

Nursing Management of the Neonatal Period
Chapters 23-26

Chapter 23

Respiratory Adaptations

- Intrauterine factors
 - Fetal lung development
 - Ongoing development
 - Surfactant – peaks ~ 35 weeks & remains high
 - Fetal breathing movements
 - Occur ~ 11 weeks gestation
 - Fluid filled lungs
 - Develop chest wall muscles & diaphragm

Respiratory Adaptations

- Initiation of breathing
 - Mechanical events
 - Removal of fluid from lungs
 - Chemical stimuli
 - Transitory asphyxia
 - \uparrow PCO₂ & \downarrow pH & PO₂
 - Thermal stimuli
 - \downarrow temperature
 - Sensory stimuli
 - Tactile, auditory, visual stimuli
- Factors opposing the 1st breath
 - Alveolar surface tension
 - Viscosity of lung fluid
 - Degree of lung compliance
- Cardiopulmonary physiology
 - Change from fetal to newborn blood flow
- Oxygen transport
 - Hgb F – high affinity for O₂
- Maintaining respiratory function
 - Difficult b/c
 - Large heart
 - Weak intercostal muscles
 - Rigid rib cage (horizontal)
 - Large abdomen
- Characteristics of newborn respirations
 - RR 30-60 breaths/min

- 60-70 breaths/min first 2 hours after birth
- Diaphragmatic, shallow, irregular
- Periodic breathing– 5 to 15 second pause
- Nose breather
- Report: RR <30 or >60 at rest, retractions, cyanosis, nasal flaring, grunting

Cardiovascular Adaptations

- Fetal-newborn transitional physiology
 - ↑ aortic pressure & ↓ venous pressure
 - ↑ systemic pressure & ↓ pulmonary artery pressure
 - Closure of foremen ovale
 - 1-2 hours after birth essentially closed
 - By 6 months, permanent closure
 - Closure of ductus arteriosus
 - 15 hours after birth
 - By 3 weeks, permanent fibrosis
 - Closure of ductus venosus
 - Within 2 months
- Characteristics of cardiac function
 - Heart rate
 - 120-160 (avg 125-130 at rest)
 - Apical pulse full minute
 - Blood pressure
 - High after birth, low 3 hours later (varies with wt)
 - Average 72/47 full term at rest (↑20 with crying)
 - Heart murmurs
 - 90% transient
 - Cardiac workload
 - Shift from right side to left side

Hematopoietic System

- Physiologic anemia of infancy
- Leukocytosis
- Blood volume varies (80-85 mL/kg)

Temperature Regulation

- Need higher environmental temp to maintain core temp.
- Factors affecting temp:
 - Newborn has decreased SQ fat & thin skin
 - Blood vessels closer to skin
 - Flexed position

- Size & age
- Heat loss
 - Convection – A/C; O2 mask; removal from incubator
 - Radiation – walls of incubator
 - Evaporation – when wet; bath time
 - Conduction – cold hands; cold scale
- Heat production
 - Brown adipose tissue (brown fat)
 - Begins at 26-30 weeks
 - Increase basal metabolic rate & O2 consumption
- Response to heat
 - Sweating; peripheral vasodilation
 - Increase basal metabolic rate & O2 consumption

Hepatic Adaptation

- Iron storage & RBC production
 - Iron storage should last ~ 5 months, then need supplement
- CHO metabolism
 - Glucose 70-80% of mom's
 - Increase glucose needs immediately after birth
 - Accucheck may be ordered
- Coagulation
 - Sterile gut
 - Vitamin K dependent clotting factors
 - Vitamin K (Aqua MEPHYTON)

Conjugation of Bilirubin

- Conjugation – convert bili to excretable form
- Unconjugated bili
 - Byproduct of destroyed RBCs
 - Not excretable
- Total bili
 - <3 mg/dL at birth
 - Liver must begin to conjugate, so increase bili levels first few days

