THE NEONATE AT 2 HOURS TO 2 DAYS OF AGE

NEONATAL ASSESSMENT DATA BASE (FULL-TERM)

(Refer to CP: The First Hour of Life.)

Activity/Rest

Wakeful state may be as little as 2–3 hr first several days.
Infant appears semicomatose while in deep sleep; grimacing or smiling is evident in rapid eye movement (REM) sleep; averages 20 hr of sleep per day.

Circulation

Apical pulse averages 120–160 bpm (115 bpm at 4–6 hr, rising to 120 bpm at 12–24 hr after birth); may fluctuate from 80–100 bpm (sleeping) to 180 bpm (crying).
Peripheral pulses may be weak (bounding pulses suggest patent ductus arteriosus [PDA]); brachial and radial pulses are more easily palpated than femoral pulses (absence of femoral and dorsalis pedis pulses suggests coarctation of the aorta).
Heart murmur often present during transition periods.
Blood pressure (BP) ranges from 60–80 mm Hg (systolic)/40–45 mm Hg (diastolic), average resting pressure approximately 74/46 mm Hg; BP lowest at 3 hr of age.
Umbilical cord clamped securely with no oozing of blood noted; shows signs of drying within 1–2 hr of birth, shriveled and blackened by day 2 or 3.

Elimination

Abdomen soft without distension; active bowel sounds present several hours after birth
Urine colorless or pale yellow, with 6–10 wet diapers per 24 hr
Passage of meconium stool within 24–48 hr of birth

Food/Fluid

Mean weight 2500–4000 g (5 lb 8 oz to 8 lb 13 oz);<2500 g suggests small for gestational age (SGA) (e.g., prematurity, rubella syndrome, or multiple gestation), greater than 4000 g suggests large for gestational age (LGA) (e.g., maternal diabetes; or may be associated with heredity). (Refer to CPs: The Preterm Infant; Newborn: Deviations in Growth Patterns).
Weight loss 5%–10% initially.
Mouth: Scant saliva; Epstein's pearls (epithelial cysts) and sucking blisters are normal on hard palate/gum margins, precocious teeth may be present.

Neurosensory

Head circumference 32–37 cm; anterior and posterior fontanels are soft and flat.
Caput succedaneum and/or molding may persist for 3–4 days; overriding of cranial sutures may be noted, slightly obliterating anterior fontanel (2–3 cm in width) and posterior fontanel (0.5–1.0 cm in width).
Eyes and eyelids may be edematous; subconjunctival or retinal hemorrhage may be noted; chemical conjunctivitis lasting 1–2 days may develop following instillation of therapeutic ophthalmic drops.
Strabismus and doll's eye phenomenon often present.
Top of ear aligns with inner and outer canthi of eye (low-set ears suggest genetic or kidney abnormalities).
Neurological Examination: Presence of Moro, plantar, palmar grasp, and Babinski's reflexes; reflex responses are bilateral/equal (unilateral Moro reflex may indicate fractured clavicle or brachial plexus injury); transient crawling movements may be seen.
Absence of jitteriness, lethargy, hypotonia, and paresis.

Respiration

Transient tachypnea may be noted, especially following cesarean or breech birth.

Breathing Pattern: Diaphragmatic and abdominal breathing with synchronous movement of chest and abdomen (inspiratory lag or alternating seesaw movements of the chest and abdomen reflects respiratory distress); slight or occasional nasal flaring may be noted; marked nasal flaring, expiratory grunting, or marked retraction of intercostal, substernal, or subcostal muscles indicates respiratory distress; inspiratory crackles may persist for first few hours after birth (rhonchi on inspiration or expiration may indicate aspiration).

Chest circumference approximately 30–35 cm (1–2 cm smaller than circumference of head).

Safety

Skin Temperature: 96.8°F–97.7°F (36°C–36.5°C), rectal 97.8°F–99°F (36.6°C–37.2°C).

Skin Color: Acrocyanosis may be present for several days during transition period (general ruddiness may indicate polycythemia); reddened or ecchymotic areas may appear over cheeks or on lower jaw or parietal areas as a result of forceps application at delivery; facial bruising may be noted following precipitous delivery.

Cephalhematoma may appear day after delivery, increasing in size by 2–3 days of age, then be reabsorbed slowly over 1–6 mo.

Extremities: Normal range of motion in all; mild degree of bowing or medial rotation of lower extremities; good muscle tone.

Sexuality

Female Genitalia: Vaginal labia may be slightly reddened or edematous, vaginal/hymenal tag may be noted; white mucous discharge (smegma) or slight bloody discharge (pseudomenstruation) may be present.

Male Genitalia: Testes descended, scrotum covered with rugae, phimosis common (opening of prepuce narrowed, preventing retraction of foreskin over the glans).

Teaching/Learning

Gestational age between 38 and 42 wk based on Dubowitz criteria

Diagnostic Studies

White Blood Cell (WBC) Count: 18,000/mm^3, neutrophils increase to 23,000–24,000/mm^3 the 1st day after birth (decline occurs in sepsis).

Hb: 15–20 g/dl (lower levels associated with anemia or excessive hemolysis).

Hct: 43%–61% (elevation to 65% or over indicates polycythemia; decreased levels reflect anemia or prenatal/perinatal hemorrhage).

Guthrie Inhibition Assay: Tests for presence of phenylalanine metabolites, indicating phenylketonuria (PKU).

Total Bilirubin: 6 mg/dl on 1st day of life, 8 mg/dl at 1–2 days, and 12 mg/dl at 3–5 days.

Dextrostix: Initial glucose drop during first 4–6 hr after birth averages 40–50 mg/dl, raising to 60–70 mg/dl by day 3.

NURSING PRIORITIES

1. Facilitate adaptation to extrauterine life.
2. Maintain thermoneutrality.
3. Prevent complications.
4. Promote parent-infant attachment.
5. Provide information and anticipatory guidance to parent(s).

DISCHARGE GOALS

1. Newborn adapting effectively to extrauterine life.
2. Free of complications.

3. Parent-infant attachment is initiated and progressing satisfactorily.
4. Parent(s) express confidence regarding infant care.

