The above chart shows the percentage distribution of questions on the Low Risk Neonatal Intensive Care Nursing exam across the major content categories covered on the examination. The major focus of the examination is the General Management, and Assessment and Management of Pathophysiologic Conditions with the most emphasis in these sections. Lesser emphasis is on General Assessment with Professional Issues having the least number of questions assigned to these content categories.
**EXAM OUTLINE**

This is an outline of topics and areas which may be included in the Low Risk Neonatal Intensive Care Nursing examination. It should be noted that the emphasis of the examination is on the newborn (birth to one month) and family components.

Content of the examination will cover assessment of all body systems and knowledge of normal and deviations from normal.

<table>
<thead>
<tr>
<th>Section</th>
<th>Percentage</th>
<th>Topics</th>
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| 10.00 General Assessment (14%) | | Maternal risk factors and birth history  
Physical and gestational age assessment  
Laboratory and diagnostic data |
| 11.00 Assessment and Management of Pathophysiologic Conditions (39%) | | Cardiovascular  
Respiratory  
Gastrointestinal and genitourinary  
Musculoskeletal and integumentary  
Neurological  
Hematology  
Genetic, metabolic and endocrine |
| 12.00 General Management (44%) | | Resuscitation & Stabilization  
Nutrition and feeding  
Pharmacology, pharmacokinetics and pharmacodynamics  
Fluid, electrolytes and glucose homeostasis  
Oxygenation, non-invasive ventilation and acid-base balance  
Thermoregulation  
Neurodevelopmental Care  
Infection and immunology  
Psychosocial support, grieving and discharge planning |
| 14.00 Professional Issues (3%) | | **including:** Legal, Ethical, Safety and Quality Improvement |
ASSOCIATED COMPETENCIES

- Demonstrate knowledge of maternal/fetal and neonatal anatomy, physiology, pharmacology and pathophysiology
- Identify antepartal, intrapartal and postpartal risk factors related to the mother and fetus that impact the neonate
- Systematically assess the neonate, the family and their environment
- Interpret assessment data to determine health status of the neonate based on maternal history, gestation age examination and neurobehavioral assessment
- Develop, implement and evaluate an individualized plan of care, in collaboration with other health care providers to facilitate the neonate’s adaptation to extrauterine life and to provide care to the low risk neonate and the family.
- Apply knowledge of anatomy, physiology and pathophysiology to assess and care for the neonate, differentiating abnormal from normal
- Identify life-threatening states and initiate appropriate interventions
- Apply knowledge of general concepts of care that determine and promote the health of the postpartal family in the hospital, in ambulatory settings and in the home environment
- Educate families about the biophysical, psychosocial and environmental needs of the neonate
- Demonstrate knowledge of factors that influence the integration of the neonate into the family and community
- Demonstrate knowledge of professional issues relative to the role of the level II Nurse
I. Maternal risk factors and birth history

- Fetal Anatomy and Physiology
- Fetal Assessment
- GBS screening
- Nonstress testing
- Biophysical profile
- Antepartal screening
- Cord gases
- Maternal age

II. Medical Conditions

- Maternal age
- Diabetes
- Blood disorders
- Infectious diseases (CMV, Toxoplasmosis, syphilis, herpes, hepatitis HIV, gonorrhea, Chlamydia, GBS)
- Maternal depression

III. Complications of Labor

- Abnormal labor patterns
- Abnormal fetal heart rate patterns (altered variability, decelerations [early, late, variable]; tachycardia, bradycardia (category I, II and III fetal heart rate tracings)
- Operative/instrument assisted birth
- Preterm/postterm
- Meconium
- Breech and other malpresentation

IV. Life-style and Environmental Conditions

- Substance use
- Teratogen exposure
- Medication use

II. Physical and gestational age assessment

A. Gestational Age

- Physical Characteristics, Etiologies and/or Risks and Complications of
- Preterm
- Term
- Post-term
- Late preterm
- AGA
- SGA
- LGA

- Intrauterine growth restriction
  - Symmetrical
  - Asymmetrical

B. Physical Assessment

- Cardiac examination findings
  - Heart rate, rhythms and sounds
  - Point of maximal intensity
  - Blood pressure
  - Peripheral pulses
  - Perfusion
  - Color
Study Guide

- Respiratory Physical Assessment
  - Respiratory rate and breath sounds
  - Respiratory patterns
  - Thorax and Chest
  - Abdominal examination findings
  - Stooling patterns

