

# Neonatal Nursing Care

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### **Learning Objectives of the Lecture:**

1. Physiological Transitioning of the Newborn
2. Describe characteristics of Normal Neonate, full term, Preterm, and Post term
3. Assess a Newborn for Normal Well Being
4. Implement Care of the Baby at the Time of Delivery (until around 1 hour after Birth)
5. Nursing Management for Immediate & Daily Neonatal Care
6. Plan Nursing Management for Daily Neonatal Care

### **Physiological Transitioning of the Newborn**

Newborns undergo profound physiologic changes at the moment of birth and, probably, psychological changes as well as they are released from a warm, snug, dark, liquid-filled environment that has met all of their basic needs into a chilly, unbounded, brightly lit, gravity-based, outside world. Within minutes after being plunged into this strange environment, a newborn has to initiate respirations and adapt a circulatory system to extra uterine oxygenation. Within 24 hours, neurologic, renal, endocrine, gastrointestinal, and metabolic functions must be operating competently for life to be sustained. How well a newborn makes these major adjustments depends on his or her genetic composition, the competency of the recent intrauterine environment, the care received during the labor and birth period, and the care received during the newborn or neonatal period (from birth through the first 28 days of life). Two thirds of all deaths that occur during the first year of life occur in the neonatal period. More than half occur in the first 24 hours after birth—an indication of how hazardous a time this is for an infant

## 1. Cardiovascular System

Changes in the cardiovascular system are necessary after birth because now the lungs must oxygenate the blood that was formerly oxygenated by the placenta. When the cord is clamped, a neonate is forced to take in oxygen through the lungs. As the lungs inflate for the first time, pressure decreases in the pulmonary artery (the artery leading from the heart to the lungs). This decrease in pressure plays a role in promoting closure of the ductus arteriosus, a fetal shunt.

## 2. Respiratory System

All newborns have some fluid in their lungs from intrauterine life that will ease the surface tension on alveolar walls and allows alveoli to inflate more easily than if the lung walls were dry. About a third of this fluid is forced out of the lungs by the pressure of vaginal birth. Additional fluid is quickly absorbed by lung blood vessels and lymphatics after the first breath. Once the alveoli have been inflated with a first breath, breathing becomes much easier for a baby, requiring only about 6 to 8 cm H<sub>2</sub>O pressure. Within 10 minutes after birth, most newborns have established a good residual volume. By 10 to 12 hours of age, vital capacity is established at newborn proportions.

## 3. Gastrointestinal System

Although the gastrointestinal tract is usually sterile at birth, bacteria may be cultured from the intestinal tract in most babies within 5 hours after birth and from all babies at 24 hours of life. Most of these bacteria enter the tract through the newborn's mouth from airborne sources. Others may come from vaginal secretions at birth, from hospital bedding, and from contact at the breast. Accumulation of bacteria in the gastrointestinal tract is necessary for digestion and for the synthesis of vitamin K. The first stool of a newborn is usually passed within 24 hours after birth. It consists of meconium, a sticky, tarlike, blackish-green, odorless material formed from mucus, vernix, lanugo, hormones, and carbohydrates that accumulated during intrauterine life.

#### 4. Urinary System

The average newborn voids within 24 hours after birth. A newborn who does not take in much fluid for the first 24 hours may void later than this, but the 24-hour point is a good general rule. Newborns who do not void within this time should be examined for the possibility of urethral stenosis or absent kidneys or ureters.

#### 5. Immune System

Because they have difficulty forming antibodies against invading antigens until about 2 months of age, newborns are prone to infection. This inability to form antibodies is the reason that most immunizations against childhood diseases are not given to infants younger than 2 months of age. Newborns do have some immunologic protection, because they are born with passive antibodies (immunoglobulin G) from their mother that crossed the placenta. In most instances, these include antibodies against poliomyelitis, measles, diphtheria, pertussis, chickenpox, rubella, and tetanus.

#### 6. Neuromuscular System

Mature newborns demonstrate neuromuscular function by moving their extremities, attempting to control head movement, exhibiting a strong cry, and demonstrating newborn reflexes. Limpness or total absence of a muscular response to manipulation is never normal and suggests narcosis, shock, or cerebral injury. A newborn occasionally makes twitching or flailing movements of the extremities in the absence of a stimulus because of the immaturity of the nervous system. Newborn reflexes can be tested with consistency by using simple maneuvers. such as Sucking Reflex, Swallowing Reflex, Palmar Grasp Reflex, Step (Walk)-in-Place Reflex and Moro Reflex.