NURSING DIAGNOSIS:	**BODY TEMPERATURE, risk for altered**
Risk Factors May Include:	Extreme of age (inability to shiver, larger body surface in relation to mass, limited amounts of insulating subcutaneous fat, nonrenewable sources of brown fat and few white fat stores, thin epidermis with close proximity of blood vessels to the skin)
Possibly Evidenced By:	[Not applicable; presence of signs/symptoms establishes an *actual* diagnosis]
DESIRED OUTCOMES/EVALUATION CRITERIA—NEONATE WILL:	Maintain temperature WNL. Be free of signs of cold stress or hyperthermia.

ACTIONS/INTERVENTIONS	RATIONALE
Independent	
Maintain ambient temperature within established thermoneutral zone (TNZ) considering neonate's weight, gestational age, and usual clothing provided.	In response to lower environmental temperature, full-term infants increase their body temperature by crying or increasing motor activity, thereby possibly consuming more energy (stored glucose) and increasing their oxygen needs. Conversely, failure to maintain the environmental temperature within the upper limits of the TNZ may result in increased oxygen consumption, dehydration, hypotension, seizures, and apnea associated with hyperthermia.
Monitor neonate's axillary, skin (abdominal), or tympanic and environmental temperature at least every 30–60 min during stabilization period, or more frequently, per protocol.	Temperature stabilization may not occur until 8–12 hr following birth. Rates of oxygen consumption and metabolism are minimal when skin temperature (a reliable indicator of energy exchanges between infant and environment) is maintained above 97.7°F (36.5°C). Skin temperature measured over the abdomen (away from bony area) is an earlier, more reliable indicator of cold stress, because it drops in response to peripheral vasoconstriction. Axillary temperature readings may be misleading, because friction in the armpit, where brown fat stores are located, can cause false elevations. Core body temperature, as assessed by rectal temperatures, may remain misleadingly high, especially in the cold-stressed newborn, as a result of vasoconstriction and metabolism of brown fat stores. Core temperature may fall only after the newborn has exhausted compensatory mechanisms and has markedly increased oxygen consumption. Note: Rectal perforation may occur with insertion of rectal thermometer, and its occurrence is associated with 70% mortality.

Assess respiratory rate; note tachypnea (rate greater than 60/min).	Infant becomes tachypneic in response to increased oxygen needs associated with cold stress and attempts to eliminate excess carbon dioxide to reduce respiratory acidosis.
Postpone initial bath until body temperature is stable and reaches 97.7°F (36.5°C).	Helps prevent further heat losses caused by evaporation. Larger appropriate-for-gestational age (AGA) infants tend to maintain body temperature more easily than the SGA infant.
Bathe neonate, working rapidly, exposing only a portion of the body at a time, and drying each part immediately. Ensure that environment is free of drafts.	Reduces possible heat loss through evaporation and convection; helps conserve energy.
Note secondary signs of cold stress (e.g., irritability, pallor, mottling, respiratory distress, tremors, jitteriness, lethargy, and cool skin).	Hypothermia, which increases the utilization rate of oxygen and glucose, is often accompanied by hypoglycemia and respiratory distress. Cooling also results in peripheral vasoconstriction, with a drop in skin temperature observed as pallor or mottling. Irritability and apnea may be associated with hypoxia. Untreated or undetected cold stress may progress to metabolic acidosis, associated with anaerobic glycolysis; pulmonary vasoconstriction or persistent fetal circulation; inhibition of lecithin formation and increased severity of respiratory distress; and release of fatty acids into bloodstream, where they compete for bilirubin-binding sites on albumin molecules.
Maintain thermoneutral environment through use of automatically controlled or manually adjustable heating equipment. Maintain controlled heat source at 98.6°F (37°C). Position crib or incubator away from heat sources such as sunlight, heaters, or bilirubin lights. Promote gradual warming of infant as needed (approximately 1.2°F [1°C] per hr). Adjust clothing as indicated.	Prevents heat imbalance or losses. Gradual warming of hypothermic infant helps avoid possible apneic spells, hypotension, seizures, or dehydration associated with too-rapid warming and hyperthermia.
Assess for behavioral signs associated with hyperthermia (e.g., increased restlessness, perspiration that begins on head or face and proceeds to chest, apnea, seizure, and hypotension activity).	Heat dissipation occurs through peripheral vasodilation and through augmentation of cooling by evaporation and by increase in insensible water loss. Apnea, seizures, and hypotension may be related to peripheral vasodilation, which causes increased evaporative water losses, cerebral ischemia, and dehydration.
Note signs of dehydration (e.g., poor skin turgor, delayed voiding, dry mucous membranes, elevated temperature, sunken fontanels).	Axillary temperature>99.5°F (37.5°C) is considered hyperthermic and suggests overheated infant. Dehydration may develop in relation to a threefold to fourfold increase in insensible water loss.
Initiate early oral feeding.	For every 1.8°F (1°C) increase in body temperature, metabolism and fluid needs increase approximately 10%. Failure to replace fluid losses further contributes to dehydrated state.

Assess infant for other disease processes, such as infection, if temperature deviates more than 1.8°F (1°C) from one reading to next.	Temperature instability or subnormal temperature may indicate infection. (Refer to ND: Infection, risk for.) In addition, CNS disorders and dehydration may cause hyperthermia.

Collaborative

Make arrangements for transfer to NICU, if indicated.	If temperature remains low regardless of appropriate intervention related to thermoregulation, transfer of neonate may be necessary for closer observation and treatment.
Administer seizure-control medication (e.g., phenobarbital), as needed.	Acts directly on cerebrum to quiet excessive motor activity, which can cause hyperthermia.

NURSING DIAGNOSIS:	**GAS EXCHANGE, risk for impaired**
Risk Factors May Include:	Prenatal/intrapartal stressors, excess production of mucus, and fluctuations of body temperature
Possibly Evidenced By:	[Not applicable; presence of signs/symptoms establishes an *actual* diagnosis]
DESIRED OUTCOMES/EVALUATION CRITERIA—NEONATE WILL:	Maintain patent airway with respiratory rate WNL (between 30 and 60/min). Be free of signs of respiratory distress.

