hours after birth (see Chapter 17 for a complete discussion). Therefore, maintaining body temperature is crucial.

Assess body temperature frequently during the immediate newborn period. It is recommended that the temperature be taken every 30 minutes for the first 2 hours or until stabilization is reached and then every 8 hours until discharge (AAP/ACOG, 2002).

Commonly, a thermistor probe (automatic sensor) is attached to the newborn to record body temperature on a monitoring device. The probe is taped to the newborn's abdomen, usually in the right upper quadrant, which allows for position changes without having to readjust the probe. The other end of the thermistor probe is inserted into the radiant heat control panel. Temperature parameters are set on an alarm system connected to the heat panel that will sound if the newborn's temperature falls out of the set range. Check the probe connection periodically to make sure that it remains secure. Be ever aware of the potential for heat loss in newborns, ensuring that all nursing interventions are performed to minimize heat loss and prevent hypothermia.

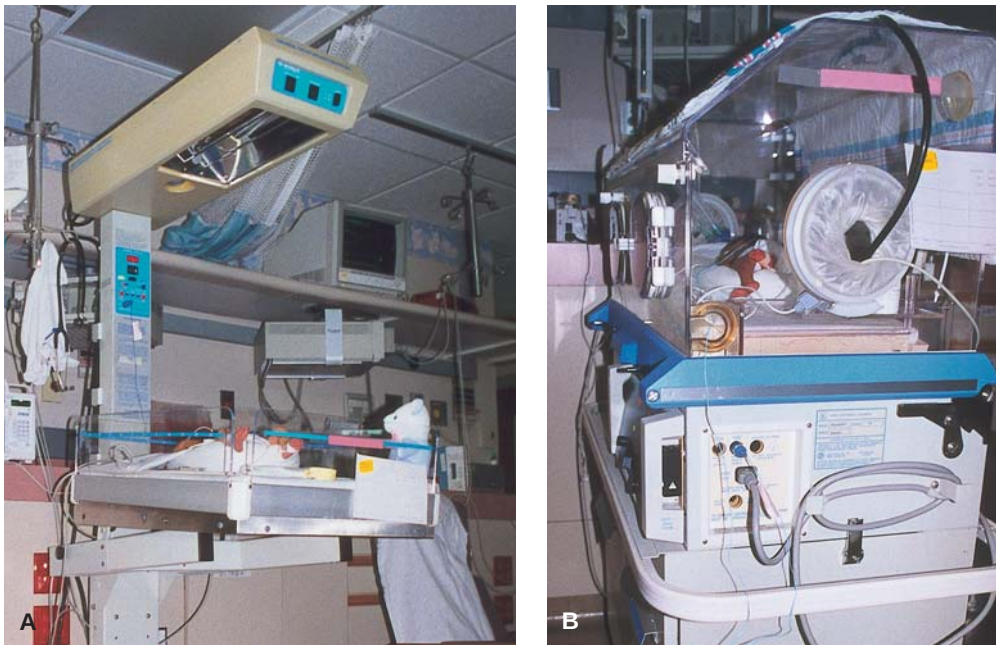
Frequent axillary temperatures can also be used to assess the newborn's body temperature. At one time, rectal thermometers were routinely used to monitor body temperature. However, their use is no longer recommended

● Figure 18-7 The nurse administers eye prophylaxis.

because of the potential damage to the rectal lining on insertion (Blackburn, 2003). A newborn's temperature typically is maintained between 36.5 to 37.5°C (97.7 to 99.7°F) (Littleton & Engebretson, 2005).

Nursing interventions to help maintain body temperature include

- Drying newborns immediately after birth to prevent heat loss through evaporation
- Wrapping them in prewarmed blankets to reduce heat loss via convection
- Using warmed covers on scales to weigh unclothed newborn
- Warming stethoscopes and hands prior to examining or providing care
- Avoiding the placement of newborns in drafts or near air vents to prevent heat loss through convection
- Delaying the initial bath until temperature has stabilized to prevent heat loss through evaporation
- Avoiding crib placement near cold outer walls to prevent heat loss through radiation
- Putting a cap on the newborn's head after it is thoroughly dried after birth
- Placing a newborn under a temperature-controlled radiant warmer (Fig. 18-8)



● Figure 18-8 Maintaining thermoregulation. (**A**) Radiant warmer. (**B**) Isolette.

Nursing Management During the Early Newborn Period

The early newborn period is a time of great adjustment for both the mother and the newborn, both of whom are adapting to many physiologic and psychological changes. In the past, mothers and newborns remained in the healthcare facility while these dramatic changes and phases of adjustment were taking place. Nursing and medical care providers were readily available to them. However, during the last decade, as a result of economics, healthcare facility stays have decreased significantly for mothers and their newborns, thus increasing the intensity of the experience. For example, the woman gives birth, experiences marked physiologic and psychological changes, adapts to her newborn, and learns the skills needed to care for herself and her newborn—all within a limited time frame. Subsequently, many new mothers are overwhelmed.

The nurse is challenged to assist the new mother and her newborn through this dramatic transition period. The newborn needs continued assessment to ensure health. The mother also needs to be prepared to care for the new addition to the family unit—all within 24 to 48 hours. When the day of discharge arrives, women may develop feelings of panic and insecurity about their role as primary caretaker. Thus, nurses play a major role in promoting the newborn's transition through ongoing assessment and care, and in promoting the woman's confidence through role modeling and teaching about proper newborn care.

Assessment

The newborn requires ongoing assessment after leaving the birthing area to ensure that his or her transition to extrauterine life is progressing without problems. The nurse uses the data gathered during the initial assessment as a baseline for comparison.

Perinatal History

Pertinent maternal and fetal data are vital to formulate a plan of care for the mother and her newborn. Historical information is obtained from the medical record and from interviewing the mother. Review the maternal history because it provides pertinent information, such as the presence of certain risk factors, that could affect the newborn. Keep in mind that a comprehensive maternal history may not be available, especially if the mother has had limited or no prenatal care.

Historical information usually includes the following:

- Mother's name, medical record number, blood type, serology result, rubella and hepatitis status, and history of substance abuse
- Other maternal tests that are relevant to the newborn and care, such as HIV and group B streptococcus status
- Intrapartum maternal antibiotic therapy (type, dose, and duration)
- Maternal illness potentially affecting the pregnancy, evidence of chorioamnionitis, maternal use of medications such as steroids
- Prenatal care, including timing of first visit and subsequent visits
- Risk for blood group incompatibility including Rh status and blood type
- Fetal distress or any nonreassuring fetal heart rate monitor patterns during labor
- Known inherited conditions such as sickle cell anemia, phenylketonuria (PKU)
- Birth weights of previous live-born children along with identification of any newborn problems
- Social history, including tobacco, alcohol, and recreational drug use
- History of depression or domestic violence
- Cultural factors, including primary language and educational level
- Pregnancy complications associated with abnormal fetal growth, fetal anomalies, or abnormal results from tests of fetal well-being
- Information regarding the labor and progress of labor, birth, labor complications, duration of ruptured membranes, and presence of meconium in the amniotic fluid
- Medications given during labor, at birth, and immediately after birth
- Time and method of delivery, including presentation and the use of any forceps or vacuum extractor
- Status of the newborn at birth, including Apgar scores at 1 and 5 minutes, the need for suctioning, weight, gestational age, vital signs, and umbilical cord status
- Medications administered to the newborn
- Postbirth maternal information, including placental findings, positive cultures, and presence of fever

Newborn Physical Examination

The initial newborn physical examination, which may demonstrate subtle differences related to the newborn's age, is carried out within the first 24 hours after birth. For example, a newborn that is 30 minutes old has not yet completed the normal transition from intrauterine to extrauterine life, and thus variability may exist in vital signs and in respiratory, neurologic, GI, skin, and cardiovascular systems. Therefore, it is ideal to perform a comprehensive examination after the newborn has completed transition.

In a quiet newborn, begin the examination with the least invasive and noxious elements of the exam (auscultation of heart and lungs). Then proceed to examining those areas most likely to irritate the newborn (for example, examining the hips and eliciting the Moro reflex). A general visual assessment provides an enormous amount of information regarding the well-being of a newborn. Initial observation gives an impression of healthy (stable) versus ill newborn and term versus preterm newborn.

The specific components of a typical physical newborn examination include a general survey of skin color, posture, state of alertness, head size, overall behavioral state, respiratory status, gender, and any obvious congenital anomalies. Check the overall appearance for anything unusual. Then complete the examination in a systematic fashion.

Anthropometric Measurements

Shortly after birth, after the gender of the child is revealed, most parents want to know the "vital statistics" of their newborn—length and weight to report to their interested family and friends. Additional measurements, including circumference of the newborn's head, chest, and abdomen, are also taken and recorded. Abdominal measurements are not routinely obtained unless there is a suspicion of pathology that causes abdominal distention. The newborn's progress from that point on will be validated based on these early measurements. These measurements will be compared with future serial measurements to determine growth patterns, which are plotted on growth charts to ascertain normalcy. Therefore, accuracy is key.

Length

The average length of most newborns is 50 cm (20 in), but can range from 45 to 55 cm (18–22 in). Measure length with the unclothed newborn lying on a warmed blanket placed on a flat surface with the knees held in an extended position. Then run a tape measure down the length of the newborn—from the head to the soles of the feet and record this measurement in the newborn's record.

Weight

The average newborn birth weight is 3400 g (7.5 lb), but it can range anywhere from 2700 to 4000 g (6–9 lb). Newborns are weighed immediately after birth and then daily. Newborns usually lose up to 10% of their birth weight within the first few days of life, but regain it in approximately 10 days. Newborns are weighed on admission to the nursery or are taken to a digital scale to be weighed and returned to the mother's room.

First, balance the scale if it is not balanced. Place a protective, warmed cloth or paper as a barrier on the scale to prevent heat loss by conduction; recalibrate the scale to zero after applying the barrier. Next, place the newborn, unclothed, in the center of the scale. Be sure to keep a hand above the newborn to ensure safety (Fig. 18-2).

Weight is influenced by racial origin, maternal age, size of the parents, maternal nutrition, and placental perfusion (Fuloria & Kreiter, 2002b). Weight should be correlated with determination of gestational age. A newborn that is more than the normal weight values might be LGA or an infant of a diabetic mother (IDM). A newborn less than the normal weight range might be preterm, have a genetic syndrome, or be an SGA neonate. It is important to identify the cause for the deviation in size and monitor the newborn for complications common to that etiology.

Head Circumference

The average newborn head circumference is about 33 to 35 cm (13–14 in). Measure the circumference at the head's widest diameter: occipitofrontal circumference with a measuring tape. Use a flexible or paper measuring tape, wrap it snugly around the newborn's head, and record the measurement (Fig. 18-9A). Head circumference may need to be remeasured at a later time if the shape of the head is altered from birth.

● Figure 18-9 (**A**) Measuring head circumference. (**B**) Measuring chest circumference.

The head is approximately one fourth of the newborn's length (McKinney, James, Murray, & Ashwill, 2005). A small-size head might indicate microcephaly caused by rubella, toxoplasmosis, or SGA status. An enlarged head circumference measurement might indicate hydrocephalus or increased intracranial pressure. In either case, both need to be documented and reported for further investigation.

Chest Circumference

The average chest circumference is about 30 to 33 cm (12–13 in). It is generally equal to or approximately 1 in less than the head circumference. Using a flexible or paper tape measure, place it around the unclothed newborn's chest at the nipple line without pulling it taut (Fig. 18-9B). The head and chest circumferences are usually equal by about one year of age.

Vital Signs

In the newborn, temperature, pulse, and respirations are monitored frequently and compared with baseline data obtained immediately after birth. General rules of thumb for monitoring vital signs (excluding blood pressure) are as follows:

- On admission to the nursery or in the LDR room after parents are allowed to hold and bond with their newborn
- Once every 30 minutes until the newborn has been stable for 2 hours
- Then once every 4 to 8 hours until discharge (AAP/ACOG, 2002)

Blood pressure is not routinely assessed in a normal newborn unless their clinical condition warrants it. This schedule can change depending on the health status of the newborn.

Obtain a newborn's temperature by placing an electronic temperature probe in the midaxillary area or by monitoring the electronic thermistor probe that has been taped to the abdominal skin (applied when the newborn was placed under a radiant heat source).

Monitor the newborn's temperature hourly for changes until it stabilizes. On average, a newborn's temperature ranges from 36.5 to 37.5°C (97.9–99.7°F). If the newborn's temperature is more than this range, adjust the environment, such as removing some clothing or blankets. If the temperature is less than this range, check the radiant warmer setting or add a warmed blanket if needed. Report any abnormalities to the primary healthcare provider if simple adjustments within the environment do not change temperature.

Obtain an apical pulse by placing the stethoscope over the fourth intercostal space on the chest. Listen for a full minute, noting rate, rhythm, and abnormal sounds such as murmurs. In the typical newborn, the heart rate ranges from 120 to 160 bpm, with wide fluctuations with activity and sleep. Sinus arrhythmia is a normal finding. Murmurs detected during the newborn period do not necessarily indicate congenital heart disease. They need to be assessed frequently over the next several months to validate their continued presence.

Also palpate the apical, femoral, and brachial pulses for presence and equality (Fig. 18-10). Report any abnormalities to the primary health care provider to ensure further evaluation.

Assess newborn respirations by observing the rising and falling of the chest for 1 full minute. Respirations should be symmetric, slightly irregular, shallow, and unlabored at a rate of 30 to 60 breaths/minute. The newborn's respirations are predominantly diaphragmatic, but

● Figure 18-10 Assessing the newborn's vital signs. (**A**) Assessing the apical pulse. (**B**) Palpating the femoral pulse. (**C**) Palpating the brachial pulse.

they are synchronous with abdominal movements. Also auscultate breath sounds. Note any abnormalities, such as tachypnea, bradypnea, grunting, gasping, periods of apnea lasting longer than 20 seconds, asymmetry or decreased chest expansion, abnormal breath sounds (rhonchi, crackles), or sternal retractions. Some variations might exist early in the period after birth, but if the abnormal pattern persists, notify the primary health care provider.

Skin

Observe the overall appearance of the skin, including color, texture, turgor, and integrity. The newborn's skin should be smooth and flexible, and the color should be consistent with genetic background. Check skin turgor by pinching a small area of skin over the chest or abdomen and note how quickly it returns to its original position. In a well-hydrated newborn, the skin should return to its normal position immediately. Skin that remains "tented" after being pinched is indicative of dehydration. A small amount of lanugo (fine downy hair) may be observed over the shoulders and on the sides of the face and upper back. There may be some cracking and peeling of the skin. It should be warm to the touch and intact.

The newborn's skin often appears blotchy or mottled, especially in the extremities. Persistent cyanosis of fingers, hands, toes, and feet with mottled blue or red discoloration and coldness describes **acrocyanosis.** It may be seen in newborns during the first few weeks of life in response to exposure to cold. Acrocyanosis is normal and intermittent.

Common Newborn Skin Variations

While assessing the skin, note any rashes, ecchymoses or petechiae, nevi, or dark pigmentation. Skin lesions may be present and can be congenital or transient; they may be a result of infection or may result from the mode of birth. If any are present, observe the anatomic location, arrangement, type, and color. Bruising may be a result of the use of devices such as a vacuum extractor during delivery. Petechiae may be the result of pressure on the skin during the birth process. Forceps marks may be observed over the cheeks and ears. A small puncture mark may be seen if internal fetal scalp electrode monitoring was used during labor.

Also be alert to common skin variations, which include **vernix caseosa, stork bites** or salmon patches, **milia, mongolian spots, erythema toxicum, harlequin sign, nevus flammeus,** and **nevus vasculosus** (Fig. 18-11).

Vernix caseosa is a thick white substance that provides a protective covering for the skin of the fetus. It is formed by secretions from the fetus' oil glands and is found during the first 2 or 3 days after birth in body creases and the hair. It does not need to be removed because it will be absorbed into the skin.

Stork bites or salmon patches are superficial vascular areas found on the nape of the neck, on the eyelids, and between the eyes and upper lip (Fig. 18-11A). The name comes from the marks on the back of the neck where, as myth goes, a stork may have picked up the baby. They are caused by a concentration of immature blood vessels and are most visible when the newborn is crying. They are considered a normal variant and most fade and disappear completely within the first year.

