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Examination of a new born. Essential care of a healthy baby, congenital defects, thermal control of a new-born. Adaptation of a new-born. Care of a healthy new-born or the one with various pathologies. Premature new-borns. Measurement criteria of gestational age.

A newborn infant, or neonate, is a child under 28 days of age.Viable newborn has duration of gestation 22 and more weeks, weight not less than 500 g.

WHO criteria of live-born fetus. Live-born is viable neonate with 1 or more attributes of live. They are: respiration, heart sounds, pulsation of an umbilical cord. Dead (still)-born is viable child who doesn't have any attributes of life. Abortion is a birth of fetus before 22 weeks, with weight less than 500 g. If this newborn has survived 168 hours (7 day), he may be considered as live-born but extremely immature.

Classifications of Newborn By Weight

Gestational Age	Expected Growth Parameters
Appropriate for gestational age (AGA)	Growth parameters for gestational age between 10th and 90th percentile
Small for gestational age (SGA)	Weight below 10th percentile for gestational age
Large for gestational age (LGA)	Weight above 90th percentile for gestational age
Normal term birth weight	Weight between 10th and 90th percentile
Low birth weight (LBW)	Weight below 2.5 kg
Very low birth weight (VLBW)	Weight below 1.5 kg
Extremely low birth weight (ELBW)	Weight below 1 kg

Classification of Newborns By Gestational Age

Gestational Age	Completed Post-Menstrual Weeks
Postterm	≥ 42 weeks
Term	Completed > 37 weeks
Preterm	Born prior to 37 completed weeks
Late preterm	Born between 34 weeks 0/7 days and 36 weeks 6/7 days

Neonatal care clinical guidelines:

Although most newborn babies require only simple supportive care at and immediately after delivery, immediate care of the newborn is essential for the survival of the babies. After birth, most full-term infants require normal neonatal routine care to make a successful transition to extrauterine life. After delivery, immediate care includes drying the newborn, clearing the airway of secretions, and providing warmth. A delivery room assessment of the neonate's clinical status is quickly performed by addressing the following questions. The answers are used to determine whether the newborn is admitted to the normal nursery or requires a higher level of care:

- Is the newborn's GA ≥35 weeks?
- Does the newborn have good muscle tone?
- Is the newborn breathing or crying?

If yes is the answer to all of these questions, the newborn does not require further intervention and should be given to the mother. Well appearing newborns should remain with the mother and be placed skin-to-skin (STS) to promote infant-maternal bonding and early initiation of breastfeeding.

The following steps should be followed to provide essential immediate care for well appearing newborns:

1. *Immediately after birth, dry the baby*, especially the head, with a warm dry towel and discard the wet towel. Cover the baby with a dry towel. Newly born babies who do not breathe spontaneously after thorough drying should be stimulated by rubbing the back 2–3 times before clamping the cord and initiating positive pressure ventilation.

2. As you dry the baby, *make an assessment of the baby* by looking for spontaneous breathing and heart rate in order to identify babies who need immediate resuscitation. This is the most important thing and must be done within 30 seconds from delivery. If the baby is having trouble breathing/ gasping/or not breathing: quickly clamp and cut the cord, leaving a stump at least 10 cm long, call for help and start resuscitation immediately.

• Continuously assess the APGAR score at 1, 5 and 10 minutes.

Figure 1: Apgar score

	0 POINTS	1 POINT	2 POINTS	POINTS TOTALED
Activity (muscle tone)	Absent	Arms and legs flexed	Active movement	
Pulse	Absent	Below 100bpm	Over 100bpm	
Grimace (reflex irritability)	Flaccid	Some flexion of extremities	Active motion (sneeze, cough, pull away)	
Appearance (skin colour)	Blue, pale	Body pink, extremities blue	Completely pink	
Respiration	Absent	Slow, irregular	Vigorous cry	

Severely depressed	0-3
Moderately depressed	4-6
Excellent condition	7-10

Approximately 90 percent of neonates have Apgar scores of 7 to 10, and generally require no further intervention. Infants with lower scores require further evaluation and possible intervention, including 1 percent of all neonates who require extensive resuscitative measures at birth. A low score on the one-minute test may show that the newborn requires medical attention but is not necessarily an indication that there will be long-term problems, particularly if there is an improvement by the stage of the five-minute test.