ACTIONS/INTERVENTIONS	RATIONALE

Independent

Estimate gestational age using Dubowitz criteria.	Surfactant system develops as gestation progresses. Once fetus reaches 35 weeks' gestation, the presence of phosphatidyl glycerol (a component of the surfactant complex, which indicates fetal lung maturity) markedly decreases the incidence of respiratory distress syndrome (RDS). Infants of diabetic mothers who have been exposed to prolonged hyperinsulinemia in response to maternal hyperglycemia may have depressed surfactant production and greater respiratory distress even though they are beyond 35 weeks' gestation at birth.
Review prenatal and intrapartal events, noting risk factors that could have contributed to excess lung fluid or aspiration of amniotic fluid (e.g., maternal diabetes, cesarean birth or breech delivery, maternal bleeding, intrapartal asphyxia, maternal oversedation).	Such events contribute to the neonate's inability to clear airway of excess fluid, mucus, and aspirated material, and to the collection of excess fluid in lungs, resulting in type II RDS, which usually resolves within 6 hr.

Assess respiratory rate and effort. Differentiate periodic breathing patterns from apneic episodes.	Normal respiratory rate is 30–60/min. Periodic breathing that is of no physiological significance is manifested by apneic periods lasting 5–15 sec occurring during REM sleep and periods of motor activity. It is easily converted to a normal breathing pattern by increasing inspired oxygen through tactile and sensory stimulation. Apneic episodes last longer than 20–30 sec, may be associated with changes in heart rate and skin color, and require further assessment and intervention.
Suction nasopharynx, as needed. Note color, amount, and character of regurgitated mucus.	Ensures clearance of airway, which is critical to neonate, who is an obligatory nose breather and may not learn to open the mouth in response to nasal obstruction until 3–4 wk of age. Regurgitation of mucus associated with an episode of gagging often occurs in the second period of reactivity (2–6 hr after delivery).
Position newborn on side with rolled towel for support at back.	Facilitates drainage of mucus.
Auscultate breath sounds and record equality and clarity. Note presence of crackles or rhonchi.	Breath sounds should be equal bilaterally. Inspiratory crackles may be present in the first few hours following delivery until lung fluid is absorbed from distal bronchioles. Persistent crackles may indicate RDS or pneumonia. Rhonchi heard on inspiration or expiration, caused by air moving through passages that have been narrowed by secretions or swelling, may indicate retained secretions/aspiration.
Review delivery records for presence of meconium at birth or meconium-stained amniotic fluid; determine whether appropriate suctioning of oropharynx was performed while infant's head was still on perineum.	When thick meconium is present, deep suctioning should take place before the initial breath is taken to avoid development of meconium-aspiration pneumonia.
Observe and record signs of respiratory distress (e.g., grunting, retraction of respiratory muscles, nasal flaring, and tachypnea).	These signs represent compensatory mechanisms to overcome hypoxia. Expiratory grunting occurs as an attempt to maintain alveolar expansion and to retain air. Retraction of respiratory muscles increases tidal volume, nasal flaring increases the diameter of the nares, and tachypnea occurs in an attempt to eliminate excess carbon dioxide.
Assess newborn for presence, location, and degree of cyanosis and its relationship to activity.	Peripheral cyanosis (acrocyanosis) associated with vasomotor instability, hypothermia, or local venous or arterial obstruction may persist through the transition period. Mild cyanosis and mottling may occur in second period of reactivity in association with fluctuations in cardiac and respiratory rates. Cyanosis that worsens with crying suggests cardiac problems (unresolved PDA or congenital anomalies) rather than respiratory problems, in which cyanosis is usually improved with crying.
Compare neonate's skin temperature and ambient air temperature.	Oxygen consumption is minimal when the difference between skin temperature and ambient air temperature is<2.7°F (1.5°C).

Monitor newborn for signs of hypothermia or hyperthermia. (Refer to ND: Body Temperature, risk for altered.)	Hypothermia and hyperthermia increase metabolic rate and oxygen consumption, causing a possible cycle of metabolic acidosis and hypoxia that perpetuates fetal circulation, reduces surfactant levels, and increases respiratory distress. A drop in skin temperature to 96.6°F (35.9°C) increases oxygen consumption by 10%. Too-rapid warming of neonate may lead to hyperthermia, which increases oxygen consumption by 6%.
Note symmetry of chest movement.	Asymmetry may indicate pneumothorax associated with previous resuscitative measures.
Auscultate heart sounds; note presence of murmurs.	Transient cardiac murmurs (usually systolic) may exist in the early newborn period because of persistence or reopening of fetal structures in response to hypoxia and crying. PDA often occurs with hypoxia, pulmonary vasoconstriction, right-to-left shunting, and congestive heart failure (CHF), or more significantly with prenatal or birth asphyxia, hyperviscosity, polycythemia, aspiration syndrome, and hypoglycemia. Foramen ovale normally closes at 1–2 hr following delivery; ductus arteriosus closes at 3–4 days of age. Inadequate lung perfusion and poorly ventilated lung tissue promote airway constriction and respiratory compromise.

Collaborative

Administer supplemental oxygen, as indicated by newborn's condition.	Persistent uninterrupted oxygen depletion increases hypoxic state, resulting in metabolic acidosis secondary to anaerobic metabolism.
Record use and results of mechanical monitoring of supplemental oxygen.	Unmonitored use of oxygen therapy can result in oxygen toxicity. Transcutaneous (pulse oximetry) monitoring helps prevent hypoxic states and evaluates therapeutic effectiveness.
Assess Hb and Hct levels. Note results of Kleihauer-Betke test.	The neonate whose Hb level is lower than normal has reduced oxygen-carrying capacity and possibly severe hypoxia. Hb levels<15 g/dl may be caused by blood loss, hemolysis, or decreased RBC production. Clinical signs of cyanosis may not appear until Hb levels are decreased by slightly more than 3 g/dl in central arterial blood or 4–6 g/dl in capillary blood. Kleihauer-Betke test identifies fetal bleeding in utero.
Monitor arterial blood gases (ABGs), if done.	Provides accurate measurement of acid-base balance to clarify respiratory versus metabolic deficits.
Determine Rh factor and ABO blood group of newborn and mother; note results of Coombs' test. (Refer to CP: Newborn: Hyperbilirubinemia.)	Identifies possible antigen-antibody reaction to Rh or ABO incompatibility, which contributes to lowered Hb levels and oxygen-carrying capacity.
Review chest x-ray.	May be necessary to diagnose pneumothorax.

