

Chapter 13

Preterm and Post-term Newborns



The Preterm Newborn

Classified on gestational age & level of maturation.

Gestational age: the actual time, from conception to birth, that fetus remains in uterus

Preterm- less than 37 weeks

Early Term- 37 weeks to 38 weeks, 6 days

Full Term – 39 to 40 weeks, 6 days

Late Term- 41 to 42 weeks

Post-term - beyond 42 weeks

SGA-maybe due to growth restrictions

LGA-neonate is 4000 g (8.8 lb)

The Preterm Newborn

Ballard scoring - standard method to evaluate gestational age. Based on infant's *external characteristics & neurological development*.

A newborn will score 45 for a 42 week gestation or only 20 for a 32-week gestation

Level of maturation – refers to how well developed infant is at birth & the ability of organs to function outside uterus.

MATURATIONAL ASSESSMENT OF GESTATIONAL AGE (New Ballard Score)

NEUROMUSCULAR MATURITY

NEUROMUSCULAR MATURITY SIGN	SCORE							RECORD SCORE HERE
	-1	0	1	2	3	4	5	
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

GESTATIONAL AGE (weeks)

By dates _____
By ultrasound _____
By exam _____

A

PHYSICAL MATURITY

PHYSICAL MATURITY SIGN	SCORE							RECORD SCORE HERE
	-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 40-50 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 & 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		
TOTAL PHYSICAL MATURITY SCORE								

Reference
Ballard JL, Khoury JC, Wedig K, et al. New Ballard Score, expanded to include extremely premature infants. *J Pediatr* 1991; 119:417-423. Reprinted by permission of Dr Ballard and Mosby-Year Book, Inc.

B

C

(From Ballard, J.L., Khoury, J., Wedig, K., et al. (1991). New Ballard score expanded to include extremely premature infants. *J Pediatr*, 119, 417-423.)

Predisposing Causes of Preterm Birth

Numerous:

- ❖ unknown
- ❖ multiple births
- ❖ illness of mother (malnutrition, heart disease, DM, or infectious conditions)
- ❖ GH
- ❖ placental abnormalities-such as rupturing of membranes, placenta previa or abruptio placentae



Studies have also shown a relationship of preterm birth and:

- ❖ poverty
- ❖ smoking
- ❖ alcohol consumption
- ❖ cocaine abuse & other drugs

Physical Characteristics

- ☞ Skin – transparent & loose
- ☞ Superficial veins can be seen
- ☞ Lack of subcutaneous fat
- ☞ Lanugo (fine hair) covering forehead, shoulders, & arms
- ☞ Abundant vernix caseosa
- ☞ Extremities appear short.
- ☞ Few creases on soles of feet.
- ☞ Protruding abdomen
- ☞ Short nails
- ☞ Small genitalia



Related Problems

Inadequate respiratory function.

- Failure of alveoli to enlarge & bring closer to capillaries in lungs.
- The muscles that move chest are not fully developed.
- The distended abdomen creates pressure on diaphragm.
- Stimulation of respiratory center is immature.
- Gag & cough reflex are weak due to immature nerve supply.

Warmed & humidified oxygen may be required and administered via nasal catheter, incubator, or oxygen hood.

Oxygen saturation levels are monitored.

Infant is usually admitted to NICU.



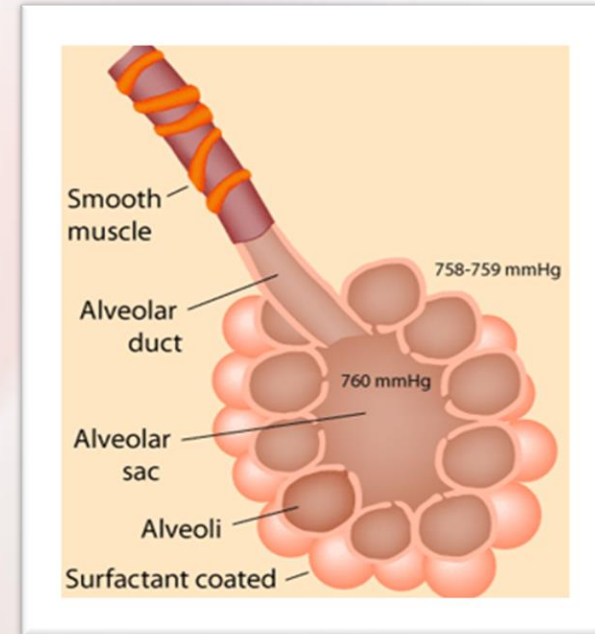
Respiratory Distress Syndrome

Also called Hyaline membrane disease
(respiratory distress syndrome type 1)

RDS 1 - result of lung immaturity, which
leads to ↓ gas exchange.