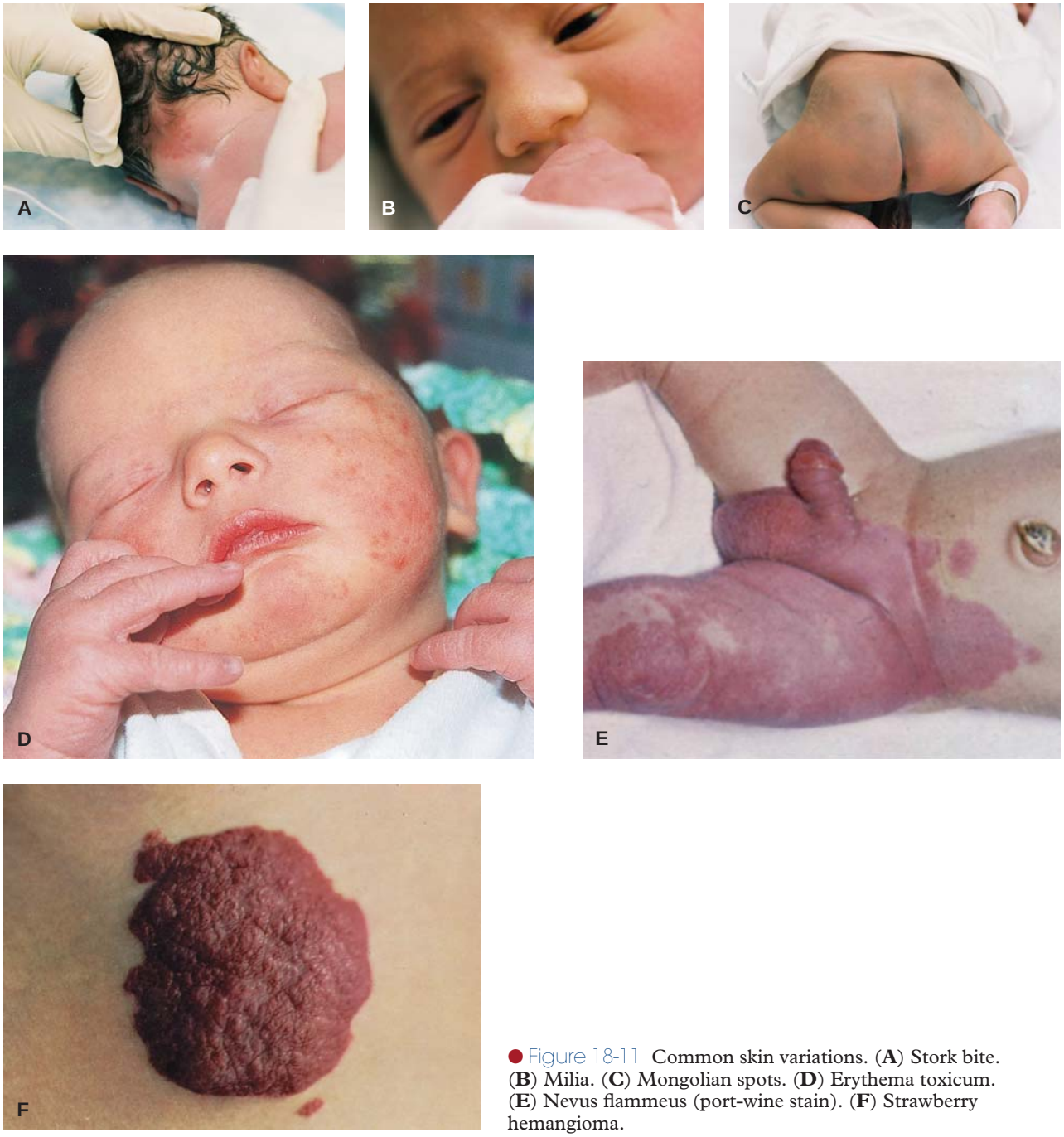
Milia are unopened sebaceous glands frequently found on a newborn's nose. They may also appear on the chin and forehead (Fig. 18-11B). They form from oil glands and disappear on their own within 2 to 4 weeks. When these occur in a newborn's mouth and gums, they are termed **Epstein's pearls.** They occur in approximately 60% of newborns (Weston, Lane, & Morelli, 2002).

Mongolian spots are blue or purple splotches that appear on the lower back and buttocks of newborns (Fig. 18-11C). They tend to occur in African-American, Asian, and Indian newborns, but can occur in dark-skin newborns of all races. The spots are caused by a concentration of pigmented cells and usually disappear within the first 4 years of life (Rutter, 2003).

Erythema toxicum (newborn rash) is a benign, idiopathic, very common, generalized, transient rash occurring in as many as 70% of all newborns during the first week of life. It consists of small papules or pustules on the skin resembling "flea bites." The rash is common on the face, chest, and back (Fig. 18-11D). One of the chief characteristics of this rash is its lack of pattern. It is caused by the newborn's eosinophils reacting to the environment as the immune system matures (Pillitteri, 2003). It does not require any treatment and it disappears in a few days.

Harlequin sign refers to the dilation of blood vessels on only one side of the body, giving the newborn the appearance of wearing a clown suit. It gives a distinct midline demarcation, which is described as pale on the nondependent side and red on the opposite, dependent side. It is as a result of immature autoregulation of blood flow and is commonly seen in LBW newborns when there is a positional change (Dillon, 2003). It is transit in nature, lasting as long as 20 minutes, and no intervention is needed.

Nevus flammeus, also called a *port wine stain,* commonly appears on the newborn's face or other body areas (Fig. 18-11E). It is a capillary angioma located directly below the dermis. It is flat with sharp demarcations and is purple–red in color. This skin lesion is made up of mature capillaries that are congested and dilated. It ranges in size from a few millimeters to large, occasionally involving as much as half the body surface. Although it does not progressively grow in area or size, it is permanent and will not fade. Port wine stains may be associated with structural malformations or bony or muscular overgrowth. Newborns with these lesions should be monitored with periodic eye examinations, neurologic imaging, and extremity measurements (Hockenberry, 2005). Pulsed dye laser surgery has



● Figure 18-11 Common skin variations. (**A**) Stork bite. (**B**) Milia. (**C**) Mongolian spots. (**D**) Erythema toxicum. (**E**) Nevus flammeus (port-wine stain). (**F**) Strawberry hemangioma.

been used to remove larger lesions with some success (O'Leary, 2004).

Nevus vasculosus, also call a *strawberry mark* or *strawberry hemangioma,* is a benign capillary hemangioma in the dermal and subdermal layers. It is raised, rough, dark-red, and sharply demarcated (Fig. 18-11F). It is commonly found in the head region within a few weeks after birth and can increase in size or number. Commonly seen in premature infants weighing less than 1500 g (Verklan & Walden, 2004), these hemangiomas tend to resolve by the age of 3 without any treatment.

Head

Head size varies with age, gender, and ethnicity, and has a general correlation with body size. Inspect a newborn's head from all angles. The head should appear symmetric and round. As many as 90% of the congenital malformations present at birth are visible on the head and neck, so careful assessment is very important (Verklan & Walden, 2004).

The newborn has two fontanels at the juncture of the cranial bones. The anterior fontanel is diamond shaped and closes by 18 to 24 months. Typically it measures 4 to

6 cm at the largest diameter (bone to bone). The posterior one is triangular in shape, smaller than the anterior fontanel, usually fingertip size or 0.5 to 1 cm, and closes by 6 to 12 weeks of age. Palpate both fontanels, which should be soft, flat, and open.

Then palpate the skull. It should feel smooth and fused, except at the area of the fontanels. Also assess the size of the head and the anterior and posterior fontanelles, and compare them with appropriate standards.

Common abnormalities in head or fontanel size that may indicate a potential problem include

- Microcephaly—a head circumference more than 2 SDs below average or less than 10% of normal parameters for gestational age caused by failure of brain development (Hockenberry, 2005). It can be familial, with autosomal dominant or recessive inheritance, and it may be associated with infections (cytomegalovirus) and syndromes such as trisomy 13 and 18, and fetal alcohol syndrome (Fuloria & Kreiter, 2002a).
- Macrocephaly—a head circumference more than 90% of normal measurement typically related to hydrocephalus (Dillon, 2003). It can be an isolated anomaly, is often familial (with autosomal dominant inheritance), and may be a manifestation of other anomalies, including hydrocephalus and skeletal disorders (achondroplasia).
- Large fontanelles—size more than 6 cm in the anterior diameter bone to bone or more than a 1-cm diameter in the posterior fontanelle possibly associated with malnutrition; hydrocephaly; congenital hypothyroidism; trisomies 13, 18, and 21; and various bone disorders such as osteogenesis imperfecta
- Small or closed fontanelles—less than the normal range measurements for anterior and posterior diameters or closed at birth associated with microcephaly or premature synostosis (union of two bones by osseous material) (O'Toole, 2003)

Variations in Head Size and Appearance

During inspection and palpation, be alert for common variations that may cause asymmetry. These include **caput succedaneum, cephalhematoma,** and molding.

Molding is the elongated shaping of the fetal head to accommodate passage through the birth canal (Fig. 18-12). It occurs with a vaginal birth from a vertex position in which elongation of the fetal head occurs with prominence of occiput and overriding sagittal suture line. It typically resolves within a week after birth without intervention.

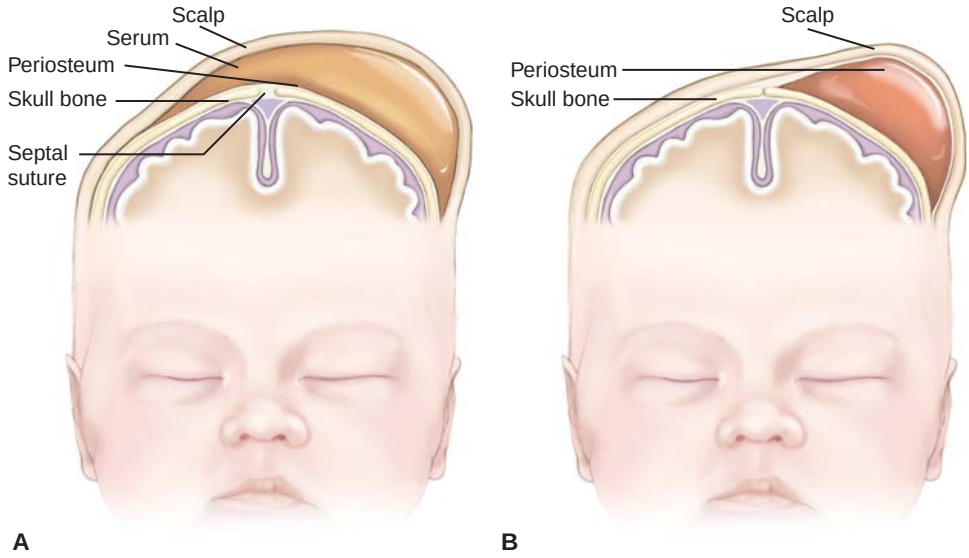
Caput succedaneum describes localized edema on the scalp that occurs from the pressure of the birth process. It is commonly observed after prolonged labor. Clinically, it appears as a poorly demarcated soft tissue swelling that crosses suture lines. Pitting edema and overlying petechiae and ecchymosis are noted (Fig. 18-13A). The swelling, which crosses suture lines, will gradually dissipate in about 3 days without any treatment. Newborns who were delivered via vacuum extraction usually have a caput in the area where the cup was used.

● Figure 18-12 Molding in a newborn's head.

Cephalhematoma is a localized effusion of blood beneath the periosteum of the skull of the newborn. This condition is as a result of the disruption of the vessels during birth. It occurs after prolonged labor and use of obstetric instruments such as low-outlet forceps or vacuum extraction (a Silastic suction cup is applied to the presenting part and traction is exerted during pushing attempts). The clinical features include a well-demarcated, often fluctuant swelling with no overlying skin discoloration. The swelling does not cross suture lines and is firmer to the touch than an edematous area (Fig. 18-13B). Cephalhematoma usually appears on the second or third day after birth and disappears within weeks or months (Olds, London, Ladewig, & Davidson, 2004).

Face

Observe the newborn's face for fullness and symmetry. The face should have full cheeks and be symmetric when resting and crying. In an assisted birth, forceps blades lay over the fetal cheeks and parietal bones when traction is applied. After birth, the newborn may have bruising and reddened areas over both cheeks and parietal bones secondary to the pressure of the forceps blades. Reassure the parents that this resolves without treatment and be sure to point out improvement each day.



● Figure 18-13 Comparing caput succedaneum and cephalhematoma. (**A**) Caput succedaneum involves the collection of serous fluid and often crosses the suture line. (**B**) Cephalhematoma involves the collection of blood and does not cross the suture line.

Problems with the face can also involve facial nerve paralysis caused by trauma resulting from the use of forceps during the birthing process. Paralysis is usually apparent on the first or second day of life. Typically, the newborn will demonstrate asymmetry of the face with the inability to close the eye and move the lips on the affected side. Newborns with facial nerve paralysis have difficulty making a seal around the nipple and consequently exhibit drooling of milk or formula from the paralyzed side of the mouth. Most facial nerve palsies resolve spontaneously within days, although full recovery may require weeks to months. Attempt to determine the cause of the deviation from the newborn's history.

Nose

Inspect the nose for size, symmetry, position, and evidence of lesions. The newborn's nose is small and narrow. The nose should have a midline placement, patent nares, and an intact septum. The nostrils should be of equal size and patent. A slight mucus discharge may be present, but there should be no actual drainage. The newborn is a preferential nose breather and will use sneezing to clear the nose if needed. The newborn can smell after the nasal passages are cleared of amniotic fluid and mucus (Olds et al., 2004).

Mouth

Observe and inspect the newborn's mouth, lips, and interior structures. The lips should be intact with symmetric movement, positioned in the midline, and without any lesions. Inspect the lips for pink color, moisture, and cracking. The lips should encircle the examiner's finger to form a vacuum when inserted into the mouth orifice. Variations involving the lip might include cleft upper lip (separation extending up onto the nose) or thin upper lip associated with fetal alcohol syndrome.

Assess the inside of the mouth for alignment of the mandible, intact soft and hard palate, sucking pads inside the cheeks, a midline uvula, a free-moving tongue, and working gag, swallow, and sucking reflexes. The mucous membranes lining the oral cavity should be pink and moist with minimal saliva present.

Normal variations might include Epstein's pearls (small, white epidermal cysts on the gums and hard palate that disappear in weeks); erupted precocious teeth that may need to be removed to prevent aspiration; and thrush (white plaque inside the mouth caused by exposure to *Candida albicans* during birth), which cannot be wiped away with a cotton-tipped applicator.

Eyes

Inspect the external eye structures including the eyelids, lashes, conjunctiva, sclera, iris, and pupils for position, color, size, and movement. There may be marked edema of the eyelids and subconjunctival hemorrhages present from pressure occurring during birth. The eyes should be clear and symmetrically placed on the face. Test the blink reflex by bringing an object in close proximity to the eye. The newborn should respond quickly by blinking. Also test the newborn's papillary reflex. Pupils should be equal, round, and reactive to light bilaterally. Assess the newborn's gaze. The newborn should be able to track objects to the midline. Be aware that movement may be uncoordinated during the first few weeks of life. There is transient strabismus (deviation or wandering of eyes independently) and searching nystagmus (involuntary repetitive eye movement) in many newborns, which is caused by immature muscular control. These are normal for the first 3 to 6 months of age.

Examine the internal eye structures. A red reflex (luminous red appearance seen on the retina) should be seen bilaterally during retinoscopy. The red reflex normally shows no dullness or irregularities.

Chemical conjunctivitis is a common variation that usually occurs within 24 hours of instillation of eye prophylaxis after birth. There is lid edema with sterile discharge from both eyes. Usually it resolves within 48 hours without treatment.

Ears

Inspect the ears for size, shape, skin condition, placement, amount of cartilage, and patency of the auditory canal. The ears should be soft and pliable, and should recoil quickly and easily when folded and released. Ears should be aligned with the outer canthi of the eyes. Low-set ears are characteristic of many syndromes and genetic abnormalities such as trisomy 13 and 18, and internal organ abnormalities involving the renal system.

An otoscopic examination is not typically done because the newborn's ear canals are filled with amniotic fluid and vernix caseosa, which would make visualization of the tympanic membrane difficult.

Newborn hearing screening is required by law in a majority of states (discussed later in the chapter). Hearing loss is the most common birth defect in the United States. One in 1000 newborns is profoundly deaf and 2 to 3 in 1000 have partial hearing loss (Wittmann-Price & Pope, 2002). Delays in identification and intervention may affect the cognitive, verbal, behavioral, and emotional development of the child. Screening at birth has become commonplace in most states, has reduced the age at which newborns with hearing loss are identified, and has improved early intervention rates dramatically (AAP, 2003b). Prior to universal newborn screening, children were usually older than 2 years before significant congenital hearing loss was detected, already negatively affecting speech and language skills (Fligor & Neault, 2004).

To assess for hearing ability generally, observe the newborn's response to noises and conversations in close proximity. The newborn typically turns toward these noises and startles with loud ones.

Neck

Inspect the newborn's neck for movement and ability to support the head. The newborn's neck will appear almost nonexistent because it is so short. Creases are usually noted. The neck should move freely in all directions and be capable of holding the head in a midline position. There should be sufficient head control to hold it up briefly without support. Report any deviations such as restricted neck movement or absence of head control.

Also inspect the clavicles, which should be straight and intact. Clavicular fractures are the most common broken bones associated with newborns, especially large newborns. In most cases, the newborn is asymptomatic. However, decreased or absent movement and pain or tenderness on movement of the arm on the affected side may be noted (Fuloria & Kreiter, 2002a). Treatment is directed toward immobilization and minimizing pain.

Chest

Inspect the newborn's chest for size, shape, and symmetry. The newborn's chest should be round, symmetric, and 1 to 2 cm smaller than the head circumference. The xiphoid process may be prominent at birth; however, it usually becomes less apparent when adipose tissue accumulates. Nipples may be engorged and may secrete a white discharge. This discharge, which occurs in both male and female newborns, is as a result of their exposure to high levels of maternal estrogen while in utero. This enlargement and milky discharge usually dissipates within a few weeks. Some newborns may have extra nipples, called *supernumerary nipples.* They are typically small, raised, pigmented areas vertical to the main nipple line 5 to 6 cm below the normal nipple (Verklan & Walden, 2004). They tend to be familial and do not contain glandular tissue. Reassure parents the extra small nipples are harmless.

The newborn chest is usually barrel shaped with equal anteroposterior and lateral diameters, and symmetric. Auscultate the lungs bilaterally for equal breath sounds. Normal breath sounds should be heard with little differentiation between inspiration and expiration. Fine crackles can be heard on inspiration soon after birth as a result of clearing amniotic fluid from the lungs. Diminished breath sounds might indicate atelectasis, effusion, or poor respiratory effort (Colyar, 2003).