NURSING DIAGNOSIS: **NUTRITION: altered, risk for less than body requirements**

Risk Factors May Include:	Increased metabolic rate, high caloric requirement, fatigue, minimal nutritional stores
Possibly Evidenced By:	[Not applicable; presence of signs/symptoms establishes an *actual* diagnosis]
DESIRED OUTCOMES/EVALUATION CRITERIA—NEONATE WILL:	Be free of signs of hypoglycemia, with blood glucose level WNL. Display weight loss ≤5%–10% of birth weight by time of discharge.

ACTIONS/INTERVENTIONS	RATIONALE
Independent	
Review mother's prenatal history for possible stressors impacting on neonatal glucose stores, such as diabetes, PIH, or cardiac or renal disorders. Note results of tests related to fetal growth and placental/fetal well-being.	Full-term neonates who are especially susceptible to hypoglycemia are those who are chronically stressed in utero, are exposed to high glucose levels in utero, are SGA or LGA, or are acutely ill. The newborn has unique nutritional needs related to a rapid metabolic rate, high caloric requirement, potential loss of fluid and electrolytes caused by increased insensible water losses through pulmonary and cutaneous routes, and a potential for inadequate or depleted glucose stores.
Review intrapartal records for Apgar scores, condition at birth, type/timing of infant feeding. Note initial temperature on admission to the nursery.	Birth stressors and cold stress increase metabolic rate and rapidly deplete glucose stores, possibly using as many as 200 cal/kg/min in the delivery room prior to admission to the nursery. First feeding may occur in delivery room for clients choosing to breastfeed; bottle-fed infants usually have their first feeding during the second period of reactivity. Note: For client receiving mother-infant care (i.e., rooming in), neonate may be admitted briefly to nursery for purpose of assessment/medical clearance.
Reduce physical stressors such as cold stress, physical exertion, and excessive exposure to radiant warmers.	Hypothermia increases energy consumption and use of nonrenewable brown fat stores. Respiratory distress and/or ambient temperatures above TNZ increase metabolic rate and activity level as well as insensible water losses. For every 1.2°F (1°C) increase in body temperature, metabolism and fluid needs increase approximately 10%.
Weigh newborn on admission to nursery and daily thereafter. Note presence of postmaturity syndrome or wasting.	Establishes caloric and fluid needs according to baseline weight, which normally drops by 5%–10% within the first 3–4 days of life because of limited oral intake and loss of excess extracellular fluid. Infant with postmaturity syndrome has increased metabolic and caloric needs in early newborn period.

Screen for hypoglycemia using Dextrostix at 1 hr of age, and more frequently as indicated for high-risk or symptomatic infant.	Newborns may maintain maternal glucose level for up to 1 hr following birth, but after this time, glucose consumption may exceed intake and production, resulting in hypoglycemia. A history of intrauterine or postdelivery stress or hypoxia markedly increases the risk of hypoglycemia.
Observe newborn for tremors, irritability, tachypnea, diaphoresis, cyanosis, pallor, and seizure activity.	Indicates hypoglycemia associated with blood glucose levels<45 mg/dl.
Monitor newborn for ruddiness; note elevated Hb/Hct levels (Hb>20 g/dl, Hct greater than 60%).	RBCs are high consumers of glucose, predisposing the polycythemic neonate to hypoglycemia.
Auscultate bowel sounds. Note absence of abdominal distension, presence of lusty cry that quiets when oral stimulus is provided, and rooting/sucking behaviors.	Indicators showing that neonate is hungry/ready for feeding.
Initiate early oral feeding with 5–15 ml of sterile water, then dextrose and water, according to hospital protocol, progressing to formula for bottle-fed infants.	Initial feeding for breastfed infants usually occurs in the delivery room. Otherwise, water may be offered in the nursery to assess effectiveness of sucking, swallowing, gag reflexes, and patency of esophagus. If aspirated, sterile water is easily absorbed by pulmonary tissues. Early feedings help meet caloric and fluid needs, especially in an infant whose metabolic rate uses 100–120 cal/kg of body weight every 24 hr. Human milk or formula has a greater sustained effect on glucose levels and reduces risk of rebound hypoglycemia associated with bolus feeding of D_5W and $D_{10}W$.
Note frequency and amount/length of feedings. Encourage demand feedings instead of "scheduled" feedings. Note frequency, amount, and appearance of regurgitation. (Refer to ND: Knowledge Deficit [Learning Need]; and CP: The Client at 4 Hours to 2 Days Postpartum, ND: Breastfeeding [specify].)	Hunger and length of time between feedings vary from feeding to feeding. Six feedings of approximately 3 oz (an average of 17 oz of formula in 24 hr) usually meet nutritional and fluid requirements of a 6-lb neonate. Excessive regurgitation contributes to fluid loss and dehydration, increasing replacement needs.
Evaluate neonate/maternal satisfaction following feedings. solutions.	Provides opportunity to answer client questions, offer encouragement for efforts, identify needs, and problem-solve
Monitor color, concentration, and frequency of voidings.	Fluid requirements range from 140–160 ml/kg per 24 hr because the newborn has proportionately less fluid reserve and higher water needs than the older child or adult. Loss of fluid and lack of oral intake rapidly deplete extracellular fluid and result in reduced urine output.
Observe newborn for indications of feeding problems (e.g., recurrent or bile-colored regurgitation, abdominal distension, abnormal stools, excessive mucus production, choking, or refusal to feed).	These problems may indicate intestinal obstruction, cystic fibrosis, or tracheoesophageal fistula.

Collaborative

Obtain immediate blood glucose if Dextrostix level is<45 mg/dl.	Blood glucose measurement confirms Dextrostix findings and the need for intervention.