**TABLE 18.1 \* Periods of Reactivity: Normal Adjustment to Extrauterine Life**

<b>Assessment</b>	<b>First Period (First 15–30 min)</b>	<b>Resting Period (30–120 min)</b>	<b>Second Period (2–6 hr)</b>
Color	Acrocyanosis	Color stabilizing	Quick color changes occur with movement or crying
Temperature	Temperature begins to fall from intrauterine temperature of about 100.6° F (38.1° C)	Temperature stabilizes at about 99° F (37.2° C)	Temperature increases to 99.8° F (37.6° C)
Heart rate	Rapid, as much as 180 bpm while crying	Slowing to 120–140 bpm	Wide swings in rate with activity
Respirations	Irregular; 30–90 breaths per min while crying; some nasal flaring, occasional retraction may be present	Slowing to 30–50 breaths per min; barreling of chest occurs	Becoming irregular again with activity
Activity	Alert; watching	Sleeping	Awakening
Ability to respond to stimulation	Vigorous reaction	Difficult to arouse	Becoming responsive again
Mucus	Visible in mouth	Small amount present while sleeping	Mouth full of mucus, causing gagging
Bowel sounds	Can be heard after first 15 min	Present	Often passage of first meconium stool

Source: Desmond, M. N., et al. (1963). The clinical behavior of the newly born: the term infant. *Journal of Pediatrics*, 62(3), 307–309.

**Figure (1) Normal Adjustment to Extrauterine Life**

## **Characteristics of Normal Neonate (Full Term)**

It is not unusual to hear the comment “all newborns look alike” from people viewing a nursery full of babies. In actuality, every child is born with individual physical and personality characteristics that make him or her unique right from the start

### **1.Length**

The average birth length (50th percentile) of a mature female neonate is 53 cm (20.9 in). For mature males, the average birth length is 54 cm (21.3 in). The lower limit of normal length is arbitrarily set at 46 cm (18 in). Although rare, babies with lengths as great as 57.5 cm (24 in) have been reported.

### **2.Head Circumference**

In a mature newborn, the head circumference is usually 34 to 35 cm (13.5 to 14in). A mature newborn with a head circumference greater than 37 cm (14.8 in) or less than 33 cm (13.2 in) should be carefully assessed for neurologic involvement, although occasionally a well newborn falls within these limits. Head circumference is measured with a tape

measure drawn across the center of the forehead and around the most prominent portion of the posterior head.

### **3.Chest Circumference**

The chest circumference in a term newborn is about 2 cm (0.75 to 1 in) less than the head circumference. This is measured at the level of the nipples. If a large amount of breast tissue or edema of breasts is present, this measurement will not be accurate until the edema has subsided.

### **4.Weight**

The average birth weight (50th percentile) for a white mature female newborn in the United States is 3.4 kg (7.5lb); for a white, mature male newborn, it is 3.5 kg (7.7 lb) Newborns of other races weigh approximately 0.5 lb less The arbitrary lower limit of normal for all races is 2.5 kg (5.5lb). Birth weight exceeding 4.7 kg (10 lb) is unusual, but weights as high as 7.7 kg (17 lb) have been documented. If a newborn weighs more than 4.7 kg, the baby is said to be macrosomic and a maternal illness, such as diabetes mellitus, must be suspected (Kwik et al., 2007). Second-born children usually weigh more than first-born. Birth weight continues to increase with each succeeding child in a family.

### **5.Vernix Caseosa**

Vernix caseosa is a white, cream cheese–like substance that serves as a skin lubricant in utero. Usually, it is noticeable on a term newborn’s skin, at least in the skin folds, at birth. Document the color of vernix, because it takes on the color of the amniotic fluid. For example, a yellow vernix implies that the amniotic fluid was yellow from bilirubin; green vernix indicates that meconium was present in the amniotic fluid.