Auscultating the heart should be carried out when the newborn is quiet or sleeping to hear sounds effectively. S1 and S2 heart sounds are accentuated at birth. The point of maximal impulse (PMI) is a lateral to midclavicular line located at the fourth intercostal space. A displaced PMI may indicate tension pneumothorax or cardiomegaly. Murmurs are often heard and are usually benign, but if present after the first 12 hours of life should be evaluated to rule out a cardiac disorder (Haws, 2004).

Abdomen

Inspect the abdomen for shape and movement. Typically the newborn's abdominal contour is protuberant without appearing distended. This contour is as a result of the immaturity of the abdominal musculature. Abdominal movements are synchronous with respirations because newborns are, at times, abdominal breathers.

Next, auscultate bowel sounds in all four quadrants and then palpate the abdomen for consistency, masses, and tenderness. Perform auscultation and palpation systematically in a clockwise fashion until all four quadrants have been assessed. Palpate gently for liver enlargement, presence of kidneys, and presence of masses. The liver is normally palpable 1 to 3 cm below the costal margin in the midclavicular line. The kidneys are 1 to 2 cm above and to both sides of the umbilicus. Normal findings would include bowel sounds noted in all four quadrants, and no masses or tenderness elicited on palpation. Absent or hyperactive bowel sounds might indicate an intestinal obstruction. Abdominal distention present may indicate

ascites, obstruction, infection, masses, or an enlarged abdominal organ (Furdon & Benjamin, 2004).

Inspect the umbilical cord area for the correct amount of blood vessels. The umbilical cord should contain three vessels: two arteries and one vein. The umbilical vein is larger than the two umbilical arteries. Evidence of only a single umbilical artery is associated with renal and GI anomalies. Be sure to count all vessels during the newborn assessment. Also inspect the umbilical area for signs of bleeding, infection, granuloma, or abnormal communication with the intraabdominal organs (Fuloria & Kreiter, 2002b).

Genitalia

Inspect the penis and scrotum in the male. For the circumcised male newborn, the glans should be smooth with the meatus centered at the tip of the penis. For the uncircumcised male, the foreskin should cover the glans. Inspect the position of the urinary meatus, which should be located in the midline at the glans tip. If it is located on the ventral surface of the penis, hypospadias is present; if it is located on the dorsal surface of the penis, it is termed *epispadias*. In either case, **circumcision** should be avoided until further evaluation.

Inspect the scrotum for size, symmetry, color, presence of rugae, and location of testes. The scrotum usually appears relatively large and should be pink in white neonates and dark brown in neonates of color. Rugae should be well formed and should cover the scrotal sac. Bulging, edema, or discoloration should be absent (Fig. 18-14A).

Palpate the scrotum for evidence of testes, which should be in the scrotal sac. The testes should feel firm and smooth, and of equal size on both sides of the scrotal sac in the term newborn. Undescended testes palpated in the inguinal canal are found in preterm infants. Undescended testes (cryptorchidism) can be unilateral or bilateral. If the testes are not palpable within the scrotal sac, further investigation is needed.

If the newborn is a female, inspect the external genitalia. By contrast, the female genitalia will be engorged; labia majora and minora may both be edematous. The labia majora is large and covers the labia minora. The clitoris is large and the hymen is thick. The urethral meatus is located below the clitoris in the midline (Dillon, 2003). All these findings are influenced by a withdrawal of the maternal hormones estrogen and progesterone (Fig. 18-14B). A vaginal discharge composed of mucus mixed with blood may also be present during the first few weeks of life. This discharge, called **pseudomenstruation,** requires no treatment. However, be sure to inform mothers of this finding so that they do not assume that something is wrong with their daughters.

Variations may include a labial bulge, which might indicate an inguinal hernia; ambiguous genitalia; rectovaginal fistula with feces present in the vagina; and an imperforate hymen.

● Figure 18-14 Newborn genitalia. (**A**) Male genitalia. Note the darkened color of the scrotum. (**B**) Female genitalia.

Inspect the anus in both male and female newborns for position and patency. Passage of meconium ensures patency. A healthcare provider can insert a lubricated rectal thermometer or perform a digital examination to determine patency if meconium is not passed. Abnormal findings would include the presence of anal fissures or fistulas and no meconium passed within 24 hours after birth.

Extremities and Back

Inspect the newborn's upper extremities for appearance and movement. Inspect the hands for shape, number, and position of fingers, and presence of palmar creases. The newborn's arms and hands should be symmetric and move through range of motion without hesitation. Observe for spontaneous movement of the extremities. Each hand should have five digits. Note any extra digits (polydactyly) or fusing of two or more digits (syndactyly). Most newborns have three palmar creases of the hand. A single palmar crease, called a *simian line*, is frequently associated with Down syndrome.

A brachial plexus injury can occur during a difficult birth involving shoulder dystocia. Erb palsy is one injury

resulting from damage to the upper plexus during birth. Clinically the affected arm hangs limp alongside the body. The affected shoulder and arm are adducted, extended, and internally rotated with a pronated wrist. The Moro reflex is absent on the affected side for brachial palsy. Complete recovery may take 3 to 6 months (Hockenberry, 2005).

Assess the lower extremities in the same manner as that for the upper extremities. The lower extremities should of equal length, with symmetric skin folds. Inspect both feet for a turning inward position (clubfoot) secondary to intrauterine positioning. This may be positional or structural. Perform Ortolani and Barlow maneuvers to identify the possibility of congenital hip dislocation, commonly termed *developmental dysplasia of the hip* (DDH). Nursing Procedure 18-1 highlights the steps for performing these maneuvers.

Inspect the back, including the spine. The spine should appear straight and flat, and should be easily flexed when held in a prone position. Observe for the presence of a tuft of hair, pilonidal dimple in the midline, cyst, or mass along the spine. These would be abnormal findings and need to be documented and reported to the primary health care provider (Table 18-2).

Neurologic Status

Assessment of the newborn's neurologic status involves assessing the newborn's state of alertness, posture, muscle tone, and reflexes. The newborn should be in an alert state and not one of persistent lethargy. The normal posture is one with hips abducted and partially flexed, and with knees flexed. Their arms are adducted and flexed at the elbow. The fists are often clenched, with fingers covering the thumb.

To assess for muscle tone, support the newborn with one hand under the chest. Observe how the neck muscles hold the head. The neck extensors should be able to hold the head in line briefly. Also, there should only be slight head lag when pulling the newborn from a supine position to a sitting one.

Newborn Reflexes

Assess the newborn's reflexes to evaluate neurologic function and development. Absent or abnormal reflexes in a newborn, persistence of a reflex past the age when the reflex is normally lost, or redevelopment of an infantile reflex in an older child or adult may indicate neurologic pathology (Table 18-3). Reflexes commonly assessed in the newborn include sucking reflex, Moro reflex, stepping, tonic neck, rooting, Babinski, and palmar grasp reflex. Spinal reflexes tested include truncal incurvation (Galant reflex) and anocutaneous reflex (anal wink).

The sucking reflex is elicited by gently stimulating the newborn's lips by touching them. The newborn will typically open their mouth and begin a sucking motion. Placing a gloved finger in the newborn's mouth will also educe a sucking motion of the finger (Fig. 18-15A).

The Moro reflex, also called the *embrace reflex,* occurs when the neonate is startled. To elicit this reflex, place the newborn on his back. Support the upper body weight of the supine newborn by the arms using a lifting motion without lifting the newborn off the surface. Then release the arms suddenly. The newborn will throw the arms outward and flex the knees; arms then return to the chest. The fingers also spread to form a C. The newborn initially appears startled, then relaxes to a normal resting position (Fig. 18-15B).

Assess the stepping reflex by holding the newborn upright and inclined forward with the soles of the feet touching a flat surface. Observe the neonate simulating a stepping motion or walking, alternating flexion and extension with the soles of their feet (Fig. 18-15C).

The tonic neck reflex resembles the stance of a fencer and is often called the *fencing reflex*. Test this reflex by having the newborn lie on his back. Then turn his head to one side. The arm toward which the neonate is facing extends straight away from the body with the hand partially open, whereas the arm on the side away from the face is flexed and the fist is clenched tightly. Reversing the direction in which the face is turned reverses the position (Fig. 18-15D).

Elicit the rooting reflex by stroking the newborn's cheek. The newborn will turn toward the side that was stoked and begin to make sucking movements with his mouth (Fig. 18-15E).

The Babinski reflex is present at birth and disappears at approximately 1 year of age. It is educed by stroking the lateral sole of the newborn's foot from the heel toward and across the ball of the foot. The toes should fan out. A diminished response is associated with a neurologic problem and needs follow-up evaluation (Fig. 18-15F).

The newborn exhibits two grasp reflexes: palmar grasp and plantar grasp. Elicit the palmar grasp reflex by placing a finger on the newborn's open palm. The newborn's hand will close around the finger. Attempting to remove the finger causes the grip to tighten. Newborns have strong grasps and can almost be lifted from a flat surface if both hands are used. The grasp should be equal bilaterally (Fig. 18-15G).

The plantar grasp is similar to the palmar grasp. Place a finger against the area just below the newborn's toes. The newborns' toes typically curl over the finger (Fig. 18-15H).

Blinking, sneezing, gagging, and coughing are all protective reflexes and are elicited when an object or light is brought close to the eye (blinking), something irritating is swallowed or a bulb syringe is used for suctioning (gagging and coughing), or an irritant is brought in close proximity to the nose (sneezing).

The truncal incurvation reflex (Galant reflex) is present at birth and disappears in a few days to 4 weeks. With the newborn in a prone position or held in ventral suspension, apply firm pressure and run a finger down either side of the spine. This stroking will cause the pelvis to flex toward the stimulated side. This indicates T2–S1

Nursing Procedure 18-1

Performing Ortolani and Barlow Maneuvers

Purpose: To Detect Possible Congenital Developmental Dysplasia of the Hip

Ortolani Maneuver

1. Place the newborn in the supine position and flex the hips and knees to 90 degrees at the hip.
2. Grasp the inner aspect of the thighs and abduct the hips (usually to approximately 180 degrees) while applying upward pressure.

3. Listen for any sounds during the maneuver. There should be no "cluck" or "click" heard when the legs are abducted. Evidence of such a sound indicates the femoral head hitting the acetabulum as the head reenters the area. This suggests developmental hip dysplasia.

Barlow Maneuver

1. With the newborn still lying supine and grasping the inner aspect of the thighs (as just mentioned), adduct the thighs while applying outward and downward pressure to the thighs.

2. Feel for the femoral head slipping out of the acetabulum; also listen for a click (Haws, 2004).

innervation. An absent response would indicate a neurologic or spinal cord problem.

The anocutaneous reflex (anal wink) is elicited by stimulating the perianal skin close to the anus. The external sphincter will constrict (wink) immediately with stimulation. This indicates S4–5 innervation (Verklan & Walden, 2004).

Nursing Interventions

Becoming parents with the confidence to care for their newborn is challenging for most couples. It takes time and patience with a great deal of instruction provided by the nurse. "Showing and telling" parents about their newborn and all the necessary procedures (feeding, bathing, changing, handling) involved in daily care are key nursing interventions.

Providing General Newborn Care

Nurses role model appropriate care and provide teaching as necessary to meet the needs of the newborn. Generally, newborn care involves bathing and hygiene, diaper care, cord care, circumcision care, use of appropriate clothing, environmental safety measures, and prevention of infection. Nurses can help families in these areas by role modeling appropriate and consistent interaction with newborns. Demonstration of respect for the newborn and his family is essential in fostering a positive atmosphere to promote the newborn's growth and development.

Bathing and Hygiene

Newborns are bathed primarily for aesthetic reasons. Such bathing is postponed until thermal and cardiorespiratory stability is ensured. The reasons cited for nurses bathing the newborn are to conduct a physical assessment, reduce the effect of hypothermia, and allow the mother to rest (Medves & O'Brien, 2004). Recent research suggests that nurses do not need to give the newborn an initial bath to reduce heat loss. Rather, the parents could be given this opportunity, supported by nurses. Heat loss was similar in newborns bathed by parents when com-

Table 18-2 Newborn Assessment Summary

Assessment	Usual Findings	Variations and Common Problems
Anthropometric measurements	Head circumference: 33–37 cm (13–14 in) Chest circumference: 30–33 cm (12–13 in) Weight: 2500–4000 g (5.5–8.5 lb) Length: 45–55 cm (19–21 in)	SGA, LGA, preterm, postterm
Vital signs	Temperature: 36.5–37.5°C (97–99°F) Apical pulse: 120–180 bpm Respirations: 30–60 breaths/minute	
Skin	Normal: smooth, flexible, good skin turgor, warm	Jaundice, acrocyanosis, milia, mongolian spots, stork bites
Head	Normal: varies with age, gender, and ethnicity	Microcephaly, macrocephaly, enlarged fontanelles
Face	Normal: full cheeks, facial features symmetric	Facial nerve paralysis, nevus flammeus, nevus vasculosus
Nose	Normal: small, placement in the midline and narrow, ability to smell	Malformation or blockage
Mouth	Normal: aligned in midline, symmetric, intact soft and hard palate	Epstein's pearls, erupted precocious teeth, thrush
Neck	Normal: short, creased, moves freely, holds head in midline	Restricted movement, clavicular fractures
Eyes	Normal: clear and symmetrically placed on face	Chemical conjunctivitis, subconjunctival hemorrhages
Ears	Normal: soft and pliable with quick recoil when folded and released	Low-set ears, hearing loss
Chest	Normal: round, symmetric, smaller than head	Nipple engorgement, whitish discharge
Abdomen	Normal: protuberant contour, soft, three vessels in umbilical cord	Distended, only two vessels in umbilical cord
Genitals	Normal male: smooth glans, meatus centered at tip of penis Normal female: swollen female genitals as a result of maternal estrogen	Edematous scrotum in males, vaginal discharge in females
Extremities and spine	Normal: extremities symmetric with free movement	Congenital hip dislocation; tuft or dimple on spine

pared with newborns who were bathed by nurses (Medves & O'Brien, 2004).

Wear gloves because of potential exposure to maternal blood on the newborn and perform the bath quickly, making sure to dry the newborn thoroughly to prevent heat loss by evaporation. Begin the bath, proceeding from the "cleanest" (eyes) to the most soiled area (diaper area) to prevent cross-contamination.

Use plain warm water on the face and eyes, adding a mild soap (such as Dove) to cleanse the remainder of the body. Instructing the parents to wash the face and neck gently after each feeding will help prevent rashes and prevent the odor that can develop when milk accumulates in the neck creases.

Washing the newborn's hair is best carried out close to a source of running water to afford thorough rinsing of the scalp. A mild shampoo or soap can be used to wash the hair and scalp. Wash both fontanel areas. Frequently parents choose to avoid these "soft spots" because they fear that they will "hurt their newborn's brain" if they rub too hard. Reassure parents that there is a strong membrane providing protection. Urge the parents to clean and rinse these areas well. If the anterior fontanelle is not rinsed well after shampooing, cradle cap—dry flakes on the scalp—can develop. Figure 18-16 shows the nurse demonstrating bathing a newborn while the father watches.

After bathing, place the newborn under the radiant warmer and wrap him securely in blankets to prevent

Table 18-3 Newborn Reflexes: Appearance and Disappearance

Reflex	Appearance	Disappearance
Blinking	Newborn	Persist into adulthood
Moro	Newborn	3–6 mo
Grasp	Newborn	3–4 mo
Stepping	Birth	1–2 mo
Tonic neck	Newborn	3–4 mo
Sneeze	Newborn	Persist into adulthood
Rooting	Birth	4–6 mo
Gag reflex	Newborn	Persist into adulthood
Cough reflex	Newborn	Persist into adulthood
Babinski sign	Newborn	12 mo

chilling. Check his temperature within an hour to validate it is within normal limits. If it is low, place the newborn under a radiant heat source.

The literature suggests that tub bathing, as opposed to sponge bathing, can be done without significantly lowering the newborn's temperature or increasing rates of cord infection in healthy term newborns (Bryanton, Walsh, Barrett, & Gaudet, 2004). Drying the newborn and removing blood may minimize the risk of infection caused by hepatitis B, herpes virus, and HIV. Specific benefits of this practice remain unclear currently. Until the newborn has been thoroughly bathed, standard precautions should be used when handling the newborn. Typically, a bath two or three times weekly is sufficient for the first year. More frequent bathing may be drying to the skin.

After the initial bath, the newborn may not receive another full one during the birthing unit stay. The diaper area will be cleansed at each diaper change, and any milk spilled will be cleaned. Clear water and a mild soap are appropriate to cleanse the diaper area. The use of lotions, baby oil, and powders is not encouraged because all can lead to skin irritation and potential rashes. If the parents desire to use them, have them apply a small amount onto their hand first, away from the newborn. Doing so helps to warm the lotion. Then instruct the parents to apply the lotion or oil sparingly.

The current recommendation is to advise parents not to immerse their newborns into water fully until the umbilical cord area is healed—about 2 weeks after birth. A sponge bath is encouraged until the umbilical cord falls off and the navel area is completely healed.

If the newborn has been circumcised, advise parents to wait until that area has also healed (usually 1–2 weeks). Clean the penis with mild soap and water and apply a small amount of Vaseline to the tip to prevent the diaper from adhering to the penis. Instruct parents to apply the diaper loosely and place the newly circumcised male infant on his side or back to prevent pressure and irritation on the penis.

Encourage the parents to gather items needed before starting the bath. These items include a soft, clean washcloth; two cotton balls to clean the eyes; mild, unscented soap and shampoo; towels or blankets; an infant tub with warm water; a clean diaper; and a change of clothes. Then provide the parents helpful guidelines for bathing their newborn (see Teaching Guidelines 18-1).