Administer glucose immediately, orally or intravenously.	May need supplemental glucose to raise significantly low serum levels.
Follow up glucose administration with Dextrostix every 30 min–2 hr, based on severity of hypoglycemia, newborn's symptoms, and hospital protocol.	Enhances the finding and facilitates the treatment of rebound hypoglycemia. Rebound hypoglycemia is especially common following bolus feedings or bolus infusions of glucose or glucagon that are not followed by continuous glucose infusions.
Avoid oral feedings for distressed neonates, those with polycythemia and hyperviscosity, or infants with gastrointestinal (GI) anomalies. Institute IV therapy of $D_{10}W$, with infusion rate of 80–120 ml/kg/day.	Polycythemia and hyperviscosity potentially diminish circulation and availability of oxygen to digestive structures, so that introducing feedings may predispose neonate to development of necrotizing enterocolitis.
Administer glucagon or hydrocortisone if IV $D_{10}W$ therapy is not effective in resolving hypoglycemia.	Glucagon stimulates liver to break down stored glycogen. Steroids stimulate gluconeogenesis in the liver, thereby increasing blood glucose level.

NURSING DIAGNOSIS:	**INFECTION, risk for**
Risk Factors May Include:	Broken skin, traumatized tissue, environmental exposure, inadequate acquired immunity
Possibly Evidenced By:	[Not applicable; presence of signs/symptoms establishes an *actual* diagnosis]
DESIRED OUTCOMES/EVALUATION CRITERIA—NEONATE WILL:	Be free from signs of infection. Display timely healing of cord stump and circumcision site, free of drainage or erythema.

ACTIONS/INTERVENTIONS	RATIONALE
Independent	
Review maternal risk factors that predispose infant to infection, which may be acquired transplacentally, via the ascending route, or at delivery. (Refer to CPs: Prenatal Infection; Puerperal Infection.)	Maternal fever during the week prior to birth, prolonged rupture of membranes (>24 hr), prolonged labor, foul-smelling amniotic fluid, and presence of infectious disease, such as gonorrhea, chlamydial infection, group B streptococcal infection, or TORCH group of viruses (toxoplasmosis, other viruses, rubella, cytomegalovirus, and herpes simplex viruses), all predispose infant to infection. Note: Use of epidural anesthesia has been correlated with increased frequency of fever in mother postpartum (temperature of 100.4°F or more) without actual infection. This could result in neonate receiving unwarranted prophylactic antibiotics.
Determine newborn's gestational age.	Transfer of immunoglobulin E and G (IgE and IgG) antibodies via the placenta increases significantly in the last trimester, providing passive immunity to gram-positive cocci (pneumococci, streptococci, and meningococci), *Haemophilus influenzae,* viruses, and toxins (diphtheria and tetanus bacilli). However, the newborn is normally deficient in immunoglobulin M (IgM), which is stimulated by infectious agents (antibodies to blood group antigens, gram-negative enteroorganisms, and some viruses), and lacking in immunoglobulin A (IgA), which possibly provides protection on the secretory surfaces of the respiratory, urinary, and gastrointestinal tracts.
Monitor vital signs including skin temperature, as appropriate.	Aids in recognizing developing infection.
Scrub hands and arms with iodophor preparation prior to entering nursery/neonate's room, after contact with contaminated material, and after handling infant. Teach parents and siblings proper hand washing technique to use before handling infant.	Proper hand washing is the most important single factor in protecting newborns from infection. Iodophor preparation is effective against both gram-positive and gram-negative organisms.
Monitor (and instruct client to monitor) personnel, parents, and visitors for infectious illnesses, skin lesions, fever, or herpes. Limit contact with newborn appropriately.	Helps prevent spread of infection to newborn.
Maintain individual equipment and supplies for each newborn.	Prevents cross-contamination of neonate through direct contact or droplet infection.

Instruct parent(s) to inspect skin daily for rashes or interruptions in skin integrity. Recommend use of mild soaps, and gently patting skin dry after bathing; avoiding excessive rubbing.	Skin is a nonspecific immunity barrier preventing invasion of pathogens. The likelihood of infection is increased by a significant number of potential portals of entry for infectious organisms, such as umbilical vessels, site of circumcision, and skin breaks associated with forceps or internal scalp electrode application. Chemicals and perfumes in soaps may predispose skin to rashes and irritation; vigorous rubbing may traumatize delicate skin. Note: In the uncircumcised male, it is not necessary to retract the foreskin for cleaning; rather, daily external washing and rinsing is sufficient.
Suggest applying Eucerin Creme to identified dry areas, especially at ankles and wrists.	Helps prevent skin cracking and breakdown, especially in neonate with dry skin caused by excessive weight loss, dysmaturity, or prolonged exposure to phototherapy or radiant heat.
Encourage early breastfeeding, as appropriate.	Colostrum and breast milk contain high amounts of secretory IgA, which provides a form of passive immunity as well as macrophages and lymphocytes that foster local inflammatory response.
Assess cord and skin area at base of cord daily for redness, odor, or discharge. Facilitate drying through exposure to air by folding diaper below, and T-shirt above, the cord stump.	Promotes drying and healing, enhances normal necrosis and sloughing, and eliminates moist medium for bacterial growth.
Inspect newborn's mouth for white plaque on oral mucosa, gums, and tongue. Distinguish between white patches of thrush and milk curds.	White patches that cannot be removed and that tend to bleed when touched are caused by *Candida albicans*, resulting from direct contact with contaminated birth canal, hands, or breast. Note: Use of improperly cleaned nipple/breast shields or breast pump may result in colonization of the breasts.
Note presence of lethargy, poor weight gain, restlessness, lowered temperature, jaundice, respiratory symptoms, or visible lesions. Isolate newborn, as indicated; notify physician.	These signs indicate possible infection. Transplacentally acquired infections tend to affect liver and CNS function; ascending route infections, in many cases, result in bacteremia or pneumonia.