3. Clamp and cut the cord. Cut the cord within 1 to 3 minutes after birth for all births while initiating simultaneous essential newborn care. If the newborn baby is placed on the mother's breast, the cord could be left unclamped until the pulsations have disappeared. Early clamping of the cord (i.e. immediately after birth) results in low haemoglobin values. Too late clamping of the cord results in hypervolaemia and possibly hyperviscosity of the blood, which may lead to respiratory difficulties and volume overload of the heart.

! Tie the cord two fingers' length from the baby's abdomen and make another tie two fingers from the first one. Cut the cord between the first and second tie. Early cord clamping (<1 minute after birth) is not recommended unless the neonate is asphyxiated and needs to be moved immediately for resuscitation.

! DO NOT apply anything on the cord stump and leave it uncovered. Clean, dry cord care is recommended for newborns born in health facilities and at home.

4. Keep the baby warm. Newborns without complications should be kept in skin-to-skin contact with their mothers during the first hour after birth to prevent hypothermia and promote breastfeeding. Cover the mother and the baby with a clean blanket/cloth.

5. Help the mother initiate breastfeeding within the first hour of birth (most newborn babies are ready to feed as early as 15 minutes after birth). Breastfed infants should receive at least 8 to 12 feeds per day during the newborn hospitalization. Babies should be placed in skin-to-skin contact immediately after birth for at least an hour. Mothers should be supported to initiate breastfeeding within 1 hour after delivery and to

recognize when their babies are ready to breastfeed. All newborn babies should be kept close to their mothers (rooming in) to ensure frequent feeding. This also helps in early secretion of breast milk and better milk flow.Counsel mothers and support them on correct positioning and attachment to promote milk flow and prevent breast conditions.

6. **Give eye care profilaxis**. Within 1 hour after birth, give the newborn eye antimicrobial medication to protect the baby from serious eye infection.

7. Prevent bleeding. A neonatal deficiency of vitamin K exists in at least 0.5% of all newborn babies. The risk of gastrointestinal or other types of neonatal bleeding is especially high in preterm babies and small for gestational age babies. To prevent early bleeding and the late hemorrhagic disease of the newborn, vitamin K prophylaxis is suggested. Give 1 mg of vitamin K intramuscularly (IM) to all neonates (including preterm) after birth. Give 0.5mg vitamin K IM to neonates less than 1kg.

8. A complete examination should be performed within about 90 minutes after birth. The exam is most quickly and easily performed on an exam table.Will be examined all exposed body parts first with the infant's clothing on, then remove all the clothing and thoroughly examine the rest of the body. Temperature of the room where the newborn will be examened - 24 -26 C. The baby is examined in daylight or the light of day lamps. The examination must be done between feedings (usually after 30 min after feeding).

Physical examination.

The examination includes:

●Observation of the infant's general appearance, including his/her body position at rest, body movement, color, and respiratory effort.
●Body measurements (ie, weight, length, and head circumference) and vital signs.
●Examination of individual body parts and organs.

The examination should be conducted in a systematic manner, as a consistent approach ensures that all aspects are evaluated. Although the exact order is not important, the examination is optimized by initially observing the infant's general appearance followed by auscultation of the lungs and heart while the infant is lying quietly. The examination usually proceeds from head to foot as outlined in the following sections. Examination of the hips and spine, which is apt to disturb the infant, usually is performed last. The hips are examined while the infant is supine, then the infant is turned prone to examine the back. The date and time of the examination should be recorded. Findings considered normal close to delivery (eg, a transitional heart murmur) may be abnormal on the second or third day after birth. The examination should include assessment of gestational age (GA).

Prior to touching the infant, much can be learned by observing the appearance of the undressed infant in the resting, nonstimulated state. General inspection should include the following:

-Sex determination;

-Detection of birth defect. Identification of any deformation (eg, metatarsus adductus) or malformations (eg, cleft lip), which may indicate the presence of a syndrome.

-Fetal nutrition. Determination of the state of fetal nutrition, by noting the amount of subcutaneous fat on the anterior thighs and gluteal region, or by the amount of Wharton's jelly in the umbilical cord.

-Color assessment. A normal infant appears pink. Acrocyanosis, a bluish appearance of the hands, feet, and perioral area, is common in the first few days after delivery

-Respiratory effort assessment. Paradoxical breathing movements, in which the abdomen moves outward and the chest wall moves inward in inspiration, are normal. Signs of respiratory distress are abnormal and

suggest pulmonary disease. They include rapid breathing, nasal flaring, use of accessory muscles (eg, significant subcostal, intercostal, supraclavicular, or suprasternal retractions), and grunting. The respiratory count should be conducted over a full minute to account for the variable breathing rate in the neonate.

