The above chart shows the percentage distribution of questions on the Neonatal Intensive Care Nursing exam across the major content categories covered on the examination. The major focus of the examination is on General Management and Assess & Manage Pathophysiologic States. Lesser emphasis is on General Assessment and Psychosocial Support with Professional Issues having the least number of questions assigned to this content category.
EXAM OUTLINE

This is an outline of topics and areas which may be included in the Neonatal Intensive Care Nursing examination.

10.00 General Assessment (9%)
   - Maternal Risk Factors and Birth History
   - Physical and Gestational Age Assessment

11.00 General Management (44%)
   - Resuscitation and Stabilization
   - Fluids and Electrolytes and Glucose Homeostasis
   - Nutrition and Feeding
   - Oxygenation, Ventilation and Acid Base Homeostasis
   - Thermoregulation and Integumentary
   - Pharmacology, Pharmacokinetics and Pharmacodynamics
   - Neuroprotective and Neurodevelopmental Care
   - Infection and Immunology

12.00 Assess & Manage Pathophysiologic States (39%)
   - Cardiovascular
   - Respiratory
   - Gastrointestinal and Gastrourinate
   - Hematopoietic
   - Neurological/Neuromuscular
   - Genetic, Metabolic and Endocrine
   - Head, Eye, Ear, Nose Throat

13.00 Psychosocial Support (5%)
   - Discharge Management, Family Centered Care, Grieving, Palliative Care, Mental Health

14.00 Professional Issues (3%)
   - including: Evidence Based Practice, Legal/Ethical, Patient Safety, Quality Improvement
EXAMINATION CONTENT

ASSOCIATED COMPETENCIES

• Identify antepartal and intrapartal indicators of neonatal risk and their potential significance
• Systematically assess all body systems utilizing physical examination, gestational age assessment and neurobehavioral assessment
• Apply knowledge of anatomy and physiology (maternal, fetal, transitional, newborn), pathophysiology, pharmacology, nutrition, and behavioral psychology to assess the neonate and differentiate abnormal from normal
• Recognize normal values and deviations in clinical laboratory and diagnostic data and identify potential significance
• Utilize biophysical monitoring techniques to identify body system alterations
• Develop an individualized plan of care for the restoration, maintenance and promotion of health for the high-risk neonate and family unit during hospitalization and following discharge
• Implement diagnostic, therapeutic and educational plans in collaboration with other health care providers to provide direct care for the high-risk neonate and family
• Assess the neonate’s family, community, and environment to identify areas of risk
• Identify life-threatening states and initiate appropriate interventions
• Evaluate the plan of care in collaboration with other health care providers and the family and modify the plan of care as indicated
• Identify professional nursing issues which impact on the role of the neonatal nurse
GENERAL ASSESSMENT

I. Maternal Risk Factors and Birth History
- Effects of maternal medical complications
  - hematologic
    - thrombocytopenia
  - hypertension
    - chronic, gestational hypertension, HELLP Syndrome
  - infections
    - CMV, Toxoplasmosis, syphilis, herpes, hepatitis, HIV, gonorrhea, chlamydia
  - renal disease
- Problems associated with amniotic fluid and membranes
  - amniotic bands
  - oligohydramnios
  - polyhydramnios
  - PROM and chorioamnionitis
- Significance of findings:
  - alpha-fetoprotein/triple quad/screen
  - biophysical profile
  - diagnostic ultrasound
- Recognize neonatal significance of fetal heart rate patterns
  - altered variability
  - decelerations
    - early, late, variable
  - tachycardia, bradycardia
- Effects of maternal medications on the neonate
  - tocolytics
  - analgesia, anesthesia
- Problems in labor - impact on the neonate
  - breech and other malpresentation
  - maternal hemorrhage
  - meconium
- Obstetric emergencies (impact on the neonate)
  - abruptio placenta
  - cord prolapse
  - placenta previa
- Impact of methods of delivery on the neonate
  - forceps, vacuum, cesarean