Elimination and Diaper Area Care

Newborn elimination patterns are highly individualized. Usually, urine is light amber in color, with newborns typically soaking 6 to 12 diapers per day, indicating adequate hydration. Stool characteristics change in color, texture, and frequency without signaling a problem. The normal progression of bowel movement changes include

1. Meconium—thick, tarry, sticky, dark green for the first 48 hours after birth
2. Transitional—thin, brown to green, typically appearing by day 3 after initiation of feeding; less sticky than meconium

Stool characteristics after transitional stool depend on whether the newborn is breast-fed or bottle-fed. Breast-fed newborns typically pass mustard-colored, soft stool with a seedy consistency; formula-fed newborns pass yellow to brown, formed stool with a pasty consistency. As long as the newborn seems content, is eating normally, and shows no signs of illness, the minor changes in bowel movements should not be a concern.

The newborn needs to be checked frequently to ascertain whether a diaper change is needed, especially after feeding. Be sure to adhere to standard precautions when providing diaper area care. Instruct parents to apply the new diaper top edge below the umbilical cord area to prevent irritation and to provide air to assist in drying the cord.

Meconium, the first stool passed by the newborn, can be difficult to remove from the skin. Use plain water or special cleansing wipes if necessary to clean the area.

Provide parents with instructions on how to clean the diaper area properly and how to prevent skin irritation. Encourage the avoidance of products such as powder and items with fragrance, which could promote irritation. Also discuss the pros and cons of using cloth diapers versus disposable diapers so that the parents can make informed decisions. Regardless of the type of diapers used, parents will need up to 10 diapers a day, or about

● Figure 18-15 Newborn reflexes. (**A**) Sucking reflex. (**B**) Moro reflex. (**C**) Stepping reflex. (**D**) Tonic neck reflex. (**E**) Rooting reflex. (**F**) Babinski reflex. (**G**) Palmar grasp. (**H**) Plantar grasp.

● Figure 18-15 (continued)

● Figure 18-16 The nurse demonstrates bathing a newborn while the father watches.

70 a week. Additional helpful information concerning diapering might include

- Before diapering, make sure all supplies are within reach, including clean diaper, cleaning agent or wipes, and ointment
- Lay the newborn on a changing table and remove the dirty diaper
- Use water and mild soap or wipes to gently wipe the genital area clean; wipe from front to back for girls to avoid a UTI
- Always wash hands thoroughly before and after changing diapers

While performing diaper area care, urge parents to observe the area closely for irritation or rash. Some helpful tips for preventing or healing a diaper rash include

TEACHING GUIDELINES 18-1

Bathing a Newborn

- Select a warm room with a flat surface at a comfortable working height.
- Before the bath, gather all supplies needed so they will be within reach.
- Never leave the newborn alone or unattended at any time during the bath.
- Undress the newborn down to his shirt and diaper.
- Always support the newborn's head and neck when moving or positioning him.
- Place a blanket or towel underneath the newborn for warmth and comfort.
- Follow this order, progressing from the cleanest to the dirtiest areas:
  - Wipe eyes with plain water either with cotton balls or a washcloth.
  - Wipe from the inner corner of the eyes to the outer with separate wipes.
  - Wash the rest of the face, including ears, with plain water.
  - Using baby shampoo, gently wash the head and rinse with water.
  - Pay special attention to body creases and dry thoroughly.
  - Wash extremities, trunk, and back: wash, rinse, dry, cover.
  - Wash diaper area last with soap and water and dry; observe for rash.
- Diaper and dress newborn at the conclusion of the bath.

- Changing diapers frequently, especially after bowel movements
- Applying a "barrier" cream, such as A & D ointment, after cleaning with mild soap and water
- Using dye and fragrance-free detergents for cloth diaper washing
- Avoiding the use of plastic pants because they tend to hold in moisture
- Exposing the newborn's bottom to air several times a day
- Placing the newborn's buttocks in warm water after having had a diaper on all night

Advise parents that if a rash does develop and persists for more than 3 days, the rash may be fungal in origin and may require additional treatment. Encourage the parents to notify the newborn's healthcare provider.

Cord Care

The umbilical cord begins drying within hours after birth and is shriveled and blackened by the second or third day. Within 7 to 10 days, it sloughs off and the umbilicus heals. During this transition, frequent assessments of the area are necessary to detect any bleeding or signs of infection. Cord bleeding is abnormal and may occur if the cord clamp is loosened. Any cord drainage is also abnormal and is generally caused by infection, which requires immediate treatment.

During each diaper change, apply the appropriate agent (such as triple dye, alcohol, or an antimicrobial agent), according to facility policy, to the cord stump to prevent any ascending infections. Single-use agents for cleaning are recommended to prevent cross-contamination with other newborns. Expect to remove the cord clamp approximately 24 hours after birth by using a cord-cutting clamp. However, if the cord is still moist, keep the clamp in place and ensure a referral to home health care so that the home care nurse can remove it after discharge. Always adhere to agency policies regarding cord care, being aware that changes may be necessary based on emerging research.

Because of the appearance of the cord site, many parents avoid contact with it to make sure they don't "bother" it. Advising them how to care for the cord site when they go home will hopefully prevent any complications from occurring (see Teaching Guidelines 18-2).

Circumcision Care

Circumcision is the surgical removal of all or part of the foreskin (prepuce) of the male penis (O'Toole, 2003). This has been traditionally done for hygienic and medical reasons and is the oldest known religious rite. In the Jewish faith, the circumcision is a ritual that is performed by a *mohel* (ordained circumciser) on the eighth day after birth if possible. The circumcision is then followed by a religious ceremony during which the newborn is also named.

During the circumcision procedure, part of the foreskin is removed by clamping and cutting with a scalpel (Gomco or Mogen clamp) or by using a plastic ring with a string tied around it to trim off the excess foreskin (Plastibell). Small sutures of pressure from the plastic ring are used to prevent bleeding and to promote wound closure (Littleton & Engebretson, 2005) (Fig. 18-17).

The debate over the practice of routine newborn circumcision remains alive and well in the United States. For many years, the purported benefits and harms of circumcision have been debated in the medical literature and society at large, with no clear consensus to date. Despite controversy about its indications, circumcision remains a procedure that is performed worldwide in large numbers. It is the most common surgical procedure performed on newborns, with almost two thirds of American male newborns being circumcised (Cunningham et al., 2005).

A policy statement by the AAP indicated that newborn circumcision has potential medical benefits and advantages as well as disadvantages and risks. For the first time in AAP circumcision policy history, the new recommendations also indicate that if parents decide to circumcise their newborn, it is essential that pain relief be provided. Research reports

TEACHING GUIDELINES 18-2

Umbilical Cord Care

- Apply alcohol or the recommended solution to the cord site at each diaper change to help dry it.
- Observe for any bleeding, redness, drainage, or foul odor from the cord stump and report it to your newborn's primary care provider immediately.
- Avoid tub baths until the cord has fallen off and the area has healed.
- Expose the cord stump to the air as much as possible throughout day.
- Fold diapers below the level of the cord to prevent contamination of the site and to promote air drying of the cord.
- Observe the cord stump, which will change color from yellow to brown to black. This is normal.
- Never pull the cord or attempt to loosen it; it will fall off naturally.

that newborns circumcised without analgesia experience pain and stress measured by changes in heart rate, blood pressure, oxygen saturation, and cortisol levels (Razmus, Dalton, & Wilson, 2004). Subsequently, the AAP policy recommends that analgesia be provided if the procedure is performed. Analgesic methods may include EMLA cream (a topical mixture of local anesthetics), a dorsal penile nerve block with buffered lidocaine, acetaminophen, sucrose pacifier, and swaddling (Cunningham et al., 2005). When being considered, the AAP recommends that parents be given accurate and unbiased information regarding the risks and benefits of the procedure.

The nurse's major responsibility is to inform the parents of the risks and benefits of the procedure and to address concerns so that the parents can reach a fully informed decision. Risks for the newborn include infection, hemorrhage, skin dehiscence, adhesions, potential urethral fistula, and pain. Benefits to the newborn include decreased incidence of UTIs and sexually transmitted infections (STIs), and possible prevention of penile cancer:

- UTIs—slightly less common in circumcised boys; however, rates of UTI are low in both groups and are easily treated without long-term sequelae
- STIs—risk believed to be related more to behavioral factors than circumcision status except for HIV, which had a decrease in the risk of acquiring it of 50% (Kinkade & Meadows, 2005).
- Penile cancer—extremely rare in the United States. There appears to be a slightly lower rate of penile cancer in circumcised males; however, risk factors such as genital warts, infection with human papilloma virus (HPV), multiple sex partners, and cigarette smoking seem to play a much lager role in causing penile cancer than circumcision status (Dickey, 2002; Zepf, 2002).

Most studies are inconclusive concerning circumcision preventing STIs, cervical and penile cancer, and UTIs. The decision to circumcise the male newborn is often a social one made by parents, with the strongest factor associated with the decision being whether the newborn's father is himself circumcised (Bar-Yam, 2002).

The absence of compelling medical evidence in favor of or against newborn circumcision makes informed consent of parents paramount. The circumcision discussion involves cultural, religious, medical, and emotional considerations. Nurses may have difficulty remaining unbiased and unemotional as they present facts to the parents trying to make a decision. Nurses must remember that circumcision is a very personal decision for parents, involving medical, cultural, religious, and family considerations.

As with other newborn procedures, research on risks and benefits continues. Nurses must be informed about current medical research to help parents untangle the data to make truly informed decisions that are most comfortable for them.

Immediately after circumcision, the tip of the penis is usually covered with petroleum jelly-coated gauze to

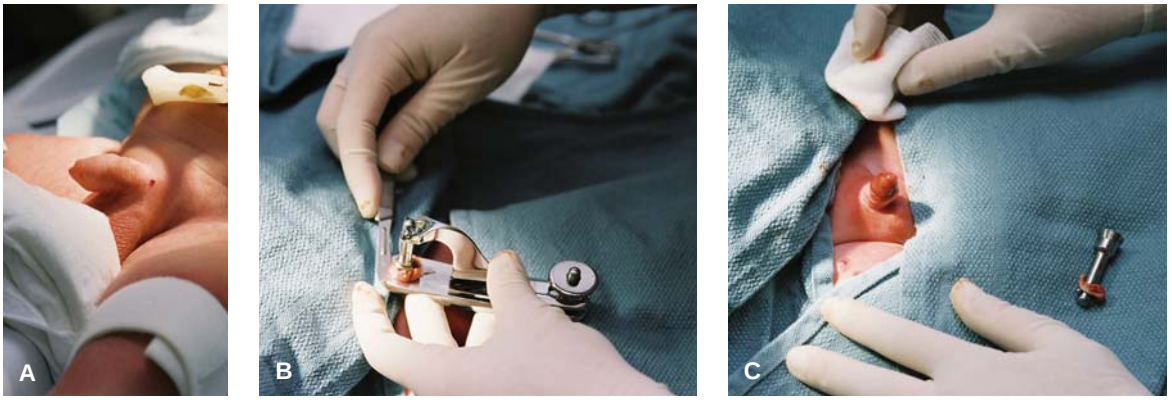


Figure 18-17 Circumcision. (**A**) Before the procedure. (**B**) Clamp applied and foreskin removed. (**C**) Appearance after circumcision.

keep the wound from sticking to the diaper. Continued care of this site includes

- Squeezing soapy water over the area and then rinsing the area with warm water and patting dry daily
- Applying a small amount of petroleum jelly with every diaper change
- Fastening the diaper loosely over the penis and avoiding placing newborn on his abdomen to prevent friction

If a Plastibell has been used, it will fall off by itself in about a week. Inform parents of this and advise them never to pull it off sooner. Also instruct the parents to check daily for any foul-smelling drainage, bleeding, or unusual swelling.

If the newborn is uncircumcised, wash the penis with mild soap and water after each diaper change and refrain from forcing the foreskin back; it will retract normally over time.

Safety

Newborns are completely dependent on those around them to ensure their safety. Their safety must be ensured while in the health care facility and after they are discharged. Parental education is key, especially as the newborn grows and develops, and begins to respond to and explore his surroundings (see Teaching Guidelines 18-3).

Environmental Safety

People who enter any health care facility for treatment expect to be safe there until they return to their homes. Today, perhaps more than ever before, birthing centers and acute care hospitals face the daunting challenge of ensuring that all people have a safe environment while interacting within their facilities.

Consider this scenario: A woman dressed in nurse's clothing entered the hospital room of a new mother soon after she had given birth. This "nurse" told the mother she needed to take her newborn to the nursery to have him weighed. Sometime later, a staff nurse making her routine rounds realized something was wrong when she saw that the newborn's bassinet in the mother's room was empty and the mother was sound asleep in her bed. The staff nurse called security immediately because she suspected a newborn abduction had taken place.

This scenario represents a typical abduction that is repeated many times throughout the United States each year. An **infant abduction** is the taking of a child less than 1 year old by a nonfamily member (Burns, 2003). Infant abductions are extremely traumatic for the parents and affect the local community and beyond, possibly making national headlines. In addition, facilities may be faced with enormous insurance liability suits filed by the parents.

Unfortunately, research on infant abduction is limited. What is known about abductions is that they are usually carried out by women during daylight hours who are not criminally sophisticated. They may have experienced a pregnancy loss in the past and are often emotionally immature and compulsive, with low self-esteem. Most female abductors are able to play the role of a hospital employee convincingly and meet their objective of securing an infant (Shogan, 2002). Health care agencies are challenged to secure the newborn's safety with sound security practices and systems to prevent abduction (Rabun, 2003).

Preventative measures include

- Mandating that all newborns be transported in cribs and not carried
- Responding immediately to any security alarm that sounds on the unit
- Never leaving newborns unattended at any time, especially in hallways
- Ensuring that all staff wear appropriate identification at all times
- Being suspicious of visitors who do not seem to be visiting a specific mother
- Participating in checking the electronic security system to validate that it works
- Ensuring proper functioning and placement of any electronic sensors used on newborns

TEACHING GUIDELINES 18-3

General Newborn Safety

- Have emergency telephone numbers readily available, such as those for emergency medical assistance and the poison control center.
- Keep small or sharp objects out of reach to prevent their aspiration.
- Put safety plugs in wall sockets within reach to prevent accidental electrocution.
- Do not leave the infant alone in any room without a portable intercom on.
- Always supervise a newborn in the tub, because she can drown in 2 in of water.
- Make sure the crib or changing table is sturdy, without any loose hardware, and is painted with lead-free paint.
- Avoid placing the crib or changing table near blinds or curtain cords.
- Provide a smoke-free environment for all infants.
- Place all infants on their backs to sleep to prevent SIDS.
- Prevent falls by not leaving a newborn alone on any elevated surface.
- Use sun shields on strollers and hats to avoid overexposing the newborn to the sun.
- Thoroughly wash hands before formula preparation to prevent infection.
- Thoroughly investigate any infant care facility before using (Brent & Weitzman, 2004)

- Assessing parents' knowledge and providing education as necessary, such as
  - What infant abduction is
  - Why infant security is important
  - The facility's security policies and procedures
  - What they can do to protect their infant while they are there
  - Rules about visitor access while they are there
  - Which staff is allowed to handle the newborn
  - What a proper ID looks like

Providing a safe and secure environment in the birth center is a shared responsibility of the facility, staff, and parents. Only if all are educated about the rules and policies can safety be achieved and abductions stopped.

Car Safety

Every state requires the use of car seats for infants and children when riding in a car, because motor vehicle accidents are still the leading cause of unintentional injury and death in children under the age of five (AAP, 2005b). In more than half these deaths, the child was unrestrained, despite the known effectiveness of federally approved car seats in reducing morbidity and mortality in such crashes (AAP, 2005b).

The value of infant safety seats to prevent injury and death is well accepted. It has been shown that a lack of knowledge about them may contribute to under use and misuse of these devices (AAP, 2005b). It is imperative that nurses educate parents about this vital life-saving device and not release any newborn unless they have secured one for their first ride home (Fig. 18-18).

Prior to discharge from the hospital or birthing center, ascertain whether the parents have secured an infant car seat to transport their newborn home. If they cannot afford to purchase one, many community organizations will provide one for them. Make sure that both parents understand the importance of safely transporting their newborn in a federally approved safety car seat every time the infant rides in a car.

● Figure 18-18 Newborn in a properly secured car seat.

According to the AAP, no one car seat is considered to be the "safest" or the "best," but rather consistent and proper use will prevent injuries and deaths. Instruct parents in the following:

- Selecting a car seat that is appropriate for the newborn's size and weight, and using it correctly, including every time the newborn is in the car
- Using only rear-facing car seats for infants until they are at least 1 year old or weigh 20 lb
- Ensuring that the harness (most seats have a three to five-point harness) is in the slots at or below the shoulders

Infection Prevention

The nurse plays a major role in preventing infection within the newborn environment. The nurse needs to institute measures to control infection by minimizing exposure of newborns to organisms; washing hands before and after providing care; insisting that all personnel wash their hands before handling any newborn; not allowing ill staff or visitors to visit or handle newborns; monitoring umbilical cord stump and circumcision site for signs of infection; providing eye prophylaxis by instilling prescribed medication soon after birth; and educating parents about appropriate home measures that will prevent infections such as practicing good hand washing before and after diaper changes, keeping their newborn well hydrated, avoiding bringing their infant into public crowds (which may expose him or her to colds and flu viruses), observing for any early signs of symptoms of infection (elevated temperature, vomiting, loss of appetite, lethargy, labored breathing, green watery stools, drainage from umbilical cord site or eyes), and making sure to keep pediatrician appointments for routine **immunizations.**

Sleeping

Although many parents feel their newborns need them every minute of the day, they actually need sleep much of the day initially. Usually newborns sleep up to 15 hours daily, sleeping for periods of 2 to 4 hours at a time, but not sleeping through the night. This is because their stomach capacity is too small to go long periods of time without nourishment. All newborns develop their own sleep patterns and cycles, with parents possibly waiting several months before the newborn sleeps through the night.