-Position and movement. The newborn's posture at rest usually reflects the intrauterine position. Term newborns who have been positioned in a vertex presentation typically lie with the hips, knees, and ankles flexed. A normal infant moves all extremities symmetrically. Deviation of posture or abnormal movement may be an indication of birth injury or deformation due to intrauterine positioning.

-Vital signs should be recorded every 30 to 60 minutes during the transitional period (first four to six hours of life) and then every 8 to 12 hours subsequently. Normal routine vital signs for the newborn infant include:

- Temperature measured with the thermometer in the axilla of 36.5 to 37.5°C (97.7 to 99.5°F) in an open crib.
- Respiratory rate of 35 to 60 breaths per minute, which should be counted over a full minute [9].
- Heart rate – The 50th percentile for term infants is about 120 beats per minute with a range between the 2nd to 98th percentile of 102 to 162 beats per minute [10]. The heart rate may decrease to 85 to 90 beats per minute in some term infants during sleep. In these infants, an increase of heart rate with stimulation is reassuring.
- Blood pressure can be measured using a neonatal-size blood pressure cuff in infants with suspected cardiovascular or renal abnormalities

Skin — The skin should be inspected for abnormalities that may indicate an underlying disorder, such as areas of abnormal pigmentation, congenital nevi, macular stains, or hemangiomas. Skin color: The normal skin color of a newborn is pink, but hands and feet may still look pale or blue soon after delivery. The pink color may be difficult to detect in dark-skinned babies. The inside of the mouth should be pink in all babies.

Head. General inspection includes noting the size and shape of the head and the presence of abnormal hair, skull and scalp defects, unusual lesions or protuberances, lacerations, abrasions or contusions, and facial asymmetry.

-Fontanelles. The fontanelles should be palpated, preferably with the infant in the sitting position. Both fontanelles normally are soft and flat. The anterior fontanelle is located at the juncture of the metopic, sagittal, and coronal sutures. Its size is variable. The posterior fontanelle is located at the juncture of the sagittal and lambdoid sutures. It usually is open, but smaller than 1 cm in diameter. Tense and bulging fontanelle in a sitting infant who is not crying may be an indication of raised intracranial pressure (ICP), which may be present in patients with a subdural hematoma or bacterial meningitis.

-Sutures. The principal sutures of the skull (sagittal, coronal, lambdoid, and metopic) should be palpated. Passage through the birth canal may result in molding, a temporary asymmetry of the skull caused by overlapping or overriding of the sutures, particularly the coronal. An asymmetric skull that persists for longer than two to three days after birth or a persistent palpable ridge along the suture line may suggest craniosynostosis. Although the sutures normally can be separated soon after delivery, widely split sutures with a full fontanelle may indicate increased ICP caused by hydrocephalus.

-Skull and scalp. Craniotabes is a soft area of skull bone, usually in the parietal region, that gives a sensation of a ping-pong ball when depressed. It commonly is found in preterm infants, and can occur in a normal term infant whose head rested on the maternal pelvic brim during the last few weeks of gestation or due to maternal/fetal vitamin D deficiency. Craniotabes can be a pathologic finding in syphilis and rickets.

-Extracranial findings. Delivery can result in the following extracranial birth findings:

- Caput succedaneum is an area of edema over the presenting part of the head. This common condition typically is present at birth, crosses suture lines, and resolves within a few days.
- Cephalohematomas are subperiosteal collections of blood that are present in 1 to 2 percent of newborns. On palpation, they form a fluctuant mass that does not cross suture lines, which may increase in size after birth, and usually takes weeks to months to resolve.
- Subgaleal hemorrhages are collections of blood between the aponeurosis covering the scalp and the periosteum. Subgaleal hemorrhages extend across suture lines and feel fluctuant. Blood loss from these hemorrhages can be extensive and life threatening.

The face is examined for asymmetry. Facial palsies and asymmetric crying facies are most obvious when the infant is crying and may go unnoticed in the quiet or sleeping infant.