➤ deficient synthesis or release of surfactant
(chemical in lung)

Surfactant is ↑ in lecithin (fatty protein)
necessary for absorption of oxygen in lungs.

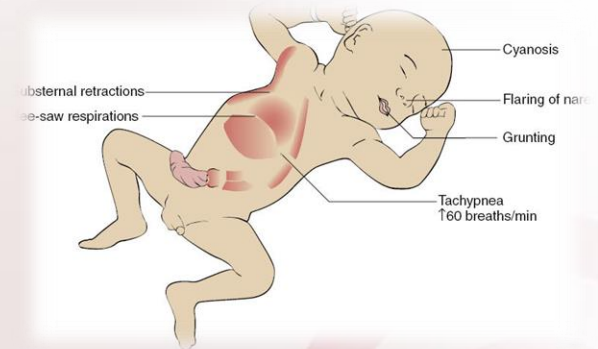


Manifestations

Symptoms of:

Respiratory Distress-

- ↑ resp. of 60 breaths/min or more
- rapid respirations with grunt like sounds
- nasal flaring
- cyanosis
- intercostal & sternal retractions



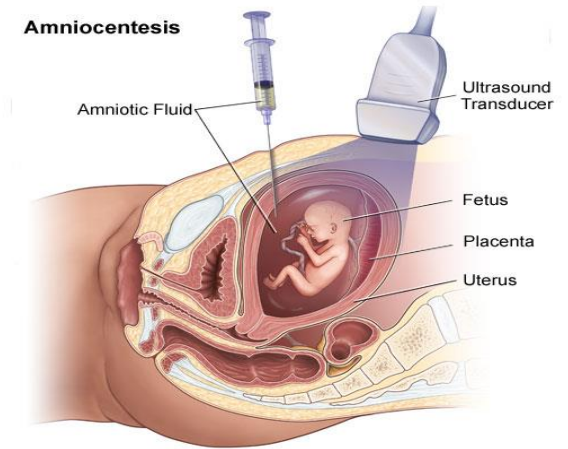
Mechanical ventilation may be necessary.
Ideally cared for at NICU.

Treatment

Surfactant begins to appear in lungs at 24 weeks of gestation.

➤ At 34 weeks there is enough produced to enable infant to breathe adequately at birth.

If insufficient amts. are detected through amniocentesis, the mother can get IM injections of corticosteroids such as betamethasone (Celestone) to ↑ production of surfactant.



Preterm Newborns

Surfactant may be administered via endotracheal tube at birth and lung function improvement will be seen in approximately 72 hours.

- Production is altered during episodes of:
 - cold stress
 - hypoxia
 - poor tissue perfusion

V/S, ABGs, are closely monitored. Placed in warm incubator. Oxygen therapy may be given by hood.

Cluster Care—to keep handling at minimum

Oxygen toxicity is a ↑ risk for infants receiving prolonged treatment w/high concentrations of oxygen. Toxic response to this is called Bronchopulmonary dysplasia.



Apnea

Cessation of breathing for 20 seconds or longer.

Believed to be r/t nervous system immaturity.

An episode may be accompanied w/bradycardia & ↑ cyanosis.

The use of apnea monitors alert nurses to this complication.

Intervention: gentle rubbing of

- infant's feet
- ankles
- back

May stimulate breathing.

Neonatal hypoxia:
inadequate oxygenation at cellular level

Monitored w/pulse oximeter.

- A reading of 92% or higher is normal.



Sepsis

Generalized infection of blood stream.

Preterm are at **↑** risk for developing sepsis due to immaturity of many body systems.

- Liver is immature & forms antibodies poorly
- Little or no immunity received from mother
- insufficient stores of nutrients, vitamins, & iron

Inflammatory process: **NO** local signs of infection, which hinders diagnosis.