Hepatic Adaptation: Physiologic Jaundice

- Related to
 - Accelerated destruction of fetal RBCs
 - Impaired conjugation of bili
 - Increased bili reabsorption from GI
- Occurs in 50% term & 80% preemies
- 2-3 days after birth; peak 3-5 days in term & peak 5-7 days in preemie
- Bili 4-6 mg/dL = yellow skin & sclera
- Should not exceed 13 mg/dL

- Nursing interventions to help decrease risk of jaundice:
 - Maintain temp ≥ 97.8
 - Monitor stools
 - Encourage early feedings

Hepatic Adaptation: Breastfeeding Jaundice

- Occurs in 1-5% breastfed newborns
- Bili levels peak at 2-3 weeks
- May reach 20-25 mg/dL
- Rarely should breastfeeding be interrupted

Gastrointestinal Adaptation

- Can digest simple CHO, protein, fat (not as well)
- In utero – swallowing & gastric emptying
- Stomach capacity at birth = 50-60 mL
- Relaxed cardiac sphincter = regurg
- Gain 30g/day & 1.2 cm
- Meconium passage in 8-24 hours

Urinary Adaptation

- Less able to concentrate urine until 3 mos
- 93% void within 24 hours; 100% void by 48 hours
- Few voids until increased PO intake
- 1st two days, expect 2-6 voids; then increases to 5-25 voids/day
- Blood-tinged diapers- pseudomenstruation, circumcision

Immunologic Adaptation

- Decreased immune function
- Hypothermia = possible infection
- IgG antibodies cross placenta in 3rd trimester

Neurologic & Sensory-Perceptual Functioning

- Intrauterine factors
 - Maternal nutrition; physical environment; drug/alcohol use
- Characteristics
 - Flexed extremities
 - Able to fixate on faces & shapes/patterns
 - + blinking reflex with light
 - Lusty, vigorous cry
 - Cephalocaudal growth pattern
 - Hypertonia
 - + reflexes
- Periods of reactivity
 - 1st period of reactivity
 - Lasts 30 mins after birth
 - Awake & active
 - Period of inactivity to sleep phase
 - Usually lasts several hours
 - RR & HR return to baseline
 - Second period of reactivity
 - Lasts 4-6 hours
- Behavioral states of newborn
 - Sleep states
 - Deep or quiet sleep
 - Active REM
 - Alert states
 - Drowsy or semidozing
 - Wide awake
 - Active awake
 - Crying
- Behavioral-sensory capacities of newborn
 - Habituation
 - Orientation
 - Self-quieting
 - Auditory capacity
 - Olfactory capacity

- Taste & sucking
- Tactile capacity

Nursing Assessment of the Newborn

Chapter 24 Assessment Timing

- 1st assessment – in birthing area
- 2nd assessment – 1st 4 hours
- 3rd assessment – prior to discharge

1. Estimation of Gestational Age

- Assessment of physical characteristics
 - Resting posture
 - Skin
 - Lanugo
 - Plantar creases
 - Areola
 - Ear form & cartilage distribution
 - Male & female genitals
- Vernix
- Hair
- Skull firmness
- Nails
- Assessment of neuromuscular maturity
 - Square window sign
 - Recoil
 - Popliteal angle
 - Scarf sign
 - Heel-to-ear extension
 - Ankle dorsiflexion
 - Head lag
 - Ventral suspension
 - Major reflexes