Facial palsies – Risk factors for facial palsy include delivery with the assistance of forceps and prolonged delivery in mothers with a prominent sacral promontory. The facial palsy is characterized by the loss of the nasolabial fold, partial closing of the eye, and the inability to contract the lower facial muscles on the affected side, leading to the appearance of a "drooping" mouth. When crying, the mouth is drawn over to the unaffected side. Facial palsies resolve completely in a few days to a few weeks. No treatment is required, with the exception of the use of artificial tears in the affected eye. In addition, it is imperative to ensure that the infant can adequately feed prior to discharge. A persistent palsy may imply a central lesion.

Eyes — The initial examination of the eyes may be difficult to perform because the eyelids often are edematous after delivery. Most infants will open their eyes spontaneously when held vertically in an environment with low ambient light. The examiner should note the position and spacing of the eyes, symmetry of the eyes, width of palpebral fissures, eye color, appearance of the sclera and conjunctiva, condition of the eyelids, pupillary size, and eye movement.

Ears — The ears are inspected for their position, size, and appearance. The ears are normally positioned when the helix is intersected by a horizontal line drawn from the outer canthus of the eye perpendicular to the vertical axis of the head. If the helix falls below this line, the ears are considered low-set. An ear is posteriorly rotated if its vertical axis deviates more than 10 degrees from the vertical axis of the head.

The ears should be inspected for branchial cleft cysts (which may be located in the preauricular area and along the line anterior to the sternocleidomastoid in the neck, sinuses, preauricular skin tags or pits, or dysplastic features. External ear abnormalities increase the risk of additional anomalies of the middle and inner ear, which are associated with hearing loss. Preauricular skin tags (papillomas) are benign.

Mouth — Assessment includes evaluating the size and shape and the interior of the mouth. The maxillae and mandible should fit well together and open at equal angles bilaterally. Asymmetry of the mouth (asynclitism) usually is caused by intrauterine position and resolves with time. A small jaw (micrognathia) may be seen in Robin sequence. The lip should be examined for evidence of a cleft.

The neck. Neck masses in the newborn infant may be differentiated by their location and include the following:

-*Cystic hygroma*, a macrocystic lymphatic malformation, is the most common lymphatic malformation in children, typically presents as a painless, transilluminated, soft mass that is located superior to the clavicle.

-*Branchial cleft cysts* may be palpated along the anterior margin of the sternocleidomastoid (SCM)

-*Hematomas* may be the cause of masses in the lower portion of the neck.

-*Torticollis* usually results from trauma to the SCM muscle caused by birth injury or intrauterine malposition. The injury causes a hematoma or swelling within the muscle. Torticollis also may be caused by developmental abnormalities of the cervical spine. In affected infants, the head is tipped to one side and the chin rotated toward the other.

-*Excess skin*. Redundant skin in the neck may be a feature of genetic syndromes. Examples include Turner syndrome, in which the neck appears webbed because of redundant skin along the posterolateral line, and Down syndrome with excess skin at the base of the neck posteriorly.

Chest examination. The chest should be inspected for size, symmetry, and movement. A small or malformed thorax may result from pulmonary hypoplasia or neuromuscular disorders. Pectus excavatum (funnel chest) or pectus carinatum (pigeon breast) may occur as an isolated finding, or as part of congenital syndromes. Asymmetry may be caused by an absent pectoralis muscle (Poland sequence) or result from a mass or abscess. The ribs and sternum are incompletely ossified in the newborn, resulting in a highly compliant chest wall. Breathing in normal infants may be paradoxical, in which the rib cage moves inward and the abdomen moves outward during inspiration.

Breast — Breast size and nipple position should be noted. The presence and amount of breast tissue may be helpful in assessment of GA. Breast hypertrophy caused by exposure to maternal hormones occurs in both males and females and can be asymmetric. Occasionally, breasts will secrete a thin milky fluid known as "witch's milk" (galactorrhea) for several days to weeks. An internipple distance that is >25 percent of chest circumference is considered widely spaced, which occur in some genetic syndromes (eg, Turner syndrome). Supernumerary nipple, or accessory mammary tissue, is a common finding, occurring with an incidence of approximately 1 in 40 newborns.