Additional tips to share with parents would include placing the newborn on her back to sleep; removing all fluffy bedding, quilts, sheepskins, stuffed animals, and pillows from the crib to prevent potential suffocation; and avoiding bed sharing. Bringing a newborn into bed to nurse or quiet her down, and then falling asleep with the newborn is not a safe practice. Counsel parents about the potential risks. For example, infants who sleep in adult beds are up to 40 times more likely to suffocate than those who sleep in cribs (McGinnis, 2004). Suffocation also can

occur when the infant gets entangled in bedding or caught under pillows, or slips between the bed and the wall or the headboard and mattress. It can also happen when someone accidentally rolls against or on top of them. Therefore, the safest sleeping location for all newborns is in their cribs without any movable objects close by. In addition, teach parents to avoid unsafe conditions for newborn sleeping, such as placing the newborn in the prone position, using a crib that does not meet federal safety guidelines, allowing window cords to hang loose and in close proximity to crib, or having the room temperature too high to cause overheating (Page-Goertz, 2004).

Enhancing Bonding

Encourage and enhance parent–newborn interaction by involving both parents with the new member of their family, and demonstrating and role modeling appropriate behaviors. To promote positive parent–newborn interactions, the following suggestions might help enhance the ways to model nurturing care:

- Say "hello" and introduce yourself to the newborn.
- Ask the parents permission to provide care and hold their newborn. This simple question assists parents in assimilating their new role of being responsible for their child and reminds nurses of their role.
- Show parents the power of a soothing voice to calm the newborn.
- Provide care to the newborn in the least stressful way for her.
- Demonstrate ways to wake the newborn up gently to feed better.
- Tell parents what you are doing, why you are doing it, and how they can duplicate what you are doing in their home environment.
- Offer the opportunity to perform care while you observe them. Affirm their efforts to soothe the newborn throughout the care process.
- Assist parents to understand the whole repertoire of "language" and communication cues the newborn uses to meet their needs.
- Point out the efforts the newborn is making to connect with the parents (e.g., alerting to the familiar voice, following the parents while they are speaking, quieting when held securely).

One of the most pleasurable aspects of newborn care is being close to them. Bonding begins soon after birth when parents cradle their newborn and gently stroke them with their fingers. Provide each parent with opportunities for "skin-to-skin" contact with their newborn, holding them against their own skin when feeding or cradling. Many newborns respond very positively to gentle massage. If necessary, recommend appropriate books and videos that cover the subject.

Newborns cry for a variety of reasons, because it is their only way to communicate that something is wrong. Try to find out the reason *why* by making sure there is a dry diaper, the temperature of the room is not too hot or too cold, and checking for signs of discomfort such as a diaper rash or tight clothing. Suggest the following ways in which parents can soothe an upset newborn:

- Try feeding or burping to relieve air or stomach gas.
- Lightly rub the newborn's back and speak softly to her.
- Gently rock side to side by swaying or rock back and forth in a rocking chair.
- Talk with the newborn while making eye contact.
- Take the newborn for a walk in a stroller or carriage to get fresh air.
- Change the position from back to side or vice versa.
- Try singing, reciting poetry and nursery rhymes, or reading to her.
- Turn on a musical mobile above the newborn's head.
- Give more physical contact by walking, rocking, or patting the newborn.
- Swaddle the newborn to provide a sense of security and comfort. To do this
  1. Spread out a receiving blanket, with one corner folded slightly
  2. Lay the newborn face up with head at the folded corner.
  3. Wrap the left corner over her body and tuck it beneath her.
  4. Bring the bottom corner over her feet.
  5. Wrap the right corner around her, leaving only the head exposed.

Assisting With Screening Tests

Screening newborns for problems is important because some will be born with potentially life-threatening metabolic disease that may not be obvious at birth. Newborn screening tests that are required in most states for newborns before discharge from the birth facility evaluate certain genetic and inborn errors of metabolism and hearing. Early identification and initiation of treatment can prevent significant complications and can minimize the negative effects of untreated disease.

Genetic and Inborn Errors of Metabolism Screening

Although each state mandates which conditions must be tested, most commonly tests screen for PKU, hypothyroidism, galactosemia, sickle cell disease, as well as many other conditions.

The trend toward early discharge of newborns before 48 hours of age can influence the timing of screening and the accuracy of some test results. For example, the newborn needs to ingest enough breast milk or formula to elevate phenylalanine levels for the screening test to identify PKU accurately. Because of this needed time for the ingestion of protein, newborn screening for PKU testing should not be performed before 24 hours of age.

Screening tests for genetic and inborn errors of metabolism require a few drops of blood taken from the newborn's heel (Fig. 18-19). These tests are usually performed shortly before discharge. Newborns who are discharged prior to 24 hours of age need to have repeat tests done within a week in an outpatient healthcare facility. Selected conditions that are screened for in the newborn are summarized in Table 18-4.

Be aware of which conditions your state regularly screens for at birth to ensure that the families receive the necessary education about the tests and the importance of early treatment. Also be familiar with the optimal time frame for screening and conditions that could adversely influence results. Ensure that a satisfactory specimen has been obtained at the appropriate time and that circumstances that could cause false results have been minimized. Send out specimens and completed forms within 24 hours of collection to the appropriate laboratory (Spahis, 2003).

Hearing Screening

Universal screening programs have been implemented across the United States. Screening only those infants who have a risk history is not enough, because as many as 50% of infants born with hearing loss have no known risk factors (De Michele & Ruth, 2005). Early identification and intervention can prevent severe psychosocial, educational, and language development delays.

Hearing loss is the most common birth disorder in the United States. Approximately three to five newborns of every 1000 have some degree of hearing loss. Unlike a physical deformity, hearing loss is not clinically detectable at birth and thus remains difficult to assess (De Michele & Ruth, 2005). Factors associated with an increased risk of hearing loss include

- Positive family history of childhood sensory hearing loss
- Congenital infections such as cytomegalovirus, rubella, toxoplasmosis, herpes
- Cranial facial anomalies involving the pinna or ear canal
- LBW of less than 1500 g
- Postnatal infections such as bacterial meningitis
- Head trauma
- Hyperbilirubinemia requiring an exchange transfusion
- Exposure to ototoxic drugs, especially aminoglycosides
- Perinatal asphyxia (De Michele & Ruth, 2005)

Delays in identification and intervention may affect language development, academic performance, and cognitive development in the older child. Detection before 3 months greatly improves outcomes. Because of this, auditory screening of all newborns is recommended by the AAP and is mandated by law in the majority of states. The current goals of Healthy People 2010 (see Healthy People 2010 display earlier in this chapter) are to screen all infants by 1 month of age, confirm hearing loss with audiologic examination by 3 months of age, and treat with comprehensive early intervention services before 6 months of age (Murray et al., 2004).

All newborns should be screened prior to discharge to ensure that any newborn with a hearing loss is not missed. Those with suspected hearing loss should be referred for follow-up assessment (see Box 18-1 for screening methods). In addition, nurses work to ensure that screening is accurate to facilitate early diagnosis and intervention services, and to optimize the newborn's developmental potential.

● Figure 18-19 Screening for PKU. (**A**) Performing a heel stick. (**B**) Applying the blood specimen to the required card for screening.

Promoting Nutrition

Several physiologic changes dictate the type and method of feeding throughout the newborn's first year. Some of these changes include the following:

- Stomach capacity is limited to about 90 mL at birth. The emptying time is short (2–3 hours) and peristalsis is rapid. Small, frequent feedings are needed early during the newborn and infancy period, with amounts progressively increasing with maturity.
- Immune system is immature at birth with a high risk for food allergies for the first 4 to 6 months of life.

Table 18-4 Selected Conditions Screened for in the Newborn

Condition	Description	Clinical Picture/ Effect If Not Treated	Treatment	Timing of Screening
PKU	Autosomal recessive inherited deficiency in one of the enzymes necessary for the metabolism of phenylalanine to tyrosine—essential amino acids found in most foods	Irritability, vomiting of protein feedings, and a musty odor to the skin or body secretions of the newborn; if not treated, mental and motor retardation, seizures, microcephaly, and poor growth and development	Lifetime diet of foods low in phenylalanine (low protein) and monitoring of blood levels (Spahis, 2003); special newborn formulas available: Phenex and Lofenalac	Universally screened for in the United States, testing done 24–48 hours after protein feeding (PKU)
Congenital hypothyroidism	Deficiency of thyroid hormone necessary for normal brain growth, calorie metabolism, and development; possibly resulting from maternal hypothyroidism	Increased risk for newborns with birth weight <2000 g or >4500 g, and those of Hispanic and Asian ethnic groups; feeding problems, growth and breathing problems; if not treated, irreversible brain damage and mental retardation	Lifelong thyroid replacement therapy (CMS, 2004).	Testing (measures thyroxin (T4) and TSH) done between fourth and sixth days of life
Galactosemia	Absence of the enzyme needed for the conversion of the milk sugar galactose to glucose	Poor weight gain, vomiting, jaundice, mood changes, loss of eyesight, seizures, and mental retardation; if untreated, galactose buildup causing permanent damage to the brain, eyes, liver, and eventually death	Elimination of milk from diet and substitute soy milk	First test done on discharge from the hospital with a follow-up test within 1 month
Sickle cell anemia	Recessively inherited abnormality in hemoglobin structure, most commonly found in African-American newborns	Anemia developing shortly after birth; increased risk for infection, growth restriction, vasoocclusive crisis	Maintenance of hydration and hemodilution, rest, electrolyte replacement, pain management, blood replacement, and antibiotics	Bloodspot obtained at same time of other newborn screening tests or prior to 3 months of age

BOX 18-1

NEWBORN HEARING SCREENING METHODS

A newborn's hearing can be screened one of two ways: otoacoustic emission (OAE) or automated auditory brainstem response (ABR). OAE technology requires placing an earphone in the infant's ear canal and measuring sounds produced by the newborn's inner ear in response to certain tones or clicks presented through the earphone. Preset parameters in the equipment decide whether the OAEs are sufficient for the newborn to pass or whether a referral is necessary for further evaluation.

ABR requires placing an earphone in the ear canal or an earmuff over the newborn's ear, through which a soft, rapid tapping noise is presented. Electrodes placed around the newborn's head, neck, and shoulders record neural activity from the infant's brainstem in response to the tapping noises. The ABR tests how well the ear and the nerves leading to the brain work. Like OAEs, automated ABR screening is sensitive to more than mild degrees of hearing loss, but a pass does not provide a guarantee of normal hearing (Fligor & Neault, 2004).

Introduction of solid foods prior to this time would only increase the risk of developing food allergies.

- Pancreatic enzymes and bile are in limited supply to assist in digestion of fat and starch until about 3 to 6 months if age. Infants are unable to digest cereal prior to this period, despite many parents adding it to their bottles.
- Kidneys are immature and not able to concentrate urine until about 4 to 6 weeks of age. Excess protein and mineral intake can place a strain on kidney function and can lead to dehydration. Infants need to consume more water per unit of body weight than adults do as a result of their high body weight from water.
- Immature muscular control at birth changes over time to assist in the feeding process by improving head and neck control, hand–eye coordination, swallowing, and ability to sit, grasp, and chew. At about 4 to 6 months, inborn reflexes disappear, head control develops, and the infant is able to sit to be fed, making spoon feeding possible (Dudek, 2006).

The newborn can be fed at any time during the transition period if assessments are normal and a desire is demonstrated. Before the newborn may be fed, determine the ability to suck and swallow. Clear any mucus present in the nares or mouth with a bulb syringe prior to initiating feeding. Auscultate bowel sounds, check for abdominal distention and inspect the anus for patency. After these feeding parameters are within in normal limits, newborn feeding may be started. Most newborns are on demand feeding schedules and are allowed to feed when they awaken. When they go home, mothers are encouraged to feed their newborns every 2 to 4 hours during the day and only when the newborn awakens during the night for the first few days after birth.

After deciding about whether to breast- or bottle-feed the newborn, parents often have many questions. Generally, it is recommended that newborns be fed on demand whenever they seem hungry. Most newborns will give clues about their hunger status by crying, placing their fingers or fist in their mouth, rooting around, and sucking.

Newborns differ in their feeding needs and preferences, but most breast-fed ones need to be fed every 2 to 3 hours and nurse 10 to 20 minutes on each breast. The length of feedings is up to the mother and her newborn. Encourage the mother to respond to cues from her infant, and not according to a standard or preset time schedule.

Formula-fed newborns usually feed every 3 to 4 hours, finishing a bottle in 30 minutes or less. Bottle-fed infants consume about 2 to 4 fl oz at first and double their intake within a few weeks of age (Meade Johnson, 2003). If the newborn seems satisfied, wets 6 to 12 diapers daily, produces several stools a day, sleeps well, and is gaining weight regularly, then they are probably receiving sufficient intake of breast milk or formula.

Newborns swallow air during feedings, which causes discomfort and fussiness. Parents can prevent this behavior by burping them frequently throughout the feeding. Helpful strategies to convey to parents about burping include

- Holding the newborn upright with her head on her parent's shoulder
- Supporting the head and neck while the parent gently pats or rubs the newborn's back
- Sitting with the newborn on a parent's lap, while supporting her chest and head
- Gently rubbing the newborn's back with the other hand while in the sitting position
- Laying the newborn on the parent's lap with her back facing up
- Supporting the newborn's head in the crook of the parent's arm and gently patting or rubbing the back (Tip: It is the upright position, not the strength of the patting or rubbing, that allows the newborn to release air accumulated in the stomach)

Figure 18-20 depicts a nurse demonstrating two proper burping techniques.

Stress to parents that feeding time is more than an opportunity to get nutrients into their newborn. It is a time for closeness and sharing. Their newborn's feedings are as much for her emotional pleasure as her physical well-being. Encourage parents to maintain eye contact with their newborn during the feeding, hold her comfortably close to them, and talk softly during the feeding to promote feelings of closeness and security.

● Figure 18-20 The nurse demonstrates holding the newborn upright over the shoulder (**A**) and sitting the newborn upright, supporting the neck and chin (**B**).

Newborn Nutritional Needs

As newborns grow, energy and nutrient requirements change to meet their body's changing needs. During infancy, energy, protein, vitamin, and mineral requirements per pound of body weight are higher than at any other time during the life span. These high requirements are needed to sustain rapid growth and development during this stage of life. Generally, an infant's birth weight doubles in the first 4 to 6 months of life and triples within the first year (McCann, 2003).

A newborn infant's caloric needs range from 80 to 120 cal/kg body weight. For the first 3 months, the infant needs 110 cal/kg/day, decreasing to 100 cal/kg/day from 3 to 6 months (Lowdermilk & Perry, 2004). Breast milk and formulas contain approximately 20 cal/oz, which meets the caloric needs of young infants with several feedings throughout the day.

Fluid requirements for the newborn and infant range from 100 to 150 mL/kg daily. This requirement can be met through breast or bottle feedings. Additional water supplementation is not necessary. Adequate carbohydrates, fats, protein, and vitamins are achieved through consumption of breast milk or formula. The AAP recommends that bottle-fed infants be given iron supplementation, because iron levels are low in all types of formula milk. This can be achieved with iron fortification formula from birth. The breast-fed infant draws on iron reserves for the first 6 months and then needs iron-rich foods or supplementation added at 6 months of age. The AAP (AAP, 2003) also has recommended that all infants (breast- and bottle-fed) receive a daily supplement of vitamin D within the first 2 months of life to prevent rickets and vitamin D deficiency. It is also recommended that fluoride supplementation be given to infants not receiving fluoridated water after the age of 6 months (AAP, 2004a).

Feeding Methods

Parents typically decide about the method of feeding well before the infant is born. Prenatal and childbirth classes present information regarding breast-feeding versus bottle feeding and allow the parents to make up their minds which method is comfortable for them. Various factors can influence their decision, including socioeconomic status, culture, employment, levels of social support available, level of education, range of care interventions provided during pregnancy, childbirth and the early postpartum period, and especially partner support (RNAO, 2003). Nurses can be instrumental in providing further evidence-based practice information to assist the couple in making their decision. Regardless of which method is chosen, the nurse needs to respect and support the couple.

Breast-Feeding

There is consensus in the medical community that breast-feeding is considered optimal for all newborns. The AAP

and the American Dietetic Association recommend breast feeding exclusively for the first 6 months of life, continuing it in conjunction with other food at least until the newborn's first birthday (AAP, 2004a). Box 18-2 highlights the advantages of breast-feeding for the mother and newborn. Keep in mind that during mild illnesses (colds, flu), breast-feeding can and should continue. In addition, mothers in the United States with HIV are advised not to breast-feed.

Breast milk composition changes over time: colostrum, transitional milk, and mature milk. *Colostrum* is a thick, yellowish substance secreted during the first few days after birth. It is high in protein, minerals, and fat-soluble vitamins. It is rich in immunoglobulins (IgA), which help protect the newborn's GI tract against infections. It is a natural laxative to help rid the intestinal tract of meconium quickly (McKinney et al., 2005).