- Signs:
- **↓** temp.
 - lethargy
 - irritability
 - poor feeding
 - resp. distress



Poor Control of Body Temperature

The preterm is vulnerable to cold stress.

Heat loss results from following factors:

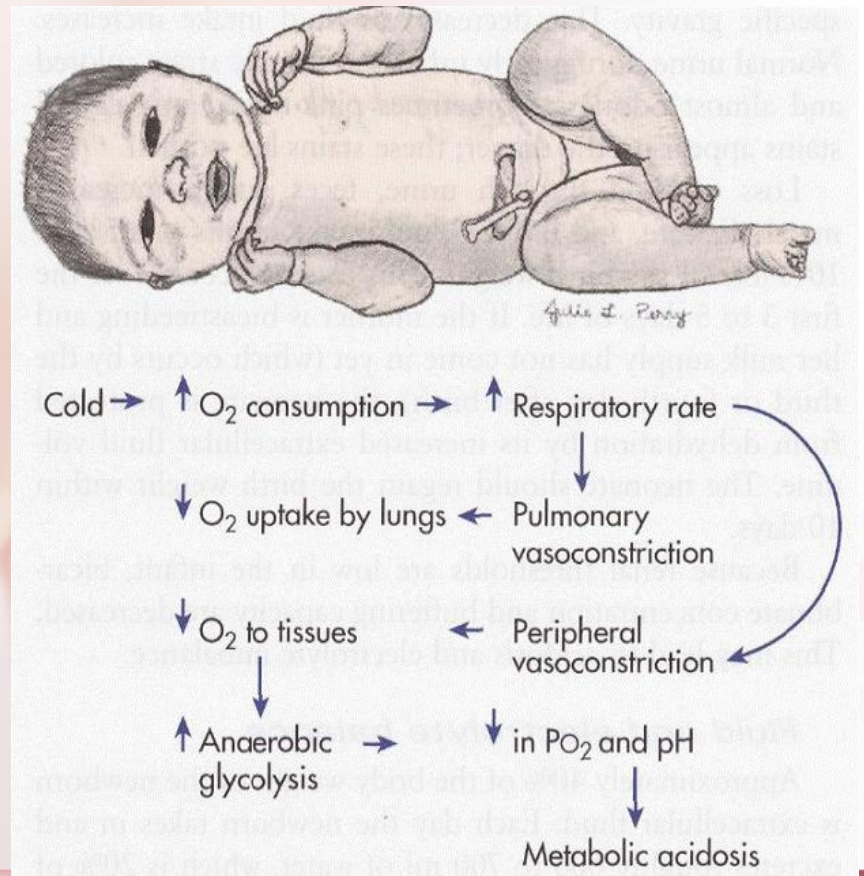
- lack of brown *fat*
- excessive loss by radiation
- immature heat-regulating center of brain
- weak muscles, less resistant to cold
- cannot *shiver* body posture with leg extension
- ↑ metabolic rate, prone to ↓ glucose levels



Cold Stress

Signs/symptoms:

- ↓ skin temp.
- ↑ resp. rate with periods of apnea
- bradycardia
- mottling of skin
- lethargy



Nursing Care

A skin probe is used to monitor temperature.

➤ infant is placed under radiant warmer or incubator

➤ Temp. of incubator is adjusted so it is at optimal level (36.2°C - 37°C) [97.1°F – 98.6°F].

Temperature is checked and recorded every 2 hours.



Hypoglycemia

Common among preterm infants

- plasma glucose levels lower than 30 mg/dL
- must be anticipated & treated promptly due to needs of steady glucose for brain
- infants require gavage or parenteral feedings

Signs: tremors, weak cry, lethargy, convulsions

Nursing Interventions include glucose monitoring and nasogastric or parental feedings

Hypocalcemia

Calcium is transported across placenta in greater amounts during 3rd trimester. Early birth can result in infants with lower calcium levels.