Lungs. The infant's breathing rate and pattern should be observed. These may fluctuate depending upon the state of wakefulness, and whether the infant is active or crying. The respiratory rate should be counted for a full minute to account for variations in rate and rhythm. A normal rate is 30 to 60 breaths per minute. Infants with respiratory disorders often have tachypnea and retractions. Other signs of respiratory distress include use of accessory respiratory muscles (eg, flaring of the nasal alae) and grunting. Auscultation of the lungs should be performed with the infant as quiet as possible. Normal breath sounds are bronchovesicular and are heard equally on both sides of the chest. The breath sounds should be clear, although some infants may have scattered rales for a few hours after delivery. Abnormal breath sounds are unusual in the absence of tachypnea or signs of respiratory distress. In infants with respiratory disease, grunting sometimes is audible only with a stethoscope.

Examination of CV system. Palpation of the chest wall determines the apical impulse and locates the position of the heart. Because the right ventricle is dominant in the newborn, the point of maximal impulse is best felt in the area of the left lower sternal border. The femoral pulses should be palpated when the infant is quiet. Diminished femoral pulses may indicate coarctation of the aorta, whereas an increased pulse pressure may occur with PDA. If femoral pulses are abnormal, brachial, radial, and pedal pulses should be assessed.

Auscultation should be performed with a warmed stethoscope while the infant lies quietly. The process includes noting the rate and rhythm, listening carefully for the first and second heart sounds, and the presence of a murmur. The heart rate is normally 120 to 160 beats per minute, but may decrease to 85 to 90 beats per minute in some term infants during sleep. *Heart sounds* – The first heart sound is a singular sound caused by nearly simultaneous closure of the tricuspid and mitral valves and is best heard at the apex. The second heart sound, best heard at the left upper sternal border, is caused by closure of the pulmonary and aortic valves, and normally is split. Prominent heart sounds in the right chest may signify dextrocardia. *Heart murmurs* – Heart murmurs are characterized by the intensity and quality of the sound they create, when they occur in the cardiac cycle, their location, and whether they are transmitted. The intensity of murmurs is graded on a scale of I to VI. In the first few days after birth, most newborns have murmurs that are transient and benign. They usually are caused by a patent ductus arteriosus (PDA), or pulmonary branch stenosis

Abdomen. The abdomen should be examined when the infant is quiet. The size and overall appearance should be assessed. The normal abdomen is slightly protuberant. Distension is abnormal and may indicate

conditions such as intestinal obstruction, organomegaly, or ascites. The abdomen may be scaphoid in the presence of a diaphragmatic hernia. Many normal infants have diastasis recti, resulting from the nonunion of the two rectus muscles, which may result in an umbilical hernia. Palpation of the abdomen should begin superficially and proceed more deeply, but remain gentle to avoid causing discomfort, which results in the infant crying. Holding the infant's legs in a flexed position and having the infant suck on a pacifier or the examiner's gloved finger may facilitate relaxation of the abdominal wall muscles. The liver edge normally is palpated 1 to 3 cm below the right costal margin. The liver should be soft with a smooth edge. The spleen usually is not palpable, although some normal infants may have a palpable spleen tip. The kidneys may be palpated through the anterior abdominal wall. The left kidney is more easily palpable than the right.

Genitalia and urinary system.

Male. The presence of testes, size of the penis, appearance of the scrotum, and the position of the urethral opening are evaluated. **Testes** should be palpable in the scrotum or inguinal canal, and be equal in size. Between 2 and 5 percent of full term and 30 percent of preterm male infants are born with an undescended testicle. Testes descend before six months of age in most cases. Testicular torsion that occurred prenatally presents with a firm, nontender testicle with discoloration of the scrotum. The scrotum of the term male is rugated and pigmented. Enlargement or swelling of the scrotum may be caused by hydroceles, hernias, or, rarely, testicular torsion. Hydroceles are fluid collections around the testes, and usually resolve spontaneously. They can be distinguished from hernias by transillumination of the scrotum. The **urethral meatus** usually can be located without retraction of the foreskin. The foreskin normally is tight or adherent in the newborn; easy retraction usually is not possible for several months to years. **Hypospadia-** a congenital anomaly of the male urethra that results in abnormal ventral placement of the urethral opening. The location of the displaced urethral meatus may range anywhere within the glans, the shaft of penis, the scrotum, or perineum .

Female. Examination the external genitalia: inspect clitoris and labia, presence of mucosal tag or blood discharge from the vagina, secondary to maternal estrogen withdrawal.
The appearance of the genitalia varies with GA. The labia minora and clitoris are prominent in preterm infants, while the labia majora becomes larger as the infant approaches term.
The vaginal opening should be fully visible. Many infants have vaginal skin tags, representing the slight protrusion of vaginal epithelium at the posterior fourchette.
The labia minora should be separated to detect whether the hymen, which normally has some opening, is imperforate . Imperforate hymen can cause hydrometrocolpos, which usually appears as a bulging hymen, especially with crying. Enlargement of the uterus resulting from an imperforate hymen may be detected as a lower midline abdominal mass.