Transitional milk occurs between colostrum and mature milk and contains all the nutrients in colostrum. It is thinner and less yellow than colostrum. This transitional milk is replaced by true or mature milk around day 10 after birth. *Mature milk* appears bluish in color and is not as thick as colostrum. It provides 20 cal/oz and contains

- Protein—Although the content is lower than formula, it is ideal to support growth and development for the newborn. The majority of protein is whey, which is easy to digest.
- Fat—Approximately 58% of total calories are fat, but they are easy to digest. Essential fatty acid content is high, as is cholesterol, which helps develop enzyme systems capable of handling cholesterol later in life.
- Carbohydrate—Approximately 35 to 40% of total calories are in the form of lactose, which stimulates growth of natural defense GI bacteria and promotes calcium absorption.
- Water—The major nutrient in breast milk comprises 85% to 95% of the total volume. Total milk volume varies with the age of the infant and demand.
- Minerals—Calcium, phosphorus, chlorine, potassium, and sodium with trace amounts of iron, copper, and manganese are provided. Iron absorption is about 50%, compared with about 4% of that in iron-fortified formulas.
- Vitamins—All vitamins are present in breast milk, with vitamin D being the lowest in amount. Discussion of the need of vitamin D supplementation is ongoing.
- Enzymes—Lipase and amylase are found in breast milk to assist with digestion (Dudek, 2006).

Formula Feeding

Despite the general acknowledgment that breast-feeding is the most desirable means of feeding infants, many mothers choose formula feeding. If approximately 60% of new mothers breast-feed, then the remaining 40% need information about how to formula-feed their newborns. Formula-fed infants grow more rapidly than breast-fed infants not only in weight but in length (Fomon, 2004).

Formula feeding requires more than opening, pouring, and feeding. Parents need information about the types of formula available, preparation and storage of formula, equipment, feeding positions, and the amount to feed their newborn. The nonbreast-feeding mother also needs information about measures to prevent lactation (see Chapter 16 for more information).

Commercially prepared formulas are regulated by the Food and Drug Administration (FDA) and are manufactured by one of three companies: Meade Johnson (Enfamil), Wyeth (SMA), and Ross Laboratories (Similac) in the United States. It is recommended that normal full-term infants receive conventional cow's milk-based formula, which is determined by the healthcare provider. If the infant shows signs of a reaction or a lactose intolerance, a switch to another formula type is recommended. The general recommendation is for all infants to receive iron-fortified formula until the age of

BOX 18-2

ADVANTAGES OF BREAST-FEEDING

Advantages for the Newborn

- Contributes to the development of a strong immune system
- Stimulates growth of positive bacteria in digestive tract
- Reduces incidence of stomach upset, diarrhea, and colic
- Begins the immunization process at birth by passive immunity
- Promotes optimal mother–infant bonding
- Reduces risk of newborn constipation
- Promotes greater developmental gains in preterm infants (O'Connor, 2003)
- Provides easily tolerated and digestible formula that is sterile, at proper temperature, and readily available with no artificial colorings, flavorings, or preservatives
- Is less likely to result in overfeeding, leading to obesity (Clifford, 2003)
- Promotes better tooth and jaw development as a result of sucking hard
- Provides protection against food allergies
- Is associated with avoidance of type 1 diabetes and heart disease

Advantages for the Mother

- Can facilitate a mother's loss of weight after birth
- Stimulates uterine contractions to control uterine bleeding
- Promotes uterine involution as a result of release of oxytocin
- Lowers risk against breast cancer and osteoporosis
- Affords some contraceptive protection, although it is not a reliable contraceptive method (Condon, 2004)

1 year. The latest generation of infant formulas includes some fortification with docosahexaenoic acid (DHA) and arachidonic acid (ARA), two natural components of breast milk. Researchers have found that formulas with DHA and ARA can enhance visual and cognitive development in children (Hatty, 2004).

Commercial formulas come in three forms: powder, concentrate, and easy to feed or ready to use. All are similar in terms of nutritional content, but differ in expense. Powdered formula is the least expensive, with concentrated formula the next most expensive. Both must be mixed with water before using. Ready-to-feed is the most expensive, but can be opened and poured into a bottle and fed directly to the infant.

Parents need important information about the equipment needed for formula feeding. Basic supplies needed will frequently consist of 4 to 6 4-oz bottles, 8 to 10 8-oz bottles, 8 to 10 nipple units, a bottle brush, and a nipple brush. A key area of instruction is assessing for flow of formula through the nipple and checking for any nipple damage. When the bottle is filled and turned upside down, the speed of flow from the nipple should be approximately one drop per second. If the parents are using bottles with disposable bags, instruct them to make sure they have a tight-fitting nipple to prevent leaks. Frequent observation of the flow rate from the nipple and the condition of the nipple will prevent choking and potential aspiration associated with too fast a rate of delivery. Request that parents fill a bottle with formula and then turn it upside down and observe the rate at which the formula drips from the bottle. If it is too fast (>1 drop/second), then the nipple should be replaced.

Formula preparation also is critical to the newborn's health and development. Many errors in dilution of formulas have been caused by a misunderstanding of proper preparation or improper measurement. Water safety in the preparation of formula always must be addressed with parents. If well water is used, advise the parents to sterilize the water by boiling it. Alternatively, bottled water can be used. Many health care providers still recommend that all water used in formula preparation be brought to a rolling boil for 1 to 2 minutes and be cooled to room temperature before using. Opened cans of ready-made or concentrated formula should be covered and refrigerated after being prepared for the day (24 hours). Instruct parents to discard any unused portions after 48 hours. Any formula left in the bottle after feeding should also be discarded, because the infant's saliva has been mixed with it.

To warm refrigerated formula, advise the parents to place the bottle in a pan of hot water and test the temperature by letting a few drops fall on the inside of the wrist. If it is comfortably warm to the mother, it is the correct temperature.

Breast-Feeding Assistance

If the mother has made the decision to breast-feed her newborn, this can be initiated immediately after birth. If the newborn is healthy and stable, wipe the newborn from head to toe with a dry cloth and place her skin-to-skin on the mother's abdomen. Then cover the newborn and mother with another warmed blanket to hold in the warmth. Immediate mother–newborn contact takes advantage of the newborn's natural alertness after a vaginal birth and fosters bonding. This immediate contact also reduces maternal bleeding and stabilizes the newborn's temperature, blood glucose level, and respiratory rate (AAP, 2004a).

Left alone on the mother's abdomen, a healthy newborn scoots upward, pushing with the feet, pulling with the arms, and bobbing the head until finding and latching on the mother's nipple. A newborn's sense of smell is highly developed, which also helps in finding the nipple. As the newborn moves to the nipple, the mother produces high levels of oxytocin, which contracts the uterus, thereby minimizing her bleeding. Oxytocin also causes her breasts to release colostrum when the newborn sucks on the nipple. Colostrum is rich in antibodies and thus provides the newborn with her "first immunization" against infection. Keys to successful breast-feeding include

- Initiating breast-feeding within the first hour of life if the newborn is stable
- Using the newborn's feeding schedule—8 to 12 times in 24 hours
- Allowing unrestricted length of breast-feeding
- Offering no supplement unless medically indicated
- Having a lactation consultant observe a feeding session
- Avoiding artificial nipples and pacifiers unless during painful procedure
- Encouraging breast-feeding from both breasts over each 24-hour period
- Instructing the mother regarding indicators of sufficient intake from infant
  - Six wet diapers daily
  - Waking up hungry 8 to 12 times in 24 hours
  - Acting content and falling asleep after feeding
- Keeping the newborn with her mother throughout the hospital stay

Assist with this task by positioning the newborn, so latching-on is effective and is not painful for the mother. Placing pillows or a folded blanket under the mother's head may help, or rolling her to one side and tucking the newborn next to her will facilitate breast-feeding initiation. Assess both the mother and newborn during this initial session to determine specific needs for assistance and additional areas for education. One tool used frequently in this assessment is the LATCH scoring tool (Table 18-5). The higher the score, the less nursing intervention is needed by this dyad.

Table 18-5 The LATCH Scoring Tool

Parameters	0 Point	1 Point	2 Points
L: latch	Sleepy infant, no sustained latch achieved	Must hold nipple in infant's mouth to sustain latch and suck; must stimulate infant to continue to suck	Grasps nipple; tongue down; rhythmic sucking
A: audible swallowing	None	A few observed with stimulation	Spontaneous and intermittent both < 24 hours old and afterward
T: type of nipple	Inverted (drawn inward into breast tissue)	Flat (not protruding)	Everted or protruding out after stimulation
C: comfort of nipple	Engorged, cracked, bleeding; severe discomfort	Filling; reddened, small blisters or bruises; mild to moderate discomfort	Soft, nontender
H: hold (positioning)	Nurse must hold infant to breast	Minimal assist; help with positioning, then mother takes over	No assistance needed by nurses

Modified from Jensen, D., Wallace, S., & Kelsey, P. (1994). LATCH: A breast-feeding charting system and documentation tool. *Journal of Obstetric and Gynecologic Neonatal Nursing, 23,* 27–32.

Breast-Feeding Positioning

The mother and infant must be in comfortable positions to ensure breast-feeding success. The four most common positions for breast-feeding are the football, cradle, across-the-lap, and side-lying holds. Each mother, on experimentation, can decide which positions feel most comfortable for her.

The football hold is achieved by holding the infant's back and shoulders in the palm of the mother's hand and tucking the infant under the mother's arm. Remind the mother to keep the infant's ear, shoulder, and hip in a straight line. Support the breast with the mother's hand and bring it to the infant's lips to latch on. Continue to support the breast until the infant begins to nurse. This position allows the mother to see the infant's mouth as she guides her infant to the nipple. This is another good choice for mothers who have had a cesarean birth to avoid pressure on the incision lines.

The cradling position is the most common one used. The newborn's head is held in the crook of the arm. The infant faces the mother, tummy to tummy. The opposite hand of the mother supports the breast. The across-the-lap position involves placing a pillow across the mother's lap with the infant facing the mother. The infant's back and shoulders are supported with the mother's palm. The mother supports her breast from underneath. After the infant is in position, the infant is pulled forward to latch on.

The fourth position is the side-lying position. The mother lies on her side with a pillow supporting her back and another pillow supporting the newborn in the front. To start, the mother props herself up on an elbow and supports her newborn with that arm, while holding her breast with the opposite hand. Once nursing is started, the mother then lies down in a comfortable position.

To assist the mother in handling her breast to promote latching-on, instruct her to make a "C" or a "V" position with her fingers. In the C hold, the mother places her thumb well above the areola and the other four fingers below the areola and under the breast. In the V hold position, the mother places her index finger above the areola and her other three fingers below the areola and under the breast. Either method can be used as long as the mother's hand is well away from the nipple so the infant can latch on to the presenting breast.

Breast-Feeding Education

Breast-feeding is not an innate skill in human mothers. Almost all women have the potential to breast-feed successfully, but many fail because of inadequate knowledge. See Nursing Care Plan 18-1 for some typical nursing diagnoses, outcomes, and interventions. For many mothers and their newborns, breast-feeding goes smoothly from the start, whereas for others it is a struggle. Nurses can help throughout this experience by encouraging, demonstrating techniques, and offering praise for success. It is important to emphasize that the key to successful breast-feeding is correct positioning and latch-on.

Teaching by nurses has been shown to have a significant effect on both the ability to breast-feed successfully and the duration of lactation (Dudek, 2006). During the

Nursing Care Plan 18-1

Overview of the Mother and Newborn Having Some Difficulty with Breast-feeding

Baby boy James, weight 7 lb, 4 oz, was born to his mother, Jane, a 19-year-old gravida 1, para 1, who gave birth a few hours ago. He has Apgar scores of 9 points and 9 points at 1 and 5 minutes, respectively. Labor and birth events were unremarkable, and James was admitted to the nursery for assessment. After stabilization, James was brought to her mother, who had indicated she wished to breast-feed. The postpartum nurse assisted Jane with positioning and latching-on and left the room for a few minutes. On returning, Jane was upset, James was crying, and Jane stated she wanted a bottle of formula to feed him since she didn't have milk and her nipples hurt.

Assessment reveals a young, inexperienced mother placed in uncomfortable situation with limited knowledge of breast-feeding: positioning, latching-on. Anxiety from the mother transferred to James, resulting in crying. The mother, apprehensive about task of breast-feeding, needs additional help.

Nursing Diagnosis: Knowledge deficit related to skills involving breast-feeding

Outcome identification and *evaluation*	Interventions with *rationales*
Mother will demonstrate understanding of skills involved with breast-feeding *as evidenced by use of correct positioning and technique, and verbalization of appropriate information related to breast-feeding*	Instruct mother on proper positioning for breast-feeding; suggest use of football hold, side-lying position, modified cradle, and across-the-lap position *to ensure adequate comfort and to promote ease in breast-feeding* Review breast anatomy and milk let-down reflex for milk supply *to enhance mother's understanding of lactation* Observe newborn's ability to suck and latch on to the nipple *to determine adequate newborn ability* Monitor sucking and newborn swallowing for several minutes *to ensure adequate latching on and to assess intake* Reinforce nipple care with water and exposure to air *to maintain nipple integrity*

Nursing Diagnosis: Anxiety related to breast-feeding ability and irritable, crying newborn

Mother will verbalize increased comfort with breast-feeding *as evidenced by positive statements related to breast-feeding and verbalization of desire to continue to breast-feed newborn*	Ensure that the environment is calm and soothing without distractions *to promote maternal and newborn relaxation* Initiate correct latching-on technique *to enhance promotion of breast-feeding* Assist in calming newborn by holding and talking *to ensure that the newborn is relaxed prior to latching on* Reassure mother she can be successful at breast-feeding *to enhance her self-esteem and confidence* Encourage frequent trials and attempts *to enhance confidence* Support and encourage the mother to verbalize her anxiety/fears *to help reduce anxiety*

Overview of the Mother and Newborn Having Some Difficulty with Breast-feeding (continued)

Nursing Diagnosis: Pain related to breast-feeding and incorrect technique for latching-on

Outcome identification and *evaluation*	Interventions with *rationales*
Mother will experience a decrease in pain related to breast-feeding *as evidenced by statements of fewer complaints of nipple pain*	Suggest several alternate positions for breast-feeding *to increase comfort level* Demonstrate how to break suction to remove infant from breast *to minimize trauma to the nipple* Inspect nipple area *to promote early identification of trauma* Reinforce correct latching-on technique *to prevent nipple trauma* Administer pain medication if indicated *to aid in relief of pain* Instruct on nipple care between feedings *to maintain nipple integrity*

first few breast-feeding sessions, mothers want to know how often they should be nursing, whether breast-feeding is going well, if the newborn is getting enough nourishment, and what problems may ensue and how to cope with them. Education for the breast-feeding mother is highlighted in Teaching Guidelines 18-4.

Breast Milk Storage and Expression

If the breast-feeding mother becomes separated from the newborn for any reason (work, travel, illness), instruction on how to express and store milk safely is needed. Expressing milk can be done manually (hand compression of breast) or by using a breast pump. Manual or hand pumps are inexpensive and can be used by mothers who occasionally need an extra bottle if they are going out. The electric breast pumps are used for mothers who experience a lengthy separation from their infants and need to pump their breasts regularly (Fig. 18-21).

To ensure the safety of expressed breast milk, instruct the mother in the following:

- Washing hands before expressing milk or handling breast milk
- Using only clean containers to store expressed milk
- Using sealed and chilled milk within 24 hours
- Discarding any milk that is refrigerated more than 72 hours
- Using any frozen expressed milk within 3 months of obtaining
- Avoiding use of microwave ovens to warm chilled milk
- Discarding any used milk; never refreezing it
- Storing milk in quantities to be used for each feeding (2–4 oz)
- Thawing milk in warm water before using (AAP, 2004a)

Formula-Feeding Assistance

Feeding a newborn formula from a bottle should mirror breast-feeding as close as possible. Although nutrition is important, so are the emotional and interactive components of feeding. Encourage parents to cuddle their newborn closely and position her so that her head is in a comfortable position, not too far back or turned, which makes swallowing difficult. Also urge parents to communicate with their newborn during the feedings by talking and singing to her.

Although it may seem that bottle-feeding is not a difficult task to accomplish, many new parents may find it awkward. At first glance, holding an infant and a bottle to feed them appears simple enough, but getting the right position as well as the right angle to hold the bottle must be mastered to be successful.

Formula-Feeding Positions

Advise mothers to feed their newborns in a relaxed and quiet setting to create a calm feeling for themselves as well as their newborn. Make sure that comfort is a priority for both mother and newborn by having the mother's arm holding the newborn supported by a pillow in a comfortable chair. Have the mother cradle the newborn in a semiupright position, supporting the newborn's head in the crook or bend of her arm. Holding the newborn close during feeding provides stimulation and helps prevent choking. Holding the newborn's head raised slightly will help prevent formula from washing backward into the eustachian tubes in the ears, which can lead to an ear infection.