- Neonatal skin assessment
  Characteristics of normal neonatal skin

- Musculoskeletal assessment

- Neurological assessment

- Reflexes
  - Moro
  - Rooting and sucking
  - Palmar grasp
  - Plantar grasp
  - Stepping
  - Babinski
  - Tonic neck
  - Gag
  - Anal wink reflex
  - Tone

- Techniques
  - Pull to sit
  - Truncal tone assessment

- Head, ear, eyes, nose, mouth assessment
  Fontanelles and cranial sutures
  - Neck appearance
  - Ear appearance, shape and placement
  - Hearing
  - Nasal patency
  - Symmetry of the mouth
  - Evaluation of pigmentation and movement
  - Evaluation of cornea/sclera
  - Eye prophylaxis

- Complications/Variations
  Skull/neck variations & abnormalities
  Molding
  Cephalhematoma
  Caput succedaneum
  Craniosynostosis
  Craniotabes
  Cystic hygroma
  Pierre Robin

- Variations & abnormalities
  Conjunctivitis
  Cleft lip and palate
  Epstein’s pearls
  Natal teeth
  Choanal atresia
  Retinopathy of prematurity
  Tracheomalacia
  Micronathia

III. Laboratory and Diagnostic Data

- Blood
- Glucose
- Complete blood count with differential
- Cultures
- Rh (Coombs)
- Blood gases
- Bilirubin
- Electrolytes
- Newborn screening
I. Cardiovascular
- Basic physiology and anatomy
- Adaptation to extrauterine life
- Complications/Variations
  - Pulmonary vascular resistance
  - Abnormal rhythms
  - Congenital heart disease
    - Patent ductus arteriosus
    - Coarctation of the aorta
    - Septal defects
    - Tetralogy of Fallot
    - Transposition of the great vessels
  - Congestive heart failure
  - Hypertension/Hypotension
  - Shock
- Patent ductus arteriosus
- Coarctation of the aorta
- Septal defects
- Tetralogy of Fallot
- Transposition of the great vessels
- Congestive heart failure
- Hypertension/Hypotension
- Shock
- Renal function/urinary output
- Complications
  - Hypospadias
  - Undescended testes
  - Testicular abnormalities
  - Hydrocele
  - Inguinal hernia
  - Vaginal discharge/abnormalities
  - Renal abnormalities
  - Circumcision
  - Postoperative care

II. Respiratory
- Basic physiology and anatomy
- Adaptation to extrauterine life
- Complications/Variations
  - Air leaks
  - Apnea of prematurity
  - Chronic lung disease
  - Pneumothorax
  - Pneumomediastinum
  - Pneumonia
  - Respiratory distress syndrome
  - Transient tachypnea of the newborn
  - Persistent pulmonary hypertension
  - Meconium aspiration syndrome
  - Diaphragmatic hernia

III. Gastrointestinal and Genitourinary
- Basic physiology and anatomy
- Complications/Variations
  - Diastasis of recti muscles
  - Duodenal atresia
  - Bowel obstruction
  - Esophageal atresia/tracheoesophageal fistula
  - Imperforate anus
  - Omphalocele/gastroschisis
  - Umbilical hernia
  - Meconium ileus/plug
  - GE reflux

IV. Musculoskeletal and Integumentary
- Musculoskeletal Complications
  - Congenital hip dysplasia
  - Metatarsus adductus
  - Polydactyly and syndactyly
  - Torticollis
  - Talipes equinovarus
  - Fracture
- Physiologic basis for general skin care
- Variations
  - Erythema toxicum
  - Mili
  - Hyperpigmented skin lesions
  - Hemangiomas/birth marks
  - Petechiae
  - Cafe au lait spots
  - Other skin lesions, e.g. pustules, vesicles
  - Umbilical cord
  - Fat necrosis
  - Diaper Dermatitis
V. Neurological
- Basic physiology
- Motor function
- Complications/Variations
  - Seizures
  - Jitteriness
  - Intracranial hemorrhage (subdural)
  - Intraventricular hemorrhages
  - Periventricular leukomalacia
  - Hydrocephalus
  - Neuromuscular birth Injuries
  - Brachial plexus injuries
  - Facial nerve injuries
  - Neural tube defects
  - Therapeutic hypothermia