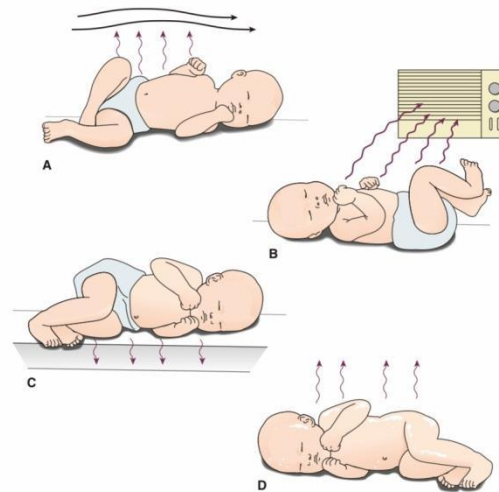
### **6.Vital Signs**

Vital sign measurements begin to change from those present in intrauterine life at the moment of birth.

#### **5.1.Temperature**

The temperature of newborns is about 99° F (37.2° C) at birth because they have been confined in an internal body organ. The

temperature falls almost immediately to below normal because of heat loss and immature temperature regulating mechanisms. The temperature of birthing rooms, approximately 68° to 72° F (21° to 22° C), can add to this loss of heat.



**Figure (2) Newborns lose heat**

Newborns lose heat by four separate mechanisms: **convection**, **conduction**, **radiation**, and **evaporation**

### **5.2.Pulse**

The heart rate of a fetus in utero averages 120 to 160 beats per minute (bpm). Immediately after birth, as the newborn struggles to initiate respirations, the heart rate may be as rapid as 180 bpm. Within 1 hour after birth, as the newborn settles down to sleep, the heart rate stabilizes to an average of 120 to 140 bpm.

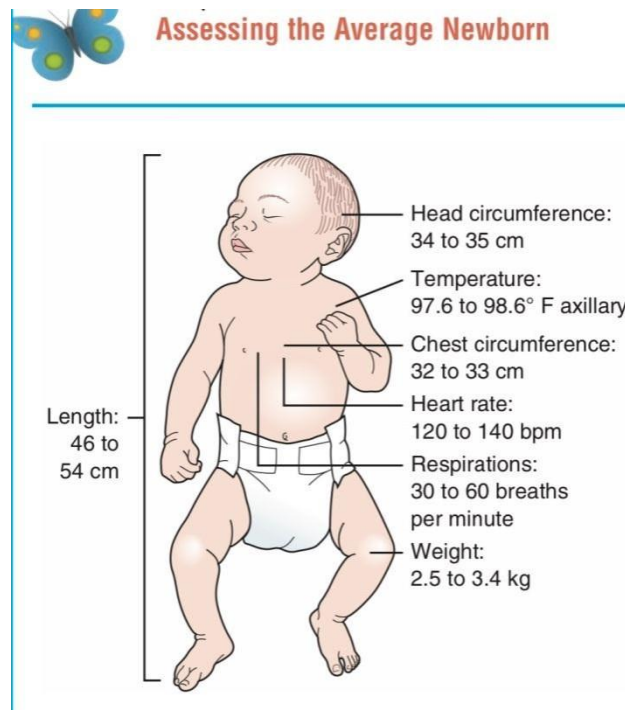
### **5.3.Respiration**

The respiratory rate of a newborn in the first few minutes of life may be as high as 80 breaths per minute. As respiratory activity is established and maintained, this rate settles to an

average of 30 to 60 breaths per minute when the newborn is at rest.

### **5.4.Blood Pressure**

The blood pressure of a newborn is approximately 80/46 mm Hg at birth. By the 10th day, it rises to about 100/50 mm Hg.



**Figure (3) Assessment of Newborn**

### **ASSESSMENT of Newborn for WELL-BEING**

There are several traditional standardized assessments to evaluate a newborn quickly at birth. Apgar Scoring. At 1 minute and 5 minutes after birth, newborns are observed and rated according to an Apgar score, an assessment scale used as a standard since 1958



**TABLE 18.2 \* Apgar Scoring Chart**

Sign	Score		
	0	1	2
Heart rate	Absent	Slow (<100)	>100
Respiratory effort	Absent	Slow, irregular; weak cry	Good; strong cry
Muscle tone	Flaccid	Some flexion of extremities	Well flexed
Reflex irritability:			
Response to catheter in nostril, or Slap to sole of foot	No response	Grimace	Cough or sneeze
	No response	Grimace	Cry and withdrawal of foot
Color	Blue, pale	Body normal pigment, extremities blue	Normal skin coloring

Source: Apgar, V., et al. (1958). Evaluation of the newborn infant: Second report. *JAMA: Journal of the American Medical Association*, 16(82), 1985–1988. Copyright 1958, American Medical Association.