Formula-Feeding Education

Parents of a newborn who is receiving formula require specific teaching related to preparation and storage of

TEACHING GUIDELINES 18-4

Breast-Feeding

- Set aside a quiet place ahead of time where you can be relaxed and won't be disturbed. Relaxation promotes milk let-down.
- Sit in a comfortable chair, rocking chair, or lie on a bed to breast-feed. Try to make each feeding calm, quiet, and leisurely. Avoid distractions.
- Listen to soothing music and sip a nutritious drink during feedings.
- Initially, nurse the newborn every couple of hours to stimulate milk production. Remember that the supply of milk is equal to the demand—the more sucking, the more milk.
- Watch for signals from infant to indicate she is hungry, such as
  - Nuzzling against the mother's breasts
  - Demonstrating the rooting reflex by making sucking motions
  - Placing fist or hands in mouth to suck on
  - Crying and squirming around
  - Smacking of the lips
- Stimulate the rooting reflex by touching the newborn's cheek to initiate sucking.
- Look for signs indicating that the newborn has latched on correctly: wide-open mouth with the nipple and much of the areola in the mouth, lips rolled outward, and tongue over lower gum, visible jaw movement drawing milk out, rhythmic sucking with an audible swallowing (soft "ka" or "ah" sound indicates the infant is swallowing milk).
- Hold the newborn closely, facing the breast with the newborn's ear, shoulder, and hip in direct alignment.
- Nurse the infant on demand, not on a rigid schedule (for example, feeding every 2 to 3 hours within a 24-hour period; 8–12 feedings).
- Alternate between which breast is offered first; identify with a safety pin on bra.
- Vary your position for each feeding to empty breasts and reduce soreness.
- Look for signs that the newborn is getting enough milk:
  - At least six wet diapers and two to five loose yellow stools daily
  - Steady weight gain after the first week of age
  - Pale-yellow urine, not deep yellow or orange
  - Sleeping well, yet looks alert and healthy when awake (AAP, 2004a)
- Wake up the newborn if she has nursed less than 5 minutes by unwrapping her.
- Break the infant's suction before removing the nipple by inserting a finger.
- Burp the infant to release air when changing breasts and at the end of the breast-feeding session.
- Avoid supplemental formula feedings to prevent nipple confusion.
- Avoid pacifiers if possible because they are linked with reduced breast-feeding duration (Ullah & Griffiths, 2003).
- Do not take drugs or medications unless approved by the healthcare provider.
- Avoid drinking alcohol or caffeinated drinks because they pass through milk.
- Do not smoke while breast-feeding; it increases the risk of SIDS.
- Always wash hands before expressing or handling milk to store.
- Wear nursing bras and clothes that are easy to undo.

formula as well as the techniques for feeding. Formula feeding guidance tips for parents are highlighted in Teaching Guidelines 18-5.

Proper positioning makes bottle-feeding easier and more enjoyable for both mother and newborn, but frequent burping also is key. Advise the parent to hold the bottle so that formula fills the nipple, thereby allowing less air to enter. Infants get fussy when they swallow air during feedings and need to be relieved of it every 2 to 3 oz. Emphasize to parents that electrolyte imbalance can occur in infants who are fed formula that has been incorrectly mixed. Hypernatremia can result from formula mixed too thickly. The resulting concentration of sodium is too much for the immature kidneys to handle. As a result, sodium is excreted along with water, leading to dehydration. Mixing the formula with too much water in an effort to save money can lead to failure to thrive and lack of weight gain (AAP, 2005a).

Weaning and Introduction of Solid Foods

Eventually, breast-feeding or formula feeding ends. The transitions from breast to bottle, from breast or bottle to cup, or from liquids to solids all describe weaning. Weaning from breast-feeding to cup has several advantages over weaning to a bottle because it eliminates the step of weaning first to a bottle and then to a cup. Another advantage is that the bottle does not become a security object that the infant does not want to give it up after it is introduced to her world.

Whether it is because the mother is returning to work and it is not feasible for her to continue to breast-feed or the infant is losing interest in breast-feeding and showing signs

● Figure 18-21 Hand-held breast pump.

of independence, the weaning process is done gradually. There is no "right" time to wean; it depends on the desires of the mother and her infant. Either one can start the weaning process, but usually it occurs between 6 months and 1 year of age.

To begin weaning from the breast, instruct mothers to substitute breast-feeding with a cup or bottle. Often the midday feeding is the easiest feeding to start the weaning process. A trainer cup with two handles and a snap-on lid with a spout is appropriate and helps to minimize spilling. Because weaning is a process, it may take months to accomplish. Instruct parents to proceed gradually and let the infant's willingness and interest guide them.

Weaning from the bottle to the cup is also a process and needs to be timed appropriately for mother and infant. Weaning is a significant change in the way mother and infant interact with each other, and each mother must decide for herself when she and her infant are ready to take that step. Typically, the night bottle is the last to be given up, with cup drinking substituted throughout the daylight hours. Slowing diluting the formula with water over a week can help in this process with the final result—a water bottle. To prevent sucking on it during the night, remove it from the crib after the infant falls asleep.

When infants double their birth weight and weigh at least 13 lb, it is time to begin to consider introducing solid foods. Readiness cues include

- Consumption of 32 oz formula or breast milk daily (estimated)
- Ability to sit up with minimal support and turn head away to indicate fullness
- Reduction of protrusion reflex so cereal can be propelled to back of throat
- Demonstration of interest in food others around them are eating
- Infant's ability to open mouth automatically when food approaches it

When introducing solid foods, certain principles apply:

- The order of food introduction is not important; however, introduction of just one new single-ingredient food (rice cereal or carrots) is recommended for several days to watch for allergies.
- Infants should be allowed to set the pace regarding how much they wish to consume.
- New foods are introduced one at a time so that any allergies or intolerances can be identified.
- New foods are introduced no more frequently than every 3 to 5 days.
- Fruits are added after cereals; then vegetables and meats are introduced; eggs are introduced last.

TEACHING GUIDELINES 18-5

Formula-Feeding

- Wash hands with soap and water prior to preparing formula.
- Mix the formula and water amounts exactly as the label specifies.
- Always hold the newborn and bottle during feedings; never prop the bottle.
- Never freeze formula or warm it in the microwave.
- Place refrigerated formula in a pan of hot water for a few minutes to warm.
- Test the temperature of the formula by shaking a few drops on the wrist.
- Hold the bottle like a pencil, keeping it tipped to prevent air from entering, positioning the bottle so that the nipple remains filled with milk.
- Burp the infant after every few ounces to allow air swallowed to escape.
- Move the nipple around in the infant's mouth to stimulate sucking.
- Always keep a bulb syringe close by to use if choking occurs.
- Avoid putting the infant to bed with a bottle to prevent "baby bottle tooth decay."
- Feed the newborn approximately every 3 to 4 hours.
- Use an iron-fortified formula for the first year.
- Prepare enough formula for the next 24 hours.
- Check nipples regularly and discard any that are sticky, cracked, or leaking.
- Store unmixed, open liquid formula in the refrigerator for up to 48 hours.
- Throw away any formula left in the bottle after each feeding.

- A relaxed, unhurried, calm atmosphere for meals is important.
- A variety of foods are provided to ensure a balanced diet.
- Infants should never be force-fed (Krepcio, Foell, Folta, & Goldberg, 2004).

Nurses play an extremely important role in assisting new mothers to feed their infants by active listening to help a mother clarify her feelings and begin to problem solve with her. A warm, sincere manner and tone of voice will help put an anxious mother at ease. Giving accurate information, making suggestions, and presenting options will empower the mother to decide what is best for her and her infant. Within the context of this helping role, nurses need to be sensitive to the individual, family, and economic and cultural differences among mothers before offering suggestions for feeding practices that may not be appropriate.

Dealing With Common Concerns

During the newborn period of transition, certain conditions can develop that require intervention. These conditions, although not typically life-threatening, can be a source of anxiety for the parents. Common concerns include transient tachypnea of the newborn, physiologic jaundice, and hypoglycemia.

Transient Tachypnea of the Newborn

Transient tachypnea of the newborn appears soon after birth. It is accompanied by retractions, expiratory grunting, or cyanosis and is relieved by administration of low-dose oxygen therapy. A mild or moderate respiratory distress typically is present at birth or within 6 hours of birth. This condition usually resolves within 3 days.

Transient tachypnea of the newborn occurs when the fetal liquid in the lungs is removed slowly or incompletely, which correlates with decreased thoracic squeeze such as from cesarean birth, or diminished respiratory effort such as from sedation in the newborn secondary to maternal central nervous system depressant medication. Prolonged labor, macrosomia of the fetus, and maternal asthma also have been associated with a higher frequency of this condition (Asenjo, 2003).

Nursing interventions include providing supportive care such as giving the newborn oxygen, ensuring warmth, observing the newborn's respiratory status frequently, and allowing time for the pulmonary capillaries and the lymphatics to remove the remaining fluid. The clinical course is relatively benign, but any newborn respiratory issue can be very frightening to the parents. Provide a thorough explanation and reassurance that the condition will resolve over time.

Physiologic Jaundice

Physiologic jaundice is a very common condition in newborns, with the majority demonstrating yellowish skin, mucous membranes, and sclera within the first 3 days of life. In any given year, approximately 60% of the newborns in the United States will experience clinical jaundice (Holcomb, 2005). Jaundice is the visible manifestation of hyperbilirubinemia. It typically results from the deposition of unconjugated bilirubin pigment in the skin and mucous membranes of newborns.

The AAP has recently released guidelines to provide a framework for the prevention and management of hyperbilirubinemia in newborns, which includes

- Promotion and support of successful breast-feeding practices
- Completion of a systematic assessment before discharge for the risk of severe hyperbilirubinemia
- Provision of early and focused follow-up based on the risk assessment
- When indicated, treatment of newborns with **phototherapy** or exchange transfusion to prevent the development of kernicterus (AAP, 2004b)

Factors that contribute to the development of physiologic jaundice in the newborn include an increased bilirubin load because of relative polycythemia, a shortened erythrocyte life span (80 days compared with the adult 120 days), and immature hepatic uptake and conjugation processes (Dixon, 2004). Normally the liver removes bilirubin from the blood and changes it to a form in which it can be excreted. As the RBC breakdown continues at a fast pace, the newborn liver is unable to keep up with bilirubin removal. Thus, bilirubin accumulates in the blood, causing a yellowish discoloration on the skin.

Assess for jaundice in all newborns by pressing gently with a fingertip on the bridge of the nose, sternum, or forehead to ascertain the color of the blanched area. If jaundice is present, the blanched area will appear yellow before the capillary refill (Lowdermilk & Perry, 2004). If or when the levels of unconjugated serum bilirubin increase, phototherapy is used. Phototherapy involves treatment with exposure to light. Exposure of newborns to sunlight represents the first documented use of phototherapy in the medical literature. Sister J. Ward, a charge nurse in Essex, England, in 1956, recognized that when jaundiced newborns were exposed to the sun they became less yellow. This observation changed the entire treatment of jaundice in newborns (Ramer, 2005).

Phototherapy reduces bilirubin levels in the blood by breaking down unconjugated bilirubin into colorless compounds. These compounds can then be excreted in the bile. Phototherapy aims to curtail the increase in bilirubin blood levels, thereby preventing kernicterus, a condition in which unconjugated bilirubin enters the brain and, if not treated, can lead to brain damage and possibly death.

During the last several decades, phototherapy has generally been administered with either banks of fluorescent lights or spotlights. Factors that determine the dose of phototherapy include spectrum of light emitted, irradiance of

light source, design of light unit, surface area of newborn exposed to the light, and distance of the newborn from the light source (Klein, 2004). For phototherapy to be effective, the rays must penetrate as much of the skin as possible. To accomplish this, the newborn must be naked and turned frequently to ensure maximum exposure of the skin. Several side effects of standard phototherapy have been identified: frequent loose stools, increased insensible water loss, transient rash, and potential retinal damage if the newborn's eyes are not covered sufficiently.

Recently, fiber optic pads (Biliblanket or Bilivest) have been developed that can be wrapped around newborns or on which newborns can lie. These pads consist of a light that is delivered from a tungsten–halogen bulb through a fiberoptic cable and is emitted from the sides and ends of the fibers inside a plastic pad (Ramer, 2005). They work on the premise that phototherapy can be improved by delivering higher-intensity therapeutic light to decrease bilirubin levels. The pads do not produce appreciable heat like the banks of lights or spotlights do, so insensible water loss is not increased. Eye patches also are not needed; thus, parents can feed and hold their newborns continuously to promote bonding.

Newborns undergoing phototherapy in the treatment of jaundice require close monitoring of their body temperature, fluid, and electrolyte balance; observation of skin integrity as a result of exposure to diarrhea and phototherapy lights; eye protection to prevent corneal injury related to phototherapy exposure; and encouragement of parents to participate in their newborn's care to prevent parent–infant separation. (See Chapter 24 for a more detailed discussion of hyperbilirubinemia.)

Hypoglycemia

Hypoglycemia, a problem experienced by newborns during the early postbirth period (6 hours after birth), affects as many as 40% of all full-term newborns (Johnson, 2003). It is defined as a blood glucose level of less than 35 mg/dL or as a plasma concentration of less than 40 mg/dL (Kenner & Lott, 2004). In newborns, blood glucose levels fall to a low point during the first few hours of life, because the source of maternal glucose is removed when the placenta is expelled. This period of transition is usually smooth, but certain newborns are at greater risk for development of hypoglycemia. These newborns include IDMs, preterm newborns, and newborns with IUGR, inadequate caloric intake, sepsis, asphyxia, hypothermia, polycythemia, glycogen storage disorders, and endocrine deficiencies (Johnson, 2003).

Most newborns experience transient hypoglycemia and are asymptomatic. The symptoms, when present, are nonspecific and include jitteriness, lethargy, cyanosis, apnea, seizures, high-pitched or weak cry, and poor feeding. If hypoglycemia is prolonged or is left untreated, serious, long-term adverse neurologic sequelae such as learning disabilities and mental retardation can occur (Verklan & Walden, 2004). Subsequently, early diagnosis and appropriate intervention are essential for all newborns.

Nursing care directed toward the hypoglycemic newborn includes monitoring for signs and symptoms of hypoglycemia if present or identifying high-risk newborns prone to this disorder based on their perinatal history, physical examination, body measurements, and gestational age. Check the blood glucose level of all newborns within the first few hours after birth and every 4 hours thereafter. More frequent monitoring and early feeding may be necessary for newborns who are considered to be high risk. Prevent hypoglycemia for newborns at risk by initiating early feedings (breast milk or formula). If hypoglycemia persists despite feeding, notify the primary healthcare provider for orders such as IV therapy with dextrose solutions. Anticipate hypoglycemia in certain high-risk newborns and begin assessments immediately on nursery admission.

Preparing for Discharge

Preparing the parents for discharge is an essential task for the nurse. As a result of limited facility stays, the nurse must identify the major teaching topics for the parents and establish a climate that will facilitate learning. Nurses need to know where the parents place themselves within the context of the birth experience, and how best to meet their learning needs. Using the following principles helps to foster a learner-centered approach:

- Set a conducive environment for learning by encouraging clients to feel comfortable during this intense time by using support and praise.
- Share control of both the content and the process of learning by allowing the clients to make their own decisions about what they want and need to learn.
- Build self-esteem by confirming that their responses to the entire birthing process and aftercare are legitimate, and others have felt the same way.
- Ensure that what the parents learn applies to their home situation by integrating new information into their own situation and their day-to-day life.
- Encourage self-responsibility by reinforcing that their emotional and physical responses are within the normal range.
- Respect cultural beliefs and practices that are important to the family by teaching within their heritage and health beliefs regarding newborn care. Examples include placing a belly band over the newborn's navel by Hispanics and African-Americans, delaying naming their newborns by Asian-Americans and Haitians; and delaying breast-feeding by Native Americans because they regard colostrum as "bad" (D'Avanzo & Geissler, 2003).

Ensuring Follow-Up Care

Most newborns are scheduled for their first health follow-up appointment within 2 to 4 days after discharge to have additional lab work done as part of the newborn screening

series, especially if they were discharged within 48 hours. After this first visit, the typical schedule of healthcare visits is as follows: 2 to 4 weeks of age; 2, 4, and 6 months of age for checkups and vaccines; 9 months of age for a checkup; 12 months for checkup and tuberculosis testing; 15 and 18 months for checkups and vaccines; and 2 years of age for a checkup. These appointments provide an opportunity for parents to ask questions and receive anticipatory guidance as their newborn grows and develops.

In addition to encouraging parents to keep follow-up appointments, advise parents to call their healthcare provider if they notice signs of illness in their newborn and which over-the-counter medicines would be important to keep on hand. Review the following warning signs of illness with parents:

- Temperature of 38.3°C (101°F) or higher
- Forceful, persistent vomiting, not just spitting up
- Refusal to take feedings
- Two or more green, watery diarrhea stools
- Infrequent wet diapers and changes in bowel movements from normal pattern
- Lethargy or excessive sleepiness
- Inconsolable crying and extreme fussiness
- Abdominal distention
- Difficult or labored breathing

Parents also need instructions about immunizations for their newborn. Immunization is the process of rendering an individual immune or of becoming immune to select communicable diseases (O'Toole, 2003). The purpose of the immune system is to identify unknown (nonself) substances in the body and develop a defense against these invaders. Disease prevention by immunization is a public health priority and one of the leading health indicators as part of Healthy People 2010. Despite many advances in vaccine delivery, the goal for universal immunization has not been reached (AAP, 2003). Nurses can help to meet this national goal by educating new parents about the importance of disease prevention through immunizations.

Immunity can be provided either passively or actively. *Passive immunity* is protection transferred via already formed antibodies from one person to another. Passive immunity includes transplacental passage of antibodies from a mother to her newborn, immunity passed through breast milk, and immunity from immunization from immunoglobulins. Passive immunity provides limited protection and decreases over a period of weeks or months (Dayton, 2004). Passive immunity is protection produced by an individual's own immune system. It can be obtained by having the actual disease or by receiving a vaccine in which there is an immunologic response by that person's body. Active immunity may be life-long either way.

Young infants and children are susceptible to various illnesses because their immune systems are not yet mature. Many of these illnesses can be prevented by following the recommended schedule of childhood immunizations. The schedule for immunizations should be reviewed with parents, stressing the importance of continual follow-up health care to preserve their infant's health.