Collaborative

Administer recombinant hepatitis B vaccine per state/agency policy.	Reduces risk of newborn's contracting hepatitis B or becoming a chronic carrier. First dose usually administered within 12 hr of birth. Note: The Centers for Disease Control and Prevention (CDC) and the American Academy of Pediatrics recommend immunization for all infants, regardless of mother's antigen status.
Monitor laboratory studies, as indicated:	
WBC count;	Deficiency of neutrophils, which participate in the early phagocytic response, and deficiencies of specific immunoglobulins predispose the full-term infant to infection, particularly in the first 4–6 wk of life. Normal WBC count of 18,000/mm^3 does not increase in the newborn in response to infection, and it often drops during sepsis.
Serum levels of IgE, IgM, and IgA;	Elevated IgM levels at birth may occur in response to an infectious organism in utero. IgE levels are increased in the third trimester and provide neonate with passive immunity to some organisms. IgA is

	found in colostrum and provides some passive immunity until the newborn begins to produce IgA at approximately 4 wk of age.
Cultures of lesions, pustules, or drainage, when present (distinguish between possible infectious rashes and erythema toxicum neonatorum);	Identifies possible pathogens. Vesicles or lesions of erythema toxicum neonatorum (thought to be a local inflammatory response) contain eosinophils and are of no clinical significance.
Blood cultures.	Diagnoses presence of bacteremia or sepsis and identifies causative agents.
Administer topical, oral, or parenteral antibiotics as indicated.	Eradicates pathogenic organisms.
Apply nystatin (Mycostatin) to mouth; swab over oral mucosa, gums, and tongue. Wash mouth with sterile water prior to application.	Eradicates *Candida albicans*, the causative organism for thrush and mycotic stomatitis.

NURSING DIAGNOSIS:	**INJURY, risk for**
Risk Factors May Include:	Birth trauma, aspiration, abnormal blood profile, congenital anomalies, drug effects
Possibly Evidenced By:	[Not applicable; presence of signs/symptoms establishes an *actual* diagnosis]
DESIRED OUTCOMES/EVALUATION CRITERIA—NEONATE WILL	Be free of injury or aspiration.
	Display bilirubin levels below 15 mg/dL.
PARENT(S) WILL:	Identify individual risks.
	Demonstrate behaviors to protect newborn from environmental injury.

ACTIONS/INTERVENTIONS	RATIONALE
Independent	
Perform thorough newborn assessment for possible abnormal findings. Note crepitus, interruption in clavicle, abnormal Moro reflex, skull depression, or absence of movement of extremities.	Helps detect possible birth injuries, such as fractures of the clavicle, skull, or extremities.
Assess newborn for congenital anomalies, especially cleft lip or palate, spina bifida, club foot, congenital hip dislocation, hypospadias, or epispadias.	Identifies conditions requiring immediate intervention. Note: Extra gluteal folds, unequal extremities, resistance to abduction, and Ortolani's sign (audible click on rotation) indicate congenital hip dislocation.

Position newborn on abdomen initially, or on side with rolled blanket at back. Monitor infant for difficulty in handling mucus.	Helps prevent aspiration, especially for neonates with gastric reflux or upper airway anomalies. During second period of reactivity, increased mucus production and gagging may predispose infant to airway obstruction, which can lead to asphyxia and death if it is undetected or untreated. Otherwise, research suggests positioning on back or side reduces risk of sudden infant death syndrome (SIDS).
Observe newborn frequently.	Necessary to detect possible regurgitation or position changes, which may compromise respiratory effort.
Never leave newborn on unenclosed surface.	Reduces risk of injury caused by falls.
Assess newborn for evidence of jaundice; note progression on body, color of skin/sclera/oral mucosa and stool, behavior changes, and CNS signs associated with kernicterus. (Refer to CP: Newborn: Hyperbilirubinemia.)	Increasing jaundice may indicate Rh or ABO incompatibility or breast milk–induced jaundice, with possible outcome of kernicterus if condition is left untreated. Up to 50% of full-term neonates display some degree of jaundice on day 2 or 3.
Assess newborn for CNS, gastric, vasomotor, and respiratory signs of drug effect/withdrawal. (Refer to CP: The Infant of an Addicted Mother.)	Onset of withdrawal often occurs 24 hr after delivery. Note: As many as one third of neonates who have withdrawal signs can be managed without additional medical treatment.

Collaborative

Administer vitamin K (AquaMEPHYTON) intramuscularly.	Because the newborn's intestinal tract is sterile at birth, and because feedings may be delayed, infant does not have the intestinal flora needed to promote coagulation by activation of factors II, VII, IX, and X.
Obtain/monitor direct and indirect bilirubin levels, as appropriate.	Helpful in determining need for/degree of therapeutic intervention based on specific serum bilirubin levels.
Schedule heel-stick testing for PKU, preferably within 72 hr after initiating intake of normal amounts of protein.	Identifies elevated serum levels of phenylpyruvic acid, which occur when phenylalanine is not converted to tyrosine because of absence of the liver enzyme phenylalanine hydroxylase. Excessive levels of the acid can result in CNS involvement, mental retardation, seizure activity, growth retardation, and absence of melanin.
Monitor x-ray studies; assist with diagnostic testing, as indicated.	Confirms presence of congenital abnormalities, such as hip dysplasia.

NURSING DIAGNOSIS:	**FLUID VOLUME, risk for deficit**
Risk Factors May Include:	Delayed feedings, limited oral intake, excessive regurgitation, increased insensible water losses
Possibly Evidenced By:	[Not applicable; presence of signs/symptoms establishes an *actual* diagnosis]

DESIRED OUTCOMES/EVALUATION CRITERIA—NEONATE WILL:	Void 2–6 times daily with output of 15–60 ml/kg/day by the second day of life. Produce urine free of uric acid crystals and urates.