2. Physical Assessment

- General appearance
 - Head large for body
 - Body appears long & extremities short
- Weight
 - Avg 3405 gm (7 lb 8 oz)
 - Affected by race, parents age/size, health of mother, interval b/t pregnancies
 - Increases 198 g weekly 1st 6 months
 - 5-10% wt loss 1st 3-4 days
- Length
 - Avg 50 cm (20 in)
 - Increase 1 in monthly 1st 6 months
- Head circumference
 - 32-37 cm (12.5-14.5 in)
 - Place tape over most prominent part of occiput & above eyebrows
 - 2 cm > chest circumference
- Chest circumference
 - Avg 32 cm (12.5 in)
 - Place tape measure at lower edge of scapulas & directly over nipple line
- Temperature
 - Skin thermal sensor 96.8-97.7
 - Axillary 97.7 – 98.6
- Skin characteristics
 - Acrocyanosis
 - Mottling
 - Harlequin sign
 - Jaundice
 - Erythema toxicum
 - Milia
 - Skin turgor
 - Forceps marks
- Birthmarks
 - Telangiectatic nevi (stork bites)
 - Mongolian spots
 - Nevus flammeus (portwine stain)
 - Nevus vasulosus (strawberry mark)

- Head
 - General appearance
 - ¼ of body size
 - Molding = overriding cranial bones
 - Fontanelles
 - Anterior – diamond shaped, 3-4 cm X 2-3 cm; closes in 18 months
 - Posterior – triangular, 0.5 cm X 1 cm; closes in 8-12 weeks
 - Cephalhematoma
 - Blood; reabsorb over weeks/months
 - Caput succedaneum
 - Soft, swollen area of scalp; reabsorbs over weeks/days

- Face
 - Designed to facilitate sucking
- Eyes
 - Blue-gray or slate-blue-gray color; sclera bluish white
 - PERRL
 - Blink reflex
 - Eyelids edematous
 - Chemical conjunctivitis – r/t silver nitrate
 - Subconjunctival hemorrhages
 - Disappear in weeks
- Eyes
 - Strabismus
 - Dolls eyes
 - No tears
- Nose
 - Nose breathers – ensure patency
 - Can smell
- Mouth
 - Pink lips
 - Cleft lip/palate w/ or w/o lip
 - Epstein's pearls
 - Thrush
- Ears
 - Soft, pliable, easily recoil
 - Pinna parallel to outer/inner canthus of eye
 - Hearing screen

- Neck
 - Short, creased with skin folds
 - Poor muscle tone
 - Head lag
 - Clavicle fracture – lump, creptius, neg. Moro reflex

- Chest
 - Breasts/nipples
- Cry
- Respiration
 - 30-60 breaths/min
 - Diaphragmatic
 - Assess s/s distress
 - Breath sounds
- Heart
 - Rate/rhythm
 - Position of apical impulse
 - Heart sounds
 - Peripheral pulses
- Abdomen
- Umbilical cord
- Genitals
 - Female
 - Male
- Anus
- Extremities
 - Arms & hands
 - Polydactyly= extra digits
 - Syndactyly = webbing of fingers or toes
 - Inspect creases
 - Brachial palsy
 - Legs & feet
 - Ortolani's/Barlow's maneuver
- Back
 - Straight & flat
 - Assess sacral dimple

3. Neurological Assessment

- Neuro status
 - State of alertness
 - Resting posture
 - Cry
 - Quality of muscle tone
 - Motor activity
- Neuro status (cont.)
 - Tonic neck reflex
 - Moro reflex
 - Grasping reflex
 - Rooting reflex
 - Sucking reflex
 - Babinski reflex
 - Trunk incurvation (Galant reflex)

Behavioral Assessment

- Newborn behavior
 - Habituation
 - Orientation to stimuli
 - Motor activity
 - Variations
 - Self-quieting activity
 - Cuddliness or social behaviors

Normal Newborn: Needs & Care

Chapter 25

Nursing Assessment & Diagnosis: 1st 4 Hours of Life

- Ineffective airway clearance
- Risk for altered body temperature
- Pain
- Admission
 - Condition of newborn
 - Labor & birth record
 - Antepartal history
 - Parent-newborn interaction