II. Physical and Gestational Age Assessment
- Interpretation of growth curves
  - weight, length and head circumference
- Physical and neuromuscular characteristics
  - preterm
  - term
  - post-term
  - AGA
  - SGA
  - LGA
- Associated risks with
  - Preterm
  - post-term
  - SGA/IUGR
  - LGA
- Normal/abnormal findings regarding:
  - general appearance
  - head, eyes, ears, nose & throat
  - neck
  - chest
  - cardiovascular
  - respiratory
  - abdomen
  - genitalia
  - extremities
  - spine/back
  - skin
  - maintaining skin integrity
  - neuromuscular and reflexes
GENERAL MANAGEMENT

I. Resuscitation and Stabilization

• Neonatal Cardiopulmonary Resuscitation
  (Per the American Heart Association & the American Academy of Pediatrics)
  - initial evaluation (ABC)
  - indications for ventilation
  - indications for intubation
  - indications for cardiac compressions
  - medications

• Use of drugs
  - epinephrine
  - volume expanders

• Resuscitation and stabilization of the neonate with
  - diaphragmatic hernia
  - hydrops fetalis
  - perinatal asphyxia
  - upper airway obstruction

II. Fluids and Electrolytes and Glucose Homeostasis

• Normal fluid and electrolyte requirements

• Monitoring fluid and electrolyte status
  - electrolytes
  - urine output

• Effects of
  - humidity
  - maturity
  - temperature

• Specific problems
  - dehydration and overhydration
  - gastrointestinal abnormalities
  - insensible water loss
  - patent ductus arteriosus
  - post-asphyxia
  - third spacing

• Parenteral fluid therapy

III. Nutrition and Feeding

• Nutritional requirements and effects of excess & deficiency
  - calories
  - carbohydrates
  - fat
  - minerals
  - protein
  - vitamins

• Enteral feeding
  - minimal enteral feedings (gut priming)

• gavage feeding

• bolus vs continuous feedings

• feeding cues

• feeding techniques

• bottle feeding
  - formula composition

• breast feeding
  - stimulating production
  - composition of breast milk
  - donor milk

• Parenteral nutrition
  - indications
  - composition
  - complications

• Dietary supplements
  - breast milk fortifiers
  - glucose polymers
  - iron
  - MCT
  - Vitamins
  - probiotics

• Nutritional management for
  - bronchopulmonary dysplasia
  - prematurity
  - short gut syndrome
  - short gut syndrome
**IV. Oxygenation, Ventilation and Acid Base**

**Homeostasis**
- Oxygenation: interpretation and management
  - hypoxia/hypoxemia
  - oxygen saturation
  - principles re: increasing/ decreasing FiO₂ levels
  - pulse oximeter
- Methods of oxygenation/ ventilation
  - indications, complications
  - noninvasive ventilation
  - extracorporeal membrane oxygenation (ECMO)
  - high flow nasal cannula
- Mechanical ventilation
  - conventional
  - high frequency
  - other methods of oxygen delivery (hood, nasal cannula)
- Blood gases: interpretation and management
  - metabolic acidosis (compensated & uncompensated)
  - metabolic alkalosis (compensated & uncompensated)
  - respiratory acidosis (compensated & uncompensated)
  - respiratory alkalosis (compensated & uncompensated)
  - mixed
  - serum lactate

**V. Thermoregulation and Integumentary**
- Mechanisms of heat loss and production
  - assessment of thermal state
  - responses to hypothermia and cold stress
  - responses to hyperthermia
- Maintaining a neutral thermal environment
- Management of thermoregulation problems
  - evaporation
  - conduction
  - convection
  - radiation
  - hypothermia and cold stress
  - hyperthermia
- Equipment
  - Incubators and radiant warmers
  - Heat mattresses and wraps
- Skin Care

**VI. Pharmacology, Pharmacokinetics and Pharmacodynamics**
- Principles of neonatal pharmacology
  - administration methods/issues
  - absorption from GI tract, skin and muscle
  - blood drug levels (toxic vs therapeutic)
  - drug distribution in the body
  - drug excretion
  - drug incompatibilities
  - drug withdrawal (therapeutic drugs)
  - drug resistance
- Dosage calculations
- Common drugs
  - anesthetics and analgesia (sedatives)
  - antibiotics
  - anticonvulsants
  - antiviral drugs
  - bronchodilators
  - cardiovascular agents
  - CNS stimulants (caffeine, etc)
  - Diuretics
  - muscle relaxants
- Management of the drug exposed neonate
  - Fetal alcohol syndrome
  - Neonatal abstinence syndrome and scoring
  - Substance use and abuse
- Laboratory drug testing
VII. Neuroprotective and Neurodevelopmental Care