VI. Hematopoietic
- Basic physiology
- Interpret lab values (CBC; hematocrit, hemoglobin, retic, platelets, total and direct serum bilirubin, direct and indirect antibody tests)
- Complications
  - Anemia (Physiologic and non-physiologic)
  - Bleeding disorders
  - ABO/Rh incompatibility
  - Polycythemia/hyperviscosity
  - Sickle Cell
  - Administration of blood and blood products
- Hyperbilirubinemia
  - Basic physiology
  - Complications
    - Jaundice
      - Physiologic jaundice
      - Pathologic jaundice
      - Breast feeding and jaundice
    - Kernicterus
    - Phototherapy
    - G6PD

VII. Genetic, Metabolic and Endocrine
Genetic Disorders
- Patterns of Inheritance
- Autosomal recessive, autosomal dominant, sex linked
- Complications
  - Common chromosomal abnormalities (trisomy 21, 18 & 13)
  - Birth defects/congenital anomalies
  - Skeletal dysplasia
  - Cystic Fibrosis
  - DiGeorge (22q11.2 deletion syndrome)
  - Turner's
Endocrine/Metabolic
- Interpreting lab values (Calcium, phosphorus, magnesium, glucose)
- Metabolic Disorders (PKU, Thyroid, CAH, Galactosemia)
- Complications
  - Hypoglycemia
  - Hypocalcemia
  - Rickets/metabolic bone disease
  - Infant of a diabetic mother
GENERAL MANAGEMENT

I. Resuscitation and Stabilization
- General assessment of status and need for resuscitation
- Management of resuscitation
  - Airway
  - Breathing
  - Circulation
- Drug Therapy
- Evaluation of effectiveness of interventions
- Apgar scores
- CHD Screening

II. Nutrition and Feeding
- Growth patterns (Growth curves)
- Fluid/Calorie requirements
- CHO, Fats, Proteins
- Lactation
  - Anatomy and physiology of lactation
  - Composition of breast milk
  - Maternal nutritional needs
  - Normal breastfeeding process
- Positioning
- Latch On
- Suck/swallow/sequence
- Timing (frequency and duration)
- Feeding cues
- Contraindications to breastfeeding
- Maternal Complications
  - Latch on problems
  - Nipple problems
  - Breast engorgement
  - Insufficient milk supply
  - Medication effects
  - Therapeutic medications
  - Infection/Mastitis
  - Maternal illness
  - Perinatal substance abuse (TCN)
- Maternal/newborn separation
- Breast reduction/augmentation
- Newborn complications

- Drug screening
- Multiple births
- Prematurity
- Patient Education
  - Breast/ nipple care
  - Use of supplementary/ complementary feedings
  - Use of breastfeeding devices
  - Expressing and storing breast milk
  - Colostrum
- Complications/Contraindications
  - Donor milk
- Formula feeding
  - Composition of formula
  - Techniques
  - Special needs (e.g. cleft palate, PKU)
- Dietary Supplements (Iron, MCT, Vitamins, probiotics, Fortifiers)
- Feeding techniques
- Tube feedings
- Feeding cues
- Special Nutritional considerations
  - Chronic Lung Disease (CLD)
  - Prematurity
  - Short Gut syndrome
- Donor milk
- Formula feeding
- Composition of formula
- Techniques
- Special needs (e.g. cleft palate, PKU)
- Dietary Supplements (Iron, MCT, Vitamins, probiotics, Fortifiers)
- Feeding techniques
- Tube feedings
- Feeding cues
- Special Nutritional considerations
  - Chronic Lung Disease (CLD)
  - Prematurity
  - Short Gut syndrome
III. Pharmacology, Pharmacokinetics and Pharmacodynamics
- Principles of administration
  - Dosage
  - Route
  - 5 rights of medication administration
  - Blood drug levels (toxic vs therapeutic)
- Pharmacokinetics
  - Common drugs used in neonates
    - Vitamin K
    - Antibiotics
    - Anticonvulsants
    - Antimicrobials
    - Antiretroviral
    - Immunologic agents
    - Bronchodilators
    - CNS stimulants (Caffeine, etc)
  - Diuretics
  - Drugs for NAS
  - Eye prophylaxis
  - Vaccines
- Pain Assessment and Management
  - Signs and symptoms
  - Nonpharmacological interventions
  - Pharmacological interventions