Spine. Check for any gross defects of the spine: abnormal pigmentation, swelling, or hairy patches over the lower back increase the suspicion that spinal abnormality exists.A sacral or pilonidal dimple may indicate a small meningocele or other anomaly. Sacral dimples below of the gluteal cleft are benign. Evaluate for congenital hip dislocation by using the Ortolani maneuver. Place the baby in the frog-leg position. Adduct the hips by using the middle finger to apply gentle inward and upward pressure over the greater trochanter. A click of reduction and a click of dislocation are elicited in infants with hip dislocation. If this disorder is suspected, imaging studies and orthopedic consultation are indicated.

Hands and feet – The hands and feet are inspected for syndactyly (fusion of digits) and polydactyly (extra digits). Syndactyly and polydactyly can be normal variants in a newborn with an otherwise normal exam or may be associated with various syndromes.The presence of a single palmar crease should be noted. A single unilateral palmar crease occurs in 5 to 10 percent of the normal population [37] and is more common in newborns with trisomy 21

Extremity movement – The extremities should move spontaneously and equally. Decreased movement of one limb may be because of pain caused by a fracture, or paralysis due to a brachial plexus injury. Brachial plexus injury typically occurs when the cervical, or rarely the upper thoracic, nerve roots are stretched during delivery. The pattern of injury is dependent upon which cervical roots are involved. C5 and C6 injury (Erb palsy) accounts for approximately 50 percent of cases. Weakness involves the deltoid and infraspinatus muscles (mainly C5) and biceps (mainly C6). As a result, the upper arm is adducted and internally rotated, and the forearm is extended, while hand and wrist movement are preserved.

Transitory condition of newborn:

States that reflect the process of adaptation to new conditions of life are called transitory (border, transitional, physiological). Borderline these conditions are called because they arise on the border of two periods of life (intrauterine and extrauterine) and under certain conditions can acquire pathological features, leading to disease.

- *Physiological weight loss*
- *Transitory hyperthermia*
- *Physiologic oliguria*
- *Passage of meconium*
- *Physiological diarrhea*
- *Uric acid crystals*
- *Mastopathy in neonates*
- *Desquamative vulvovaginitis*

Preterm birth refers to a delivery that occurs before 37 weeks of gestation.

Risc factors.

-Maternal factors: Younger or older maternal age (eg, < 16 years, > 35 years), drug use (such as cocaine), cigarette smoking, Poor nutrition during gestation, preeclampsia (also known as toxemia or high blood pressure of pregnancy), chronic medical illness (such as heart or kidney disease), infection (such as group B streptococcus, urinary tract infections, vaginal infections and infections of the fetal/placental tissues), abnormal structure of the uterus, cervical incompetence (inability of the cervix to stay closed during pregnancy), previous preterm birth, multiple gestation (eg, twins, triplets);

-Factors involving the pregnancy: abnormal or decreased function of the placenta, placenta previa (low lying position of the placenta), placental abruption (early detachment from the uterus), premature rupture of membranes (amniotic sac), polyhydramnios (too much amniotic fluid);

-Factors involving the fetus:when fetal behavior indicates the intrauterine environment isn't healthy, multiple gestation (twins, triplets or more).

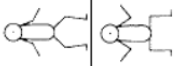
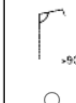
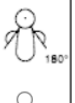
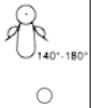
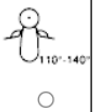
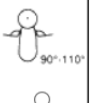
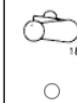
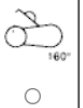
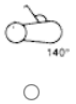
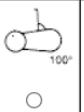
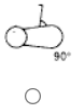
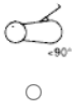
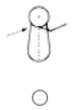
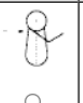
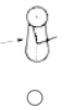
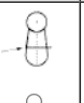
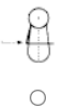
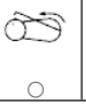
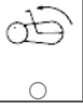
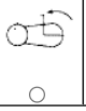
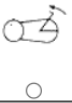
Signs of prematurity:

- Small size, with a disproportional large head

- Sharper looking, less rounded features than a full-term baby's features, due to a lack of fat stores
- Fine hair (lanugo) covering the body
- Low body temperature, especially immediately after birth in the delivery room, due to a lack of stored body fat
- Lack of reflexes for sucking and swallowing, leading to feeding difficulties
- Red, thin, transparent, gelly consinstanse skin
- Soft ears.
- Chest is longer and thinner.
- Big abdomen, umbilical cord is thinner and positioned lower.
- Undeveloped external genital organs (testicles are not in the scrotum)
- Low sucking and swallowing reflexes, weak cry, slepeness
- Hypodinamia, low muscular tone
- Abdominal type of breathing, irregular, superficial, apnea frecvent
- RR 48-52 min, in extreme premature baby – up to 80 per minute.
- Low blood pressure 45/20mmHg.
- Heart rate 140 -200 beats per minute, embriocardia.

Assessment of gestational age. Physical and neuromuscular criteria of maturity are given in Expanded New Ballard score (NBS). It now also includes extremely premature infants and has been refined to improve accuracy in more mature infants. In Ballard score, physical and neurologic scores are added and by this added score, gestational age is calculated.

The score is accurate within 2 weeks of gestation in infants weighing >999 g at birth and is most accurate at 30-42 hours of age.

SIGN	NEUROMUSCULAR MATURITY SCORE							SIGN SCORE
	-1	0	1	2	3	4	5	
Posture								
Square Window								
Arm Recoil								
Popliteal Angle								
Scarf Sign								
Heel To Ear								

TOTAL 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
TOTAL NEUROMUSCULAR MATURITY SCORE	
TOTAL PHYSICAL MATURITY SCORE	
TOTAL SCORE	WEEKS

SIGN	PHYSICAL MATURITY SCORE							SIGN SCORE
	-1	0	1	2	3	4	5	
Skin	Sticky, friable, transparent	gelatinous, red, translucent	smooth pink, visible veins	superficial peeling &/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 40-50mm: -1 <40mm: -2	>50 mm no crease	faint red marks	anterior transverse crease only	creases ant. 2/3	creases over entire sole		
Breast	imperceptable	barely perceptable	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 & 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 & labia flat	prominent clitoris & small labia minora	prominent clitoris & enlarging minora	majora & minora equally prominent	majora large, minora small	majora cover clitoris & minora		

Health problems of very low birthweight infants

Immediate (acute) problems: hypothermia, hypoglycemia, hypocalcemia, respiratory difficulties , intra-ventricular hemorrhage (ivh), liver immaturity, increased susceptibility to infections, necrotizing enterocolitis (nec), patent ductus arteriosus, feeding problems, anemia of prematurity, retinopathy of prematurity, metabolic bone diseases of prematurity

Causes of low termogeneses:

- Big body area comparing with weight

- Typical position
- Muscular activity is reduced
- Brown fat tissue is reduced
- The quantity of norepinephrine after cold stress is low

- Can’t tolerate additional energetical aport which is necessary for termogenesis.

- Lungs diseases which are present in 95% of cases, makes thermogenesis limitated, due to additional consumption of oxygen.

- Thermolysis’s high due to skin irradiation and vascularization particulations of skin.

All this are the result of often hypothermia at premature babies

Long term problems

- Chronic lung disease (bronchopulmonary dysplasia)
- Poor growth
- CNS dysfunctions

The management of preterm baby is based upon the proper anticipation and prevention of complications:

- Antenatal prophylaxis
- Childbirth in a third-level maternity hospital
- Transportation "in utero“
- Use of dexamethasone for the prevention of distress syndrome in a newborn
- The administration of antibiotics for the prophylaxis of neonatal infection

If baby is of good size and vigorous, then by simply cleaning airways, wrap the baby properly and shift to well baby nursery with instructions of early feeding and monitoring for hypoglycemia and hypothermia.

If baby weight is very low < 1kg, then electively intubate the baby and shift to NICU for ventilator care. Babies weighing 1-1.5kg should also be shifted to NICU for observation and management of potential problems.Transfer from the delivery room to the NICU: If available, use transport incubator. If not, the child is placed in polyethylene bag wrapped in cloth heated before transfer. If baby's breathing is inadequate, intubate and ventilate the child hold it with Ambu bag with oxygen during the transfer.