- Neurobehavioral development
  - Habituation
  - motor organization
  - state organization
  - sensory/interaction capabilities
- Self-regulatory (stability) and stress responses
  - autonomic
  - motoric
  - state/sleep cycles
  - attentional
- Impact of the NICU environment
  - physical
  - light
  - sound
  - social
  - caregiver-infants interactions
  - patterns of caregiving
- Intervention strategies
  - reducing noise levels
  - reducing light levels/diurnal patterns
  - altering care patterns
  - handling/positioning
  - kangaroo care/skin-to-skin
  - nonnutritive sucking
- Provision of sensory experiences
  - auditory
  - tactile
  - visual
  - vestibular and proprioceptive
- Pain
  - assessment
  - non-pharmacologic interventions

VIII. Infection and Immunology

- Interpret laboratory values
  - WBC and differential
  - cerebrospinal fluid
- Immature host defenses
- Neonatal sepsis/meningitis
- Viral and fungal infections
  - candidiasis
  - cytomegalovirus
  - hepatitis B
  - herpes
  - HIV/AIDS
  - toxoplasmosis
  - varicella
- Specific bacterial infections such as
  - E coli infection
  - Group B Streptococcal infection
  - Early/late onset staphylococcal infection
  - syphilis
  - enterovirus
- Infection control procedures
  - nosocomial infection
STUDY GUIDE

ASSESS AND MANAGE PATHOPHYSIOLOGIC STATES

I. Cardiovascular
• Transition to Extraterine Life

• Cyanosis
  central vs peripheral
  cardiac vs pulmonary

• Specific Problems
  For all problems: presentation/ assessment causes, management, complications, outcome
  arrhythmias
cardiac tamponade
congestive heart failure
congenital heart defects
  AV canal
cocarctation of the aorta
hypoplastic left heart
pulmonary stenosis and atresia
tetralogy of fallot
transposition of the great vessels
total anomalous pulmonary venous return
ventricular septal defect
cyanotic vs acyanotic disease
hypertension
patent ductus arteriosus
shock

• Cardiovascular assessment
  blood pressure
  EKG
  cardiopulmonary monitoring
  indwelling lines

II. Respiratory
• Normal pulmonary function, surfactant

• Specific respiratory problems
  For all problems: presentation/ assessment causes, management, complications, outcome
  apnea of prematurity
bronchopulmonary dysplasia
diaphragmatic hernia/paralysis
hypoplastic lungs
meconium aspiration
persistent pulmonary hypertension
pneumothorax/air leaks
pulmonary hemorrhage
respiratory distress syndrome
transient tachypnea of the newborn

• Specific therapies
  For all problems: presentation/ assessment causes, management, complications, outcome
  endotracheal intubation
  suctioning
  surfactant replacement therapy
  chest tubes and drainage systems

III. Gastrointestinal and Gastrourinary
• Normal gastrointestinal function

• Maturation of GI tract

• Specific GI problems
  For all problems: presentation/ assessment, causes, management, complications, outcome
  GE reflux
  GI bleeds perforation/peritonitis
  Hirschsprung’s disease
  intestinal obstructions (duodenal, jejunal, ileal, imperforate anus)
  meconium ileus/plug
  malrotation/volvulus
  necrotizing enterocolitis
  omphalocele/gastrochisis
  short gut syndrome
  ostomy care
  colitis
  bloody stools
  protein allergies

• Renal function/urinary output

• Specific genitourinary problems
  For all problems: presentation/ assessment, causes, management, complications, outcome
  Genital
  ambiguous genitalia
  inguinal hernia
  testicular torsion

  Urinary tract
  asphyxial renal damage
  renal abnormalities
  renal failure
  renal vein thrombosis
STUDY GUIDE