The newborn's first immunization (hepatitis B) is received in the hospital soon after birth and prior to discharge. The first dose can also be given by age 2 months if the newborn's mother is HBsAg negative. If the newborn's mother is HbsAg positive, then the newborn should receive hepatitis B vaccine and hepatitis B immunoglobulin within 12 hours of birth (Cunningham et al., 2005). Education for the parents pertaining to immunizations should include risks and benefits for each vaccine, possible side effects, and information to answer their questions. Parents have the right to refuse based on religious beliefs and can sign a waiver noting their decision.

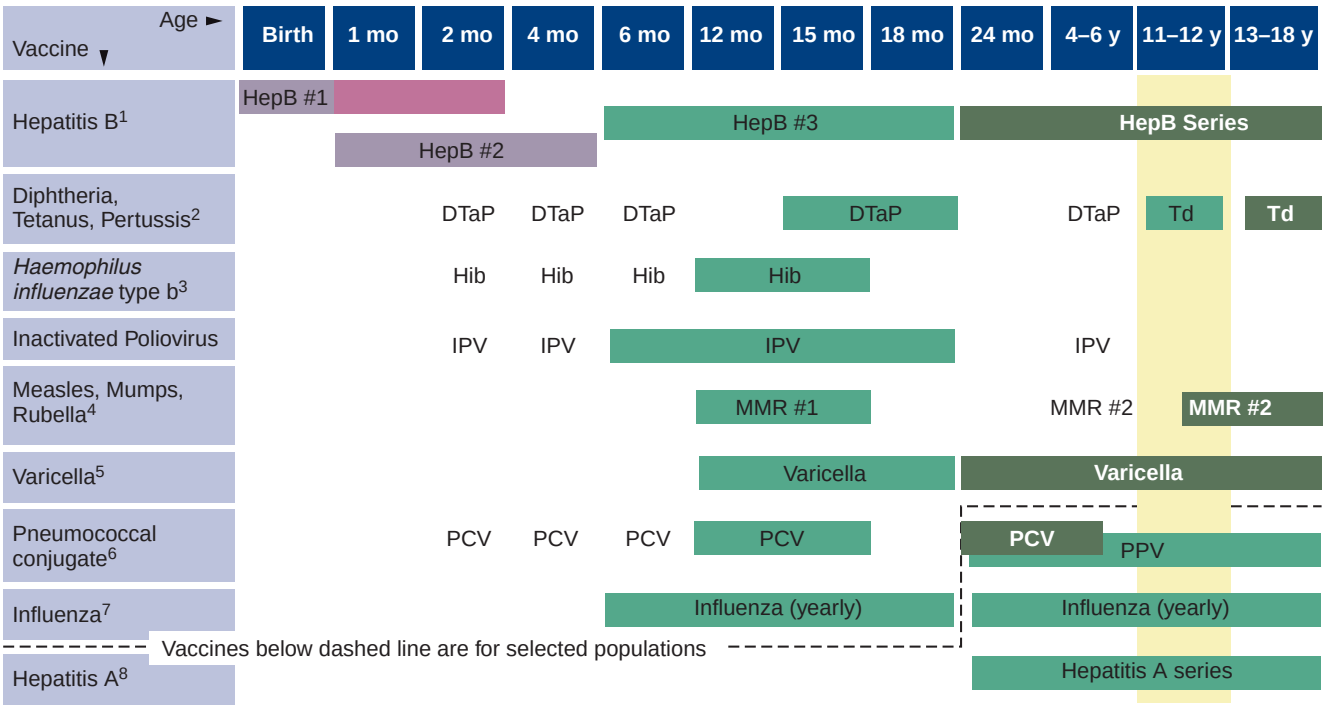
Federal legislation requires consent to be signed before administering a vaccine. The nurse administering the vaccine must document the date and time it was given, name and manufacturer, lot number and expiration date of the vaccine given, site and route of administration, and the name and title of the nurse who administered the vaccine (see Fig. 18-22 for the 2005 Childhood and Adolescent Immunization Schedule).

While in the hospital setting, women who give birth have continued assessment, support, and hands-on instruction regarding feeding and newborn care. When the new mother is discharged, this close supervision and support by nurses need not end abruptly when the newborn is placed in the car seat and the car door closes. Providing the new family with a "life-line" phone number of the mother–baby unit will help her through this stressful transitional period. Arming the new family with knowledge and offering backup support via the telephone will increase parenting success.

KEY CONCEPTS

- The period of transition from intrauterine to extrauterine life occurs during the first several hours after birth. It is a time of stabilization for the newborn's temperature, respiration, and cardiovascular dynamics.
- The newborn's bowel is sterile at birth. It usually takes about a week for the newborn to produce vitamin K in sufficient quantities to prevent VKDB.
- It is recommended that all newborns in the United States receive an instillation of a prophylactic agent (erythromycin or tetracycline ophthalmic ointment) in their eyes within an hour or two of being born.
- Nursing measures to maintain newborns' body temperature include drying them immediately after birth to prevent heat loss through evaporation, wrapping them in prewarmed blankets, putting a hat on their head, and placing them under a temperature-controlled radiant warmer.

RECOMMENDED CHILDHOOD AND ADOLESCENT IMMUNIZATION SCHEDULE—UNITED STATES, 2005



This schedule indicates the recommended ages for routine administration of currently licensed childhood vaccines, as of December 1, 2004, for children through age 18 years. Any dose not administered at the recommended age should be administered at any subsequent visit when indicated and feasible.

Indicates age groups that warrant special effort to administer those vaccines not previously administered. Additional vaccines may be used whenever any components of the combination are indicated and other components of the vaccine are not contraindicated. Providers should consult the manufacturers' package inserts for detailed recommendations. Clinically significant adverse events that follow immunization should be reported to the Vaccine Adverse Event Reporting System (VAERS). Guidance about how to obtain and complete a VAERS form is available at www.vaers.org or by telephone, 800-822-7967.

Range of recommended ages
Preadolescent assessment
Only if mother HBsAg(–)
Catch-up immunization

FOOTNOTES

1. Hepatitis B (HepB) vaccine. All infants should receive the first dose of HepB vaccine soon after birth and before hospital discharge; the first dose may also be administered by age 2 months if the mother is hepatitits B surface antigen (HBsAg)-negative. Only monovalent HepB may be used for the birth dose. Monovalent or combination vaccine containing HepB may be used to complete the series. Four doses of vaccine may be administered when a birth dose is given. The second dose should be given at least 4 weeks after the first dose, expect for combination vaccines which cannot be administered before age 6 weeks. The third dose should be given at least 16 weeks after the first dose and at least 8 weeks after the second dose. The last dose in the vaccination series (third or fourth dose) should not be administered before age 24 weeks.

Infants born to HBsAg-positive mothers should receive HepB and 0.5 mL of hepatitis B immune globulin (HBIG) at separate sites within 12 hours of birth. The second dose is recommended at age 1–2 months. The final dose in the immunization series should not be administered before age 24 weeks. These infants should be tested for HBsAg and antibody to HBsAg (anti-HBs) at age 9–15 months.

Infants born to mothers whose HBsAg status is unknown should receive the first dose of the HepB series within 12 hours of birth. Maternal blood should be drawn as soon as possible to determine the mother's HBsAg status; if the HBsAg test is positive, the infant should receive HBIG as soon as possible (no later than age 1 week). The second dose is recommended at age 1–2 months. The last dose in the immunization series should not be adminstered before age 24 weeks.

2. Diphtheria and tetanus toxoids and acellular pertussis (DTaP) vaccine. The fourth dose of DTaP may be administered as early as age 12 months, provided 6 months have elapsed since the third dose and the child is unlikely to return at age 15–18 months. The final dose in the series should be given at age ≥4 years. **Tetanus and diphtheria toxoids (Td)** is recommended at age 11–12 years if at least 5 years have elapsed since the last dose of tetanus and diphtheria toxoid-containing vaccine. Subsequent routine Td boosters are recommended every 10 years.

3. *Haemophilus influenzae* type b (Hib) conjugate vaccine. Three Hib conjugate vaccines are licensed for infant use. If PRP-OMP (PedvaxHIB® or ComVax® [Merck]) is administered at ages 2 and 4 months, a dose at age 6 months is not required. DTaP/Hib combination products should not be used for primary immunization in infants at ages 2, 4, or 6 months but can be used as boosters after any Hib vaccine. The final dose in the series should be adminstered at age ≥12 months.

4. Measles, mumps, and rubella vaccine (MMR). The second dose of MMR is recommended routinely at age 4–6 years but may be administered during any visit, provided at least 4 weeks have elapsed since the first dose and both doses are administered beginning at or after age 12 months. Those who have not previously received the second dose should complete the schedule by age 11–12 years.

5. Varicella vaccine. Varicella vaccine is recommended at any visit at or after age 12 months for susceptible children (i.e., those who lack a reliable history of chickenpox). Susceptible persons aged ≥13 years should receive 2 doses administered at least 4 weeks apart.

6. Pneumococcal vaccine. The heptavalent **pneumococcal conjugate vaccine (PCV)** is recommended for all children aged 2–23 months and for certain children aged 24–59 months. The final dose in the series should be given at age ≥12 months. **Pneumococcal polysaccharide vaccine (PPV)** is recommended in addition to PCV for certain high-risk groups. See *MMWR* 2000;49(RR-9):1-35.

7. Influenza vaccine. Influenza vaccine is recommended annually for children aged ≥6 months with certain risk factors (including, but not limited to, asthma, cardiac disease, sickle cell disease, human immunodeficiency virus [HIV], and diabetes), healthcare workers, and other persons (including household members) in close contact with persons in groups to high risk (see *MMWR* 2004;53[RR-6]:1-40). In addition, healthy children aged 6–23 months and close contacts of healthy children aged 0–23 months are recommended to receive influenza vaccine because children in this age group are at substantially increased risk for influenza-related hospitalization. For healthy persons aged 5–49 years, the intranasally administered, live, attenuated influenza vaccine (LAIV) is an acceptable alternative to the intramuscular trivalent inactivated influenza vaccine (TIV). See *MMWR* 2004;53(RR-6):1-40. Children receiving TIV should be adminstered a dosage appropriate for their age (0.25 mL if aged 6–35 months or 0.5 mL if aged ≥3 years). Children aged ≤8 years who are receiving influenza vaccine for the first time should receive 2 doses (separated by at least 4 weeks for TIV and at least 6 weeks for LAIV).

8. Hepatitis A vaccine. Hepatitis A vaccine is recommended for children and adolescents in selected states and regions and for certain high-risk groups; consult your local public health authority. Children and adolescents in these states, regions, and high-risk groups who have not been immunized against hepatitis A can begin the hepatitis A immunization series during any visit. The 2 doses in the series should be adminstered at least 6 months apart. See *MMWR* 1999;48(RR-12):1-37.

● Figure 18-22 Recommended childhood and adolescent immunization schedule.

- The specific components of a typical newborn examination include a general survey of skin color, posture, state of alertness, head size, overall behavioral state, respiratory status, gender, and any obvious congenital anomalies.
- Gestational age assessment is pertinent because it allows the nurse to plot growth parameters, and to anticipate potential problems related to prematurity/postmaturity and growth abnormalities such as SGA/LGA.
- After the newborn has passed the transitional period and stabilized, the nurse needs to complete ongoing assessments, vital signs, weight and measurements, cord care, hygiene measures, newborn screening tests, and various other tasks until the newborn is discharged home from the birthing unit.
- Important topics about which to educate parents include environmental safety, newborn characteristics, feeding and bathing, circumcision and cord care, sleep and elimination patterns of newborns, safe infant car seats, holding/positioning, and follow-up care.
- Newborn screening tests consist of hearing, and certain genetic and inborn errors of metabolism tests required in most states for newborns before discharge from the birth facility.
- The AAP and the American Dietetic Association recommend breast-feeding exclusively for the first 6 months of life and that it continue along with other food at least until their first birthday.
- Parents who choose not to breast-feed need to know what types of formula are available, preparation and storage of formula, equipment, feeding positions, and how much to feed their infant.
- Common problems associated with the newborn include transient tachypnea, physiologic jaundice, and hypoglycemia.
- Transient tachypnea of the newborn appears soon after birth and is accompanied by retractions, expiratory grunting, or cyanosis and is relieved by low-dose oxygen.
- Physiologic jaundice is a very common condition in newborns, with the majority demonstrating yellowish skin, mucous membranes, and sclera within the first 3 days of life. Newborns undergoing phototherapy in the treatment of jaundice require close monitoring of their body temperature, fluid, and electrolyte balance; observation of skin integrity; eye protection; and parental participation in their care.
- The newborn with hypoglycemia requires close monitoring for signs and symptoms of hypoglycemia if present. In addition, newborns at high risk need to be identified based on their perinatal history, physical examination, body measurements, and gestational age. Blood glucose levels of all newborns are checked within the first few hours after birth and every 4 hours thereafter.
- The schedule for immunizations should be reviewed with parents, stressing the importance of continual follow-up health care to preserve their infant's health.

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Web Resources

American Academy of Pediatrics: Newborn Screening Facts Sheets, **www.aap.org/policy/01565.html**
American Academy of Pediatrics: Breast-feeding and use of human milk, **www.aap.org/policy/re9729.html**
American Social Health Association, **www.vaccines.ashastd.org**
Baby Trend, **www.babytrend.com**
Breast-feeding information, **www.breastfeeding.com**
Bright Future Lactation Resource Center, **www.bflrc.com**
CDC's National Immunization Program, **www.cdc.gov/nip**
Graco/Century, **www.gracobaby.com**
Immunization Action Coalition, **www.immunize.org**
La Leche League International, **www.lalecheleague.org**
March of Dimes: Newborn Screening Tests, **www.marchofdimes.com/professionals/681_1200.asp**
National Center for Missing and Exploited Children, **www.missingkids.com**
National Healthy Mothers, Healthy Babies Coalition, **www.hmhb.org**
National Institute of Child Health and Human Development, **www.nih.gov**
National Newborn Screening and Genetics Resource Center, **http://genes-r-us.uthscsa.edu/resources/newborn/screestatus.htm**
Neonatal Network, **www.neonatalnetwork.com**
Safeline Corporation, **www.safelinekids.com**
The Vaccine Education Center, **www.vaccine.chop.edu**

Chapter WORKSHEET

MULTIPLE CHOICE QUESTIONS

1. At birth, a newborn's assessment reveals the following: heart rate of 140 bpm, loud crying, some flexion of extremities, crying when bulb syringe is introduced into the nares, and a pink body with blue extremities. The nurse would document the newborn's Apgar score as

   a. 5 points

   b. 6 points

   c. 7 points

   d. 8 points

2. The nurse is explaining phototherapy to the parents of a newborn. The nurse would include which of the following as the purpose?

   a. Increase surfactant levels

   b. Stabilize the newborn's temperature

   c. Destroy Rh-negative antibodies

   d. Oxidize bilirubin on the skin

3. The nurse administers a single dose of vitamin K intramuscularly to a newborn after birth to promote

   a. Conjugation of bilirubin

   b. Blood clotting

   c. Foreman ovale closure

   d. Digestion of complex proteins

4. Instillation of a prophylactic agent is administered in both eyes of all newborns to prevent which of the following conditions?

   a. Gonorrhea and *Chlamydia*

   b. Thrush and *Enterobacter*

   c. *Staphylococcus* and syphilis

   d. Hepatitis B and herpes

5. The AAP recommends that all newborns be placed on their backs to sleep to reduce the risk of

   a. Respiratory distress syndrome

   b. Bottle mouth syndrome

   c. SIDS

   d. GI regurgitation syndrome

6. Which of the following immunizations is received by newborns before hospital discharge?

   a. Pneumococcus

   b. Varicella

   c. Hepatitis A

   d. Hepatitis B

7. Which condition would be missed if newborns are screened before they have tolerated protein feedings for at least 48 hours?

   a. Hypothyroidism

   b. Cystic fibrosis

   c. Phenylketonuria

   d. Sickle cell disease

CRITICAL THINKING EXERCISES

1. Linda Scott, an African-American mother who delivered her first baby and is on the mother–baby unit, calls the nursery nurse into her room and appears upset about how her daughter looks. Ms. Scott tells the nurse that her baby's head looks like a "banana" and is mushy to touch, and she has white spots all over her nose. In addition, there appear to be big bluish bruises all over her baby's buttocks. She wants to know what is wrong with her baby's appearance and whether these problems go away.

   a. How should the nurse respond to Ms. Scott's questions?

   b. What additional newborn instruction might be appropriate at this time?

   c. What reassurance can be given to Ms. Scott regarding her daughter's appearance?

2. At approximately 12:30 AM on a Friday morning a woman entered a hospital through a busy emergency room. She was dressed in a white uniform and a lab coat with a stethoscope around her neck. She identified herself as a new nurse coming back to check on something she had left on the unit on a earlier shift. Subsequently, she entered a postpartum patient's room containing the patient's newborn infant, pushed the open crib down a hallway, and escaped through an exit. The security cameras weren't working at the time. The infant wasn't discovered missing until the 2 AM check by the nurse.

   a. What impact does an infant abduction have on family and the hospital?

   b. What security measure was the weak link in the chain of security?

   c. What can hospitals do to prevent infant abduction from happening?

STUDY ACTIVITIES

1. Interview a new mother on the postpartum unit on her second day about changes she has noticed in her newborn within the last 24 hours regarding his appearance and/or behavior. Discuss your interview findings at post conference.

2. Demonstrate a newborn bath to a new mother on a one-to-one basis in her room utilizing the principles of bathing from the cleanest to the dirtiest body part. Discuss the questions asked by the mother and her reaction to the bath demonstration in post conference.

3. Go to the La Leche League Web site (www.lalecheleague.org) and critique it for its information on breast-feeding and how helpful it would be to a new mother.

4. Debate the risks and benefits of neonatal circumcision within your nursing group at post conference. Did either side present a stronger position? What is your opinion and why?