IV Fluid, Electrolytes and Glucose Homeostasis
- Normal fluid and electrolyte requirements
- Monitoring fluid and electrolyte status
  - Electrolytes
  - Urine output
- Parenteral nutrition (indication, composition, complications)
- Lipids
- Metabolic panel
- PICC lines or midlines
- Umbilical lines
- Hypoglycemia

V. Oxygenation, non-invasive ventilation and Acid-base balance
- Oxygenation: interpretation and management
  - Hypoxia/hypoxemia
  - Oxygen saturation (SaO2)
- Methods of oxygenation/ventilation
  - Non-invasive ventilation (high flow NC, CPAP, Nasal cannula, hood)
- Blood gas: interpretation and management
  - Metabolic acidosis/alkalosis
  - Respiratory acidosis/alkalosis
  - Mixed

VI. Thermoregulation
- Mechanisms of Thermoregulation
  - Heat production
  - Temperature maintenance
- Complications
- Temperature assessment and interpretation
- Equipment (e.g. infant warmers, incubators, servocontrol)
- Mechanisms of Heat Loss
  - Insensible water loss
  - Evaporation
  - Conduction
  - Convection
  - Radiation
VII. Neurodevelopmental Care
• Neurobehavioral development
  - habituation
motor organization
  - sensory/interaction capabilities
  - state/sleep cycles
• Environmental impact on development
  - Interventions (Reducing noise, light level, diurnal patterns, handling, positioning, kangaroo care/skin to skin)
  - Nonnutritive sucking
• Complications of Substance Exposure in Utero
  - Alcohol
  - Heroin
  - Methadone
  - Cocaine
  - Nicotine
  - Subutex
  - Cannabis (marijuana)
  - Prescription drug abuse
• Neonatal Abstinence Syndrome (NAS)
  - Methadone
  - Cocaine
  - Nicotine
  - Subutex
  - Cannabis (marijuana)
  - Prescription drug abuse

VIII. Infection and Immunology
Immune System
• Basic physiology
• Interpret laboratory values
• WBC and differential
• CRP
• Antibody function
  - IgA
  - IgG
  - IgM
• Infection Control
  - Handwashing
  - Visitation
  - Standards precautions
• Complications/Variations
  - Neonatal sepsis
  - Septic shock
  - Viral and fungal infections
    - AIDS/HIV
    - Cytomegalovirus
    - Rubella
    - Hepatitis B
    - Varicella
    - Toxoplasmosis
    - Herpes
    - Human papilloma virus
  - Enterovirus
  - Bacterial infections
    - Group B streptococcus
    - Staphylococcus
    - E. coli
    - Sexually Transmitted infections
      - Gonorrhea
      - Chlamydia
      - Syphilis
    - Early and late onset infections
IX. Psychosocial support, grieving and discharge planning

Psychosocial support
- Parent-infant interaction/attachment – normal characteristics
- Family response to stress and crisis
- Barriers to parent infant interaction
- Non-traditional parents
- Sibling response and interventions
- Principles of culturally sensitive care
- Recognizing post-partum depression
- Foster and Adoptive Issue

Grieving
- Grieving process
  - stages of grieving, common behaviors and intervention
  - Factors which impede or enhance grief process
  - Pathologic responses
  - Maternal/paternal differences
  - Chronic sorrow
  - Repeat obstetric loss/infertility

Discharge Planning/Home Care (Hospital, Ambulatory Settings, Home)
- Follow up Care
  - Apnea monitoring
  - Oxygen therapy
- Screening
  - Car Seat Challenge
  - CCHD screening
  - Visual/ROP screening/follow-up
  - Hearing screening
- Parent education
  - Cord care
  - Circumcision
  - Bathing
  - Genital care
  - Feeding/elimination
  - Immunizations
  - Assessment of problems
  - CPR for neonates and infants
  - Signs and symptoms of illness
  - RSV eligibility and concerns
  - Safety Issues
  - Plagiocephaly
  - Medication
  - Special care needs
  - Special equipment
  - Motor delays and developmental follow up
  - Follow up care/referrals
  - Shaken Baby
  - Safe sleep
Professional Issues

Ethical Principles
• Autonomy
• Beneficence
• Non-maleficence
• Justice

Patient Safety
• Communication
• Interprofessional practice

Professional/Legal Issues
• Professional
  - Regulation
  - Practice
• Staffing issues
• Legal liability
  - Consent
  - Documentation/medical records
  - Negligence/malpractice

Quality Improvement
• Snell, et al., Care of the Well Newborn, Jones & Bartlett, 2017.