**Figure (4) Apgar score**

### **Nursing Care of A newborn at Birth**

Birthing rooms provide an island for newborn care separate from the supplies needed for the mother's care. Necessary equipment includes a radiant heat table or warmed bassinet; a warm, soft blanket; and equipment for oxygen administration, resuscitation, suction, eye care, identification, and weighing of a newborn.

#### **Implement Nursing care of the newborn at the time of delivery (until around 1 hour after birth)**

1. Record the First Cry
2. Promote Adequate Breathing Pattern and Prevent Aspiration.
3. Inspect and Care for Umbilical Cord
4. Administer Eye Care
5. General Infection Precautions

#### **Newborn Identification and Registration**

Infant identification is important, because there always exists the possibility that a newborn may be handed to the wrong parents or be switched or kidnapped from a health care facility, although these events are rare.

#### **Birth Record Documentation**

The infant's chart is also a vital piece of documentation. It serves as a baseline indicating whether the infant was well at

birth. Be certain a newborn chart contains the following information:

1. Time of birth
2. Time the infant breathed
3. Whether respirations were spontaneous or aided
4. Apgar score at 1 minute and at 5 minutes of life
5. Whether eye prophylaxis was given
6. Whether vitamin K was administered
7. General condition of the infant
8. Number of vessels in the umbilical cord
9. Whether cultures were taken (they are taken if at some point sterile birth technique was broken or the mother has a history of vaginal or uterine infection)
10. Whether the infant voided and whether he or she passed a stool (this information is helpful if, later on, the diagnosis of bowel obstruction or absence of a kidney is considered)

### **Nursing management for immediate & daily neonatal care**

Newborns are usually kept in either a birthing room or a transitional nursery for optimal safety in the first few hours of life.

#### **1. Initial Feeding**

A term newborn who is to be breastfed may be fed immediately after birth. A baby who is to be formula-fed may receive a first feeding at about 2 to 4 hours of age. Both formula-fed and breastfed infants do best on a demand schedule; many need to be fed as often as every 2 hours in the first few days of life.

#### **2. Bathing**

In most hospitals, newborns receive a complete bath to wash away vernix caseosa within an hour after birth. Thereafter, they are bathed once a day, although the procedure may be limited to washing only the baby's face, diaper area, and skin folds. Wear gloves when

handling newborns until the first bath, to avoid exposing your hands to body secretions.

### **3.Sleeping Position**

Stress to parents that a newborn should be positioned on the back for sleep. Sudden infant death syndrome (SIDS) is the sudden, unexplained death of an infant younger than 1 year of age. Although the specific cause of SIDS cannot be explained, placing infants to sleep in a supine position with a pacifier has been shown to decrease the incidence of the syndrome

### **4.Diaper Area Care**

Preventing diaper dermatitis is a practice that parents need to start from the very beginning with their newborns. With each diaper change, the area should be washed with clear water and dried well, to prevent the ammonia in urine from irritating the infant's skin and causing a diaper rash.

### **5.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 ,frequent assessments of the area are necessary to :

1. Observe for bleeding, redness, drainage, or foul odor from the cord stump and report it to your newborn's primary care provider immediately.
2. Avoid tub baths until the cord has fallen off and the area has healed.
3. Expose the cord stump to the air as much as possible throughout the day.
4. Fold diapers below the level of the cord to prevent contamination of the site and to promote air-drying of the cord.
5. Observe the cord stump, which will change color from yellow to brown to black. This is normal.

6. Never pull the cord or attempt to loosen it; it will fall off naturally.

### **6.Hepatitis B Vaccination**

All newborns receive a first vaccination against hepatitis B within 12 hours after birth; a second dose is administered at one month and a third at 6 months.