- Weight & measurements
- Physical exam
- Labs as appropriate
- Maintenance of clear airway
 - Position on back or side
 - Suction available
- Stable vital signs
 - Temperature: 97.7-98.6
 - Pulse: 120-160
 - Respirations: 30-60
 - Blood pressure 80-60/45-40
- **Maintenance of neutral thermal environment**
 - Prewarm radiant warmer
 - Wipe off blood & excessive vernix
 - May give to mom after wrapping for skin to skin contact
 - Place under radiant warmer
 - Skin probe nothing except diaper and hat
- **Maintenance of neutral thermal environment**
 - Dress & wrap in blanket
 - Cap on head
 - Avoid chilling
- **Prevention of complications of hemorrhagic disease of newborn**
 - Vitamin K (AquaMEPHYTON)
 - 0.5 – 1 mg IM in vastus lateralis
 - 25 g 5/8 in needle
 - Within 1 hour of birth
 - S.E.: pain & edema at injection site; allergic reaction possible
 - NSG: protect from light. Give before invasive procedure; observe for jaundice & hemolytic anemia; observe for bleeding
- Prevention of eye infection
 - Prophylaxis – N gonorrhoeae
 - Topical meds such as 0.5% erythromycin
 - ¼ inch along lower conjunctiva of each eye
 - 1st hour after birth
 - S.E.: local edema, inflammation, drainage (should clear in 24-48 hours)
 - NSG: clean eyes before administration; massage eyelids gently to distribute med; may wipe away excess after 1 minute
- **Early assessment of distress**
 - Increased RR labored respirations

- Sternal retractions
- Nasal flaring
- Grunting
- Excessive mucus
- Facial grimacing
- Central cyanosis
- Abdominal distension or mass

- Bile-stained vomitus
- No meconium within 24 hours of birth
- No urine within 24 hours of birth
- Jaundice within 24 hours
- Hypo/hyperthermia
- Jitteriness or blood glucose < 40
- First feeding
 - Breastfeeding – encourage early attempts
 - Formula feeding – begin by 5 hours of age
 - Cues to feed – active bowel sounds, rooting, sucking

- Promotion of adequate hydration/nutrition
 - Maintain neutral thermal environment
 - Early, frequent feedings (at least q 3 h)
 - Monitor & record void/stool
 - Daily weight – expect 10% wt loss 1st week
 - Ensure adequate rest
 - Assess breast/bottle feeding

- Altered nutrition: less than body requirements
- Altered urinary elimination
- Risk for infection
- Health-seeking behaviors
- Altered family processes
- Maintenance of cardiopulmonary function
 - VS every 6-8 hours or more
 - Propped, back or side-lying position
 - Bulb syringe in bassinet at all times!!
 - Cardiac/respiratory monitor if at risk

- Promotion of skin integrity
 - Diaper changes – clean with water/cotton wipe
 - Umbilical cord care
 - Assess bleeding, infection such as smell, redness and drainage, heat or tenderness
- Promotion of safety/prevention of complications
 - Safety
 - Compare ID bands!!!!
 - All employees must wear badge
 - Don't leave baby alone in room
 - Code Pink
- Promotion of safety/prevention of complications
 - Prevent complications
 - Infection
 - 2-3 minute hand scrub beginning of shift & continued handwashing
 - Bleeding
 - Assess, monitor
 - Vaseline gauze after circumcision
- Circumcision
- Parent-infant attachment
 - Eye-to-eye contact immediately after birth
 - Holding
 - Feeding
 - Quieting
 - Bathing

Parent Teaching

- General instructions
 - Handling, positioning, bathing, cord care, taking temp, normal voiding/stooling
- Nasal/oral suctioning
 - Nose breathers!
 - Bulb syringe
- Swaddling
- Sleep & activity
- Car safety
 - Back seat, rear facing

- Newborn Screening Tests
 - NC – PKU, sickle cell, hypothyroid, etc.
 - Must be at least 24 hours old
- Immunizations
 - Hep B

Newborn Nutrition

Chapter 26 Nutritional Needs

- Protein – cellular growth
- CHO – energy
- Fat – calories, f/e, brain/neuro system
- 105-108 kcal/kg/day
- 140 – 160 mL/kg/day
- Iron