Early

➤ parathyroid fails to respond to ↓ levels of Ca^+

Infants stress by:

- hypoxia
 - birth trauma
 - receiving sodium bicarbonate
 - born to a mother who had diabetes while pregnant
 - mother having vitamin D deficiency while pregnant
- are at ↑ risk for this problem

Late

➤ occurs 1 week who are fed cow's milk

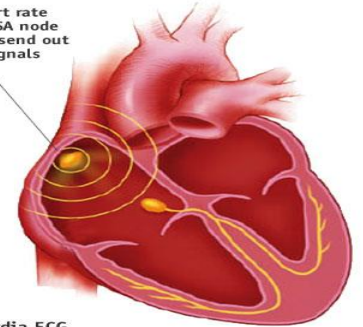
➤ Cow's milk ↑ phosphate levels ↓ Ca^+

Treated with:

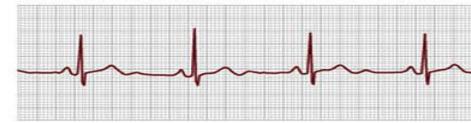
- IV calcium gluconate
- monitor for bradycardia



Slow heart rate or when SA node does not send out enough signals



Bradycardia ECG

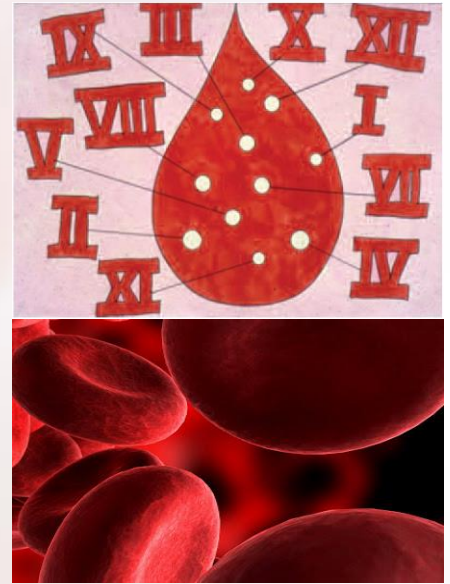


Increased Tendency to Bleed

- More prone to bleeding
- blood deficient in prothrombin
- head particularly susceptible to injury, causing intracranial hemorrhage

Monitor neurological status-report bulging fontanelles; lethargy; poor feeding; and seizures

Bed in slight Fowler's and avoid unnecessary stimulation—can cause ICP



Retinopathy of Prematurity

Separation and fibrosis of retina,
which leads to blindness

Damage to immature retinal blood
vessels:

- caused by ↑ arterial blood oxygen levels
- leading cause of blindness in newborns weighing less than 1500 g (3.3 lb)
- Priority: careful monitoring of oxygen saturation with pulse oximeter.
- level of oxygen in blood, rather than amount of oxygen is important in oxygen therapy



Poor Nutrition

- Stomach capacity is small
- Stomach sphincter muscles are immature
- Contributes to regurgitation & vomiting

Gavage or parenteral feedings are usually required until infant is strong enough to tolerate oral feedings.



Necrotizing Enterocolitis

Acute inflammation of bowel that leads to bowel necrosis.

Factors: ➤ Diminished blood supply to lining of bowel due to hypoxia or sepsis which in turn will cause a decrease in protective mucus

Sources of bacterial growth occurs when infant is fed:

- milk formula or
- hypertonic gavage feeding



Necrotizing Enterocolitis

Signs:

- ⇒ abdominal distention
- ⇒ bloody stools
- ⇒ diarrhea
- ⇒ bilious vomiting

Nursing responsibilities:

- V/S
- maintain infection control
- carefully resuming oral fluids as ordered

Measuring abdomen & listening for bowel sounds are important measures.

- Treatment includes: antimicrobials, parenteral nutrition and surgical removal of affected bowel.



Immature Kidneys

- ⇒ Infant gets easily dehydrated
- ⇒ document I & O
- ⇒ subtract dry diaper from infant's wet diaper to determine urine output
- urine output should be between 1 to 3 mL/kg/hr
- Close observation for dehydration & overhydration is important.
- Documentation should include assessment of fontanelles, tissue turgor, weight, and urine output



Jaundice

Immature liver called Icterus or Jaundice

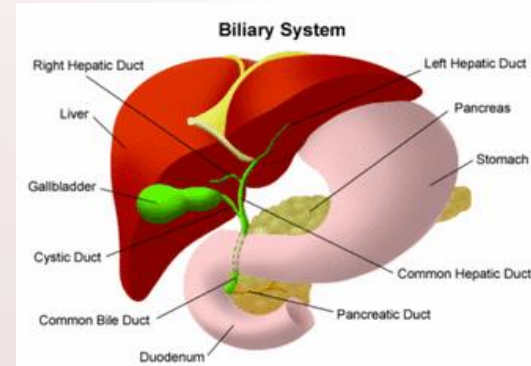
Jaundice-skin & sclera to assume a yellow-orange cast.