After birth care:

1. Maintain thermo-neutral environment: It is environmental temperature at which heat production and O2 consumption is minimal yet the core temperature is maintained within normal range. Maintain temperature in the delivery room in range of 25- 30°C. Place the baby in incubator, keep humidity at 70%.

Temperature of incubator varies with age by setting air temperature or by setting skin temperature of baby. Temperature can be maintained by the use of radiant heaters by wrapping the baby properly and by the use of mitten on hands and socks on feet and cap on head if nursed in cot. To ensure thermal control infants born up to 28 weeks (birth weight less than 1500 g) are coated (up to the neck) in a polyethylene bag that closes to prevent heat loss and then placed under light source radiant .

A nest maintains the preterm infant with limits (similar to that in the womb); thus the preterm infant has a surface to touch. Nesting maintains the flexion posture, while maintaining intrauterine position and postures. The nesting positions were given using sheets or towels on the infants.

2. Maintenance of fluid and electrolyte balance: Preterm babies need more fluids as compared to full term infants. Baby should be carefully monitored for hypoglycemia, hypo or hypernatremia and hype kalemia by frequent blood samples and their correction. Fluid requirement of premature baby: -1st day 60-80 ml/kg/day , -2nd day 80-100 ml/kg/day, -3rd day 100-110 ml/kg/day, -4th day 120-130 ml/kg/day, -5th day and onwards 150-160 ml/kg/day

3. Oxygen administration: O2 administration should be carefully monitored in a very premature infant because concentration of O2 more than 40% increases the risk of lung and visual toxicity (bronchopulmonary dysplasia and retrolental fibroplasia)

4. Feeding: The method of feeding should be individualized as it varies with weight and gestational age of infant. The process of oral feeding in addition to sucking requires coordination of swallowing, epiglottic closure of larynx, normal esophageal motility, a synchronized process which is usually absent prior to 34 weeks of gestation. If the infant is more than 35 wk gestation, weighing > 2kg and there is no contraindication of feeding like persistent vomiting, RDS, sepsis, seizures etc; he should be started on oral feeding preferably by breast milk or infant formula with bottle or cup and spoon. If baby cannot suck and general condition is better, tube feeding is preferred. If very sick or premature, then total or partial parenteral nutrition is the choice.

AE initiated the first 2 hours of life, with sol. Glucose 15% (or Maltodextrin15%), then with milk-10 ml / kg / day on the first day for children up to 1000 g; 20 ml / kg / day -for children weighing more than 1000 g. For a more effective follow enteral nutrition intestine release

5. Supplementation of iron and vitamins. Every preterm infant should receive supplement vitamins in addition to breast milk until full mixed feeding is established or weight is more than 2250 gm. All preterm babies should receive vitamin K prophylaxis 1 mg at birth. It is given Vitamin E (also decreases the incidence of retinopathy), folic acid in the 3rd week of life. Vitamin A 5,000 IU / m X 3 times / week for 4 weeks. (children weighing ≤1000 g + requires respiratory support 24 hours after birth)-day 8 of life if the volume of enteral nutrition is about 2 ml / hour and the baby is not added to parenteral nutrition multivitamins and folic acid 0.5ml. Iron supplementation should be started at the age of 4-8 weeks at dose of 2mg/kg/day. Before this age it is not well absorbed and also increases the risk of gastrointestinal infection and also predisposes to vitamin E deficient hemolysis

6. Protection from infection: Transplacentar passage of gamma globulins occurs at 32 weeks of gestation which is why preterm babies are highly susceptible to infection. Make laboratory tests in for infection evaluation in premature children: a) complete blood count (complete with differential), b) C-reactive protein after 12 hours of life, c) calculation ANC, d) the ratio of imature/ total neutrophil count.

7. Early detection and management of complications of prematurity

Prognosis.

It is related to gestation and birth weight. With new advancement in neonatal intensive care in developed countries, the survival rate for 24 wk gestation is 25%. But still there is marked disability in survivors. 5-10% of babies with birth weight less than 1500 gm have major handicap such as cerebral palsy, developmental delay, blindness or deafness. Risk increases with decreasing gestational age and weight

Discharge criteria for preterm baby

- A premature infant should be taking feed by nipple (either bottle or breast feed)

- Baby should be gaining weight properly (10-30 g/day)
- Temperature should be stabilized in an open cot
- There should be no recent episode of apnea or bradycardia
- There should be no parenteral drug administration, it may be converted to oral dosing