Breast Milk Feeding

- Colostrum
 - More proteins, vitamins, minerals
 - Immunoglobulins
 - Lasts 2-4 days, then transitional milk
- Transitional milk
 - Lasts until 2 weeks PP
 - More calories than colostrum
- Mature milk
 - 10% solids; 90% water
 - Composition varies
 - 20 kcal/oz
- Immunologic advantages
 - Protection against infection
 - nonallergenic
- Nutritional advantages
 - Brain development
 - Appropriate doses of minerals
 - Iron readily absorbed
 - All natural
- Psychosocial advantages

- Contraindications
 - Mother – HIV/AIDS
 - Certain meds mom's taking
 - Baby – galactosemia
- Disadvantages
 - Must always be present to feed
 - Dad doesn't get to feed

Formula Feeding

- Numerous types
 - _ Artificial baby milk
 - _ Lactose free
 - Soy protein-based
 - Specialized
- Must mix correctly
- Possible allergies

Formula vs Breast Milk Initial Feeding

- Look for cues infant is ready
- Assess suck, swallow, gag reflexes
- Stimulates peristalsis
- Enhances maternal-infant attachment
- Expect some regurg – position on R side

Establishing a Feeding Pattern

- On demand
 - Breast
 - may cluster feed at first, then go longer intervals b/t feeds
 - At least q 2 hours at first to establish milk supply
 - Bottle
 - Q 3-4 hours
 - May be able to go all night by 3 months
- Increased feedings with growth spurts

Promotion of Successful Infant Feeding

- Support
- Get comfortable
 - Positioning
- Make sure baby is ready to eat

Cultural Considerations

- Breast exposure
- How soon/how often to feed
- How long to continue breast feeding.

Physiology of Breasts & Lactation

- Prolactin – promotes milk production
- Oxytocin – letdown reflex

- Must empty completely & frequently

Breastfeeding Education & Self-Care

- Breastfeeding process
 - Adequate nutrition
 - Maternal-infant attachment
 - Prevent trauma to nipples
- Breastfeeding assessment
 - Maternal & infant cues; latch on; position; letdown; nipple condition; infant response; maternal response
 - Lactation consultant may be needed
- Leaking
 - R/t thinking about/hearing/seeing baby
 - Breast pads – change frequently
- Supplemental bottle-feeding
 - Nipple confusion???
 - Avoid bottles until breastfeeding established
 - Is he getting enough?
 - Breasts soften after feeding
 - 6-8 wet diapers/day
 - Gaining weight
 - Hear sucking
- Expression of milk
 - Pump at least q3 hours at first
 - Electric pump
 - Both breasts simultaneously
- Storing breast milk
 - Room temp – 6-10 hours

- Up to 3 days in refrigerator
- Frozen 3-4 mos (side freezer) 6 mos (deep freeze)
- Store in plastic bottles/bags

- External supports
 - LaLeche League
 - Lactation consultants
 - Books, videos, etc.
- Drugs & breastfeeding
 - Most drugs pass into breastmilk, but most only appear in small amounts in milk
 - Very few drugs contraindicated
 - Avoid long acting drugs
 - Less drug passes into milk if taken just after feeding
 - Risk vs. benefit

Bottle Feeding Education

- Always hold bottles; never prop
- Appropriate nipple size
- Point nipple into mouth
- Burp infant
- Expect reflux
- Avoid overfeeding
- Preparing bottles
 - Bottles dishwasher safe
 - Nipples – warm soapy water
 - May prepare up to 1 day supply formula
 - Discard leftovers
- See “Key Facts To Remember” p 678-679

Nutritional Assessment

- Nutritional history from parent
 - Type, amt, frequency of milk, supplemental foods, vitamins/minerals; if formula, how is it mixed
- Weight gain since last visit
- Growth chart %
 - Weight, head, length
- Physical exam