ACTIONS/INTERVENTIONS	RATIONALE
Independent	
Record initial and subsequent voidings.	Following birth, vascular resistance within renal vessels lessens and blood flow increases, but normal functioning may not be established until 24 hr following delivery. Urine output is usually limited and voiding scanty until fluid intake is adequate. During the first 2 days of life, the newborn usually voids 2–6 times daily. Thereafter, newborn usually voids 6–10 times daily, with output of 15–60 ml/kg per 24 hr.
Initiate oral feedings; note amount ingested and regurgitated.	Oral fluid requirements range from 140–160 ml/kg/day by the 3rd to 4th day of life (average is 105 ml/kg/day, or 5 oz/kg/day). Appropriate fluid ingestion helps promote hydration and offset kidney's inability to concentrate urine and to conserve fluid during periods of high insensible losses and fluid and electrolytic stress.
Monitor fluid intake and output. Note color and concentration of urine and the presence of peach-colored crystals on diaper.	Bladder usually empties when it contains between 15 and 40 ml of urine. Excessive drooling and mucus production, regurgitation, and poor fluid intake contribute to dehydration and scanty urine output. Urates and uric acid crystals reflect the need for prompt increase in fluid intake.
Note presence of blood in urine.	Bloody urine usually suggests pseudomenstruation in female infant or circumcision-related problems in male infant, but may also indicate renal injury, possibly associated with birth asphyxia, renal vein thrombosis, or infection.
Note presence of edema; assess hydration level (e.g., indicated by skin turgor and presence of mucus).	Edematous or well-hydrated neonate voids earlier after birth than dehydrated neonate and has increased urine output.
Reduce cold stressors; optimize respiratory effort and thermoregulation.	Limited tubular reabsorption and low renal threshold reduce reabsorption of bicarbonate (HCO_3), predisposing infant to metabolic acidosis associated with reduced buffering capacity to offset respiratory imbalances.
Palpate for bladder distension, restlessness, discomfort, or bladder pressure if infant fails to void within 24 hr after birth.	Helps in determining presence of urine; may suggest problem related to bladder or anomalies of urethra that may prevent voiding.

Collaborative

Assist with suprapubic bladder aspiration if indicated.	May be used to ascertain the presence or absence of urine, if voiding has not occurred.

NURSING DIAGNOSIS:	**CONSTIPATION, risk for**
Risk Factors May Include:	Inadequate fluid intake, intestinal obstruction
Possibly Evidenced By:	[Not applicable; presence of signs/symptoms establishes an *actual* diagnosis]
DESIRED OUTCOMES/EVALUATION CRITERIA—NEONATE WILL:	Pass meconium stool within 48 hr after birth.

ACTIONS/INTERVENTIONS	RATIONALE
Independent	
Review intrapartal record for indications of passage of meconium.	Relaxation of anal sphincter may occur in response to vagal stimulation related to hypoxia, causing meconium passage in utero or at delivery.
Note maternal complications negatively affecting meconium passage.	Stressors such as cesarean delivery or PIH delay initial meconium passage and possibly contribute to development of hyperbilirubinemia.
Auscultate bowel sounds.	Air ingestion into the GI tract normally stimulates onset of bowel sounds within 1–2 hr after delivery.
Take rectal temperature or insert soft rubber catheter into anus with caution.	Easy passage indicates patency of anus (rules out imperforate anus).
Monitor frequency and amount/length of feeding, frequency of voiding, skin turgor and status of fontanels, and weight. Encourage early feeding; provide extra water as indicated. (Refer to ND: Fluid Volume, risk for deficit).	Inadequate oral intake, as evidenced by decreased urine output, changes in skin turgor, sunken fontanels, and excessive weight loss, can lead to constipation.
Note passage of first meconium:	Once the newborn wakens and the first feeding is initiated, passage of meconium usually follows, establishing patency of lower GI tract. Approximately 6% of healthy newborns do not defecate by 24 hr after birth. Failure to pass stool by 48 hr usually indicates intestinal obstruction.
Record frequency, color, consistency, and odor of stools;	Number, consistency, and color of stools vary, depending on ingestion of breast milk or formula.
Note deviations from normal stool cycle (meconium stools for 3–4 days; they will be followed by transitional stools, which are greenish-brown and may last for 3–6 days, followed by formed or loose-yellow stools).	Thick, puttylike meconium suggests meconium ileus or possible cystic fibrosis; a small, puttylike stool may indicate bowel stenosis or atresia. Loose green or diarrheal stool may indicate infection or gastroenteritis, or may be a normal result of high bilirubin content associated with phototherapy.

Assess abdomen for constant or intermittent distension. Note persistent vomiting and presence of bile in vomitus.	Abdominal distension and persistent vomiting suggest obstruction. Obstruction that is high or complete is associated with vomiting soon after birth; more distal lesions are associated with later vomiting. Bile-stained gastric contents suggest duodenal obstruction. Paralytic ileus or partial obstruction is characterized by intermittent distension. Intestinal obstruction is the most frequent GI emergency requiring surgery in the neonatal period.
Observe for motility disturbance associated with constipation, vomiting, and fluid and electrolytic imbalances.	These signs may indicate aganglionic megacolon (Hirschsprung's disease), whereby absence of parasympathetic nerve cells in both the muscles and submucosa of the rectosigmoid colon inhibits passage of fecal material.
Note cluster of GI signs such as abdominal distension and tenderness, poor feeding, vomiting, presenceof blood in stool (positive result on Hematest), or presence of reducing substances in blood.	These signs may indicate necrotizing enterocolitis, the onset of which ranges from the 1st day to the 1st mo of life. Necrotizing enterocolitis is associated with ischemia of intestines precipitated by hypoxia and systemic shock.

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Assist with diagnostic studies (e.g., abdominal x-rays, contrast studies, and upper GI barium series or enema).	Helps in determining degree and location of obstruction and in diagnosing possible malrotation.
Transfer infant to acute care setting (NICU), if indicated.	May be needed for intermittent gastric suctioning, surgical repair, or initiation of total parenteral nutrition.

NURSING DIAGNOSIS:	**KNOWLEDGE deficit [Learning Need], regarding growth/development and infant care**
May Be Related To:	Lack of exposure, misinterpretation, unfamiliarity with information resources
Possibly Evidenced By:	Verbalization of questions/misconceptions, hesitancy to perform care activities, inaccurate follow-through of instructions
DESIRED OUTCOMES/EVALUATION CRITERIA—PARENT(S) WILL:	Verbalize understanding of newborn's individual needs. Demonstrate appropriate behaviors to meet physiological and emotional needs of newborn. Identify signs/symptoms requiring medical intervention. Demonstrate proper technique for obtaining infant temperature, administering oral medication.