➤ Liver is unable to clear blood of bile pigments that result from normal postnatal destruction of RBCs

The higher the bilirubin level, the deeper the jaundice & greater risk for neurological damage.

An increase of more than 5 mg/dL in 24 hours or a bilirubin level greater than 12.9 mg/dL requires careful investigation

In preterms, the normal rise in bilirubin levels is slower than in full-term infants & lasts longer, which predisposes infant to hyperbilirubinemia.



Jaundice

Total bilirubin levels peaks 3-5 days after birth.

➤ Early discharge needs follow up within 2 days to check total serum bilirubin and prevent development of kernicterus

Treatment goals for hyperbilirubinemia:

- prevent kernicterus--a serious neurological complication that can cause brain damage
- avoid continued ↑ of bilirubin levels in blood



Thermoregulation

Involves:

- maintaining a stable body temperature
- Preventing hypothermia & hyperthermia

Neutral thermal environment:

Placing infant in incubator to control temperature.



Thermoregulation

Temperature of incubator is adjusted to level that will maintain optimal body temp.

☛ Nurse records temp of infant & incubator every 2 hours.

A heat-sensitive probe is taped to abdomen to monitor infant's temperature.



Kangaroo Care

Uses skin-to-skin contact.

➤ Infant only wears a diaper and cap & rests on father's or mother's chest.

➤ The skin warms & calms the infant, and contact promotes bonding.



Nutrition

Feeding varies.

Ability to coordinate breathing, sucking, & swallowing, does not develop before 34 weeks of gestation.

➤ A preterm may require gavage feedings (via a tube placed through the nose or mouth into stomach)-these need to be replaced every 3 to 7 days

Nursing care: observe and record bowel sounds and passage of meconium

When gavage fed:

- ➡ The contents of stomach should be aspirated before feeding is started
- ➡ If residual of liquid contents is aspirated, the physician is notified before proceeding with feeding.



Prognosis

Growth of preterm nears that of term infant by about 2nd year, if no complications or severe birth defects.

In general, growth & development of preterm infant are based on current age minus number of week before term the infant was born.

Example: If born at 36 week of gestation,

➤ 1 month old infant would be newborn's achievement level.

40 weeks

-36 weeks

4 weeks = 1 month



Nursing Care

Includes:

- ▶ Positioning of newborn; and go over Table 13-1 for signs to report
- ▶ provide short periods of stimulation during alert phase of activity
- ▶ teach parents to use black & white mobile
- ▶ stroking gently
- ▶ talking to infant
- ▶ rocking
- ▶ providing ROM activity
- ▶ Kangaroo care



Nursing Care

Care should be taken NOT to overly stimulate or tire the infant.

- there should be minimal stimulation during feeding to ensure concentrates on sucking and swallowing

- stimulation and interaction with parents should be provided between feedings



The Postterm Newborn

Pregnancy goes beyond 42 weeks.

Cause:

- unclear
- it is known that placenta does not function adequately as it ages
- Mortality & morbidity are ↑ than term infants.

Complications

Associated w/postmaturity:

- asphyxia
- meconium aspirations
- hypoglycemia
- polycythemia
- dystocia-difficult birthing
- birth defects
- seizures



Physical Characteristics

- Long & thin-because fat deposits have been used up in utero-possible cold stress
- Little lanugo
- Skin, dry & cracked-because loss of vernix caseosa
- Long nails
- Thick head of hair
- Looks alert



Nursing Care of Postterm Newborns

Observing for:

- ✓ Respiratory distress-due to meconium
- ✓ Hypoglycemia-depleted glycogen
- ✓ Hyperbilirubinemia-due to polycythemia
- ✓ Cold stress-due to loss of fat storage