IV. Hematopoietic
• Interpret laboratory values
  CBC
  hematocrit, hemoglobin
  platelets
  total and direct serum bilirubin
  direct and indirect antibody test
  Kleihauer Betke test
• Developmental differences
  fetal vs adult hemoglobin
  RBC differences
• Administration of blood and blood products
  techniques
  risks
• Hyperbilirubinemia
  physiologic jaundice
  causes of direct hyperbilirubinemia
  causes of indirect hyperbilirubinemia
  phototherapy
• Specific hematologic problems
  anemia
  coagulopathies/DIC
  polycythemia and hyperviscosity
  Rh and ABO incompatibility/ hydrops fetalis
  Thrombocytopenia

V. Neurological/ Neuromuscular
For all problems: presentation/ assessment, causes, management, complications, outcome
• Birth injuries (neuromuscular)
• Hydrocephalus
• Hypoxic ischemic encephalopathy
• Neural tube defects
• Germinal matrix hemorrhage
• Intraventricular hemorrhage
• Periventricular leukomalacia
• Seizures
• Subdural hemorrhage

VI. Genetic, Metabolic and Endocrine
• Interpret laboratory values
  calcium, phosphorus magnesium
  glucose
• Metabolic screening
  PKU
  Thyroid
  CAH
  Sickle cell
  Galactosemia
• Glucose homeostasis
• Specific metabolic/endocrine problems
  For all problems: presentation/ assessment, causes, management, complications, outcome
  hypocalcemia and hypercalcemia
  rickets
  hypoglycemia and hyperglycemia
  infant of diabetic mother
  thyroid disorders
  adrenal disorders
• Mendelian inheritance patterns
  autosomal recessive
  autosomal dominant
  sex-linked
• Chromosomal anomalies and diseases
  Trisomy 13
  Trisomy 18
  Trisomy 21
  Multifactorial diseases
  DiGeorge
  Turners

VII. Head, Eyes, Ears, Nose and Throat
• Eye prophylaxis
• Specific problems
  For all problems: presentation/ assessment, causes, management, complications, outcome
  cephalhematoma
  choanal atresia
  cleft palate/lip
  retinopathy of prematurity
  tracheal stenosis/atroisia
  tracheomalacia
  tracheostomy
  vocal cord paralysis
  subgaleal
  trachea-esophageal atresia (TEF)
  esophageal atresia
  micrognathia
PSYCHOSOCIAL SUPPORT

I. Discharge Management, Family-Centered Care, Grieving, Palliative Care, Mental Health
- General discharge planning and parent teaching
  - car seats
  - CPR
  - CCHD screening
  - feeding
  - immunizations
  - SIDS/safe sleep/plagiocephaly
- Visitors
  - Shaken baby
- Discharge planning and parent teaching
  - for infants with special needs
    - nutrition
    - medications
    - special equipment needs
    - special care needs
    - developmental follow up
    - visual screening
    - hearing screening
    - motor delay (including cerebral palsy)
    - cognitive/language delay
- Anticipatory grief
- Stages of grieving and common behaviors and interventions
- Factors which impede/enhance grief process
- Pathologic responses
- Maternal/paternal differences (incongruent grieving)
- Specific circumstances
  - chronic sorrow
  - death of a twin (triplets, etc)
  - repeated obstetric loss (recurrent abortion, stillbirth, preterm delivery)
  - sibling responses
- Support systems and referrals
  - bereavement groups
  - parent support groups
  - palliative care
- Parent-infant attachment behaviors
- Parental stress responses
  - high risk birth
  - changes in status
  - transfer
- Barriers to parent infant interaction
- Specific circumstances
  - adolescent parents
  - grandparents and other extended family
  - long distance nurturing of parent/infant attachment
  - sibling responses and interventions
- Specific interventions with parents and extended family
  - counseling techniques
  - parent teaching
- Shared decision making
  - parent-staff disagreements regarding treatment
- Principles of culturally sensitive care
- Maternal psychiatric issues
  - Post-traumatic stress disorder
  - Post-partum depression
PROFESSIONAL ISSUES

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

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

Evidence based practice
• Terminology
  Reliability
  Validity
  Significance
  Levels of Evidence
• Quality Improvement
• Research utilization

Patient Safety
• Communication
• Interprofessional practice
STUDY RESOURCES

- Bissinger, et al., Golden Hours, NCC, 2019.