Infants whose mothers are positive for the hepatitis B surface antigen (HBsAg) also receive hepatitis B immune globulin (HBIG) at birth

### **7.Vitamin K Administration**

Newborns are at risk for bleeding disorders during the first week of life because their gastrointestinal tract is sterile at birth and unable to produce vitamin K, which is necessary for blood coagulation. A single dose of 0.5 to 1.0 mg of vitamin K is administered intramuscularly within the first hour of life to prevent such problems

### **8.Circumcision**

Circumcision is the surgical removal of the foreskin of the penis. In only a few babies, constriction (phimosis) of the foreskin is so severe that it obstructs the urinary meatal opening; otherwise, there are few medical indications for circumcision of a male newborn. This has been traditionally done for hygiene and medical reasons and is the oldest known religious rite. In the Jewish faith

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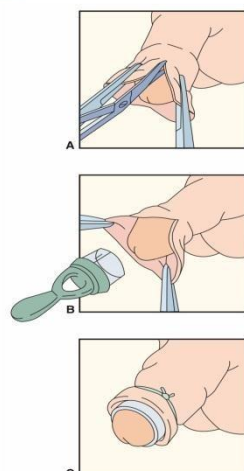


FIGURE 18.29 Technique for performing circumcision using a Plastibell. (A) An incision is made in the top of the foreskin. (B) The Plastibell is placed over the head of the penis, and the

**Figure (5) Circumcision**

### **Characteristics of Preterm Neonate**

A baby born before 37 weeks of pregnancy is considered premature, that is, born before complete maturity.

The following are the most common characteristics of a premature baby. However, each baby may show different characteristics of the condition. Characteristics may include:

1. Small baby, often weighing less than 2,500 grams .
2. Thin, shiny, pink or red skin, able to see veins
3. Little body fat
4. Little scalp hair, but may have lots of lanugo (soft body hair)
5. Weak cry and body tone
6. Genitals may be small and underdeveloped



**Figure (6) Preterm Neonate**

## **Lanugo**

Lanugo is the fine, downy hair that covers a newborn's shoulders, back, and upper arms. It may be found also on the forehead and ears. A baby born between 37 to 39 weeks of gestation has more lanugo than a newborn of 40 weeks' gestational age. Postmature infants (more than 42 weeks of gestation) rarely have lanugo. Lanugo is rubbed away by the friction of bedding and clothes against the newborn's skin. By 2 weeks of age, it has disappeared.

## **Care of premature may also include:**

1. Temperature-controlled beds
2. Monitoring of temperature, blood pressure, heart and breathing rates, and oxygen levels
3. Giving extra oxygen by a mask or with a breathing machine
4. Mechanical ventilators (breathing machines) to do the work of breathing for the baby
5. Intravenous (IV) fluids, when feedings cannot be given, or for medications
6. Placement of catheters (small tube) into the umbilical cord to give fluids and medications and to draw blood
7. X-rays (for diagnosing problems and checking tube placement)
8. Special feedings of breast milk or formula, sometimes with a tube into the stomach if a baby cannot suck. Breast milk has many advantages for premature babies as it contains immunities from the mother and many important nutrients.
9. Medications and other treatments for complications, such as antibiotics
10. Kangaroo Care. A method of caring for premature babies using skin-to-skin contact with the parent to

provide contact and aid parent-infant attachment. Studies have found that babies who "kangaroo" may have shorter stays in the NICU.

### **Characteristics of post Term Neonate**

A postterm infant is an infant born after 42 weeks gestation. A Postmature infants have higher morbidity and mortality than term infants due in large part to Perinatal asphyxia

#### **Meconium aspiration syndrome**

Perinatal asphyxia may result from placental insufficiency as well as cord compression secondary to oligohydramnios.

Meconium aspiration syndrome may be unusually severe because amniotic fluid volume is decreased and thus the aspirated meconium is less dilute. Persistent pulmonary hypertension often occurs after meconium aspiration.

**Neonatal hypoglycemia** is a complication caused by insufficient glycogen stores at birth. Because anaerobic metabolism rapidly uses the remaining glycogen stores, hypoglycemia is exaggerated if perinatal asphyxia has occurred.

#### **Characteristics post term neonate:**

1. Postmature infants are alert and appear mature.
2. They have a decreased amount of soft-tissue mass, particularly subcutaneous fat.
3. The skin may hang loosely on the extremities and is often dry and peeling.
4. The fingernails and toenails are long.
5. The nails and umbilical cord may be stained with meconium passed in utero.



**Figure (7) post-term Neonate**

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