ACTIONS/INTERVENTIONS	RATIONALE
Independent	
Appraise level of parent's understanding of infant's physiological needs and adaptation to extrauterine life associated with maintenance of body temperature, nutrition, respiratory needs, and bowel and bladder functioning.	Identifies areas of concern/need requiring additional information and/or demonstration of care activities.
Provide information and correct misconceptions, as appropriate; encourage discussion and questions.	Promotes understanding of newborn behaviors, need for specific actions/interventions.
Discuss newborn behaviors after the first and during the second periods of reactivity.	After first period of reactivity, newborn usually falls into a deep sleep, followed by the second period of reactivity, which involves wakefulness, mucus regurgitation, gagging, and often passage of first meconium stool.
Perform newborn physical assessment in presence of parent(s) as appropriate. Provide information about normal variations and characteristics, such as pseudomenstruation, breast enlargement, physiological jaundice, caput succedaneum, cephalhematoma, and milia.	Helps parents to recognize normal variations, and may reduce anxiety.
Discuss and demonstrate normal newborn reflexes; review ages at which each reflex disappears.	Encourages early detection of CNS abnormalities associated with prolonged presence of reflexes.
Provide information about newborn interactional capabilities, states of consciousness, and means of stimulating cognitive development. (Refer to CP: The Client at 4 Hours to 2 Days Postpartum; ND: Parent/Infant Attachment; Parenting, risk for altered.)	Helps parents recognize and respond to infant cues during interactional process; fosters optimal interaction, attachment behaviors, and cognitive development in infant. The state of consciousness can be divided into the sleep and wake states, involving separate and predictable behavioral characteristics.
Discuss different types of cries that the neonate may use in communication and the means to assess significance of each. Demonstrate consoling measures.	Crying does not necessarily indicate hunger. Other causes include the need to be held, burped, or changed, or just a need to express irritability, because all babies tend to have a particular part of the day (often suppertime) when irritability increases. Parents' success or failure at consoling the newborn has a tremendous impact on their feelings of competence. Crying episodes usually vary in length from 3–7 min after initiation of consoling measures.
Provide information related to thermoregulatory mechanisms of the newborn, types of heat loss, and ways to minimize or prevent excessive heat loss or overheating.	Reduces risk of possible complications associated with hypothermia and hyperthermia.
Discuss newborn's usual sleep patterns and ways of promoting sleep.	Usually requires at least 17 hr of sleep per day for normal growth.

Demonstrate and supervise infant care activities related to feeding and holding; bathing, diapering, and clothing; care of circumcised male infant; and care of umbilical cord stump. Provide written/ pictorial information for parents to refer to after discharge.	Promotes understanding of principles and techniques of newborn care; fosters parents' skills as caregivers.
Discuss infant's nutritional needs, variability in infant appetite from one feeding to the next, and means of assessing adequate hydration and nutrition.	Alleviates potential concern that may result if intake varies from feeding to feeding. Helps to ensure adequate nutritional and fluid intake.
Discuss infant feeding methods, types of formula preparations available, economics of formula use versus breastfeeding, and necessary preparation and storage of formula/expressed breast milk.	Clarifies options, helps ensure appropriateness and safety of infant feeding.
Identify dangers associated with bottle propping.	Bottle propping robs infant of needed skin-to-skin contact with parents and may cause blockage of air passage if nipple lodges against back of infant's throat, or aspiration if infant regurgitates. Bottle propping may also cause otitis media associated with drainage of nasal mucus or occlusion of duct when eustachian tube orifice opens during swallowing.
Instruct parents regarding positioning of newborn after feedings and demonstrate use of bulb syringe. Note infant's gag reflex.	Weak gag reflex predisposes newborn to aspiration. Positioning newborn on the abdomen or side with rolled towel at back allows external drainage of mucus or vomitus, reducing risk of aspiration. When infant is placed on back in carrier seat or carriage, head should be elevated 30–45 degrees. Syringe removes secretions from nasopharynx, clearing air passages.
Instruct parents regarding special care of diapers. Discuss use of cloth versus disposable diapers, recognition of rashes, and appropriate treatment.	Promotes good hygiene, reduces risk/severity of diaper rash.
Discuss nail care in newborn, including peeling of soft nails or nail trimming with manicure scissors or special infant nail scissors during infant's sound sleep.	Prevents infant's scratching with long nails and injury associated with movement during the cutting process.
Reinforce necessity of not leaving infant unattended unless in crib with siderails up.	Initially, neonate is at risk for regurgitation or aspiration. Over time, as infant matures, new concerns are associated with increasing mobility and dexterity (e.g., rolling off surface, falling down stairs, inserting inappropriate objects into mouth, which may be aspirated/swallowed, getting head caught).
Discuss requirement of federally approved car seat tailored to infant's size. Have family bring care seat to unit and demonstrate proper positioning, of infant in seat, and how seat is to be placed in car.	Accidents are the leading cause of childhood mortality, with auto accidents causing the most deaths. All states require use of approved restraint systems to protect children while passengers in automobiles. Note: There is currently ongoing discussion as to whether this requirement should be extended to include travel on airplanes.

Emphasize newborn's need for follow-up evaluation by healthcare provider and need for timely immunizations.	Ongoing evaluation is important for monitoring growth and development. Immunizations are necessary to protect the infant from childhood diseases with associated serious complications. Note: Most day-care and school systems require completed immunizations, including hepatitis B series, before enrolling.
Provide information about routine laboratory testing, as indicated.	Increases likelihood of parents following through with urine and blood testing for genetic disorders, such as PKU and congenital hypothyroidism, which if undetected can cause mental and physical retardation.
Identify signs of jaundice and when healthcare provider should be contacted.	If newborn develops yellow coloring in the face, trunk, sclera that progresses to groin, arm/legs, evaluation and treatment are indicated to prevent serious complications. Note: If neonate feeds poorly or is lethargic, prompt intervention is required.
Discuss manifestations of illness and infection and the times at which a healthcare provider should be contacted. Demonstrate proper technique for taking temperature and administering oral medications as required.	Early recognition of illness and prompt use of healthcare facilitate treatment and positive outcome. To obtain an axillary temperature appropriately, thermometer should be held in place in the center of the axilla. Use of a rectal/tympanic thermometer is not recommended until infant is older. Improper administration of medication increases risk of aspiration and ineffective treatment.