

# *Exam Blueprint and Specialty Competencies*

## **Introduction – Blueprint for the Neonatal Nursing Certification Exam**

The primary function of the blueprint for the CNA Neonatal Nursing Certification Exam is to describe how the exam is to be developed. Specifically, this blueprint provides explicit instructions and guidelines on how the competencies are to be expressed within the exam in order for accurate decisions to be made on the candidates' competence in neonatal nursing.

The blueprint has two major components: (1) the content area to be measured and (2) the explicit guidelines on how this content is to be measured. The content area consists of the list of competencies (i.e., the competencies expected of fully competent practising neonatal nurses with at least two years of experience), and the guidelines are expressed as structural and contextual variables. The blueprint also includes a summary chart that summarizes the exam guidelines.

### **Description of Domain**

The CNA Neonatal Nursing Exam is a criterion-referenced exam.<sup>1</sup> A fundamental component of a criterion-referenced approach to testing is the comprehensive description of the content area being measured. In the case of the Neonatal Nursing Certification Exam, the content consists of the competencies of a fully competent practising neonatal nurse with at least two years of experience.

This section describes the competencies, how they have been grouped and how they are to be sampled for creating an exam.

### **Developing the List of Competencies**

The final list of competencies was updated and approved by the Neonatal Nursing Certification Exam Committee.

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<sup>1</sup> Criterion-referenced exam: An exam that measures a candidate's command of a specified content or skills domain or list of instructional objectives. Scores are interpreted in comparison to a predetermined performance standard or as a mastery of defined domain (e.g., percentage correct and mastery scores), independently of the results obtained by other candidates (Brown, 1983).

## Assumptions

In developing the set of competencies for neonatal nurses, the following assumptions, based on current national standards for nursing practice, were made:

### The Neonatal Nurse

- The neonatal nurse has a responsibility to provide a high standard of care for the neonate and family across the health continuum.
- The neonatal nurse possesses knowledge of the stages of fetal and neonatal development, the effects of maternal health, pregnancy and birth on the developing fetus and neonate, and transition to extrauterine life.
- The neonatal nurse is skilled in neonatal resuscitation and the care of neonates who are ill and/or premature.
- The neonatal nurse's practice is based on the principles of developmentally supportive care (DSC), family-centred care (FCC) and culturally sensitive care.
- The neonatal nurse employs a variety of strategies consistent with the principles of adult learning to teach, empower and share information to the family.
- The neonatal nurse actively collaborates with the interprofessional health-care team, professional organizations, clinical practice facilities and/or academic institutions.
- The neonatal nurse applies best evidence to guide clinical practice.
- The neonatal nurse advocates for practice environments that promote quality, ethical and safe care.
- The neonatal nurse demonstrates continual inquiry in all practice areas in order to establish or enhance innovation in clinical care.
- The neonatal nurse supports, facilitates and participates in the development of new knowledge.
- The neonatal nurse is a powerful change agent in health care, policy and education.
- The neonatal nurse possesses unique knowledge and skills to respond to current and developing treatment modalities, informatics and technologies.
- The neonatal nurse recognizes the significant effects of the environment on the health and well-being of the neonate and the family.
- The neonatal nurse strives to eliminate or minimize negative iatrogenic effects for the neonate and to provide holistic and developmentally supportive care.
- The neonatal nurse recognizes and demonstrates the importance of the family's role as the neonate's advocate and holistic care provider.
- The neonatal nurse supports the family's ability to adapt and cope with the neonate's condition.
- The neonatal nurse communicates effectively and professionally using verbal and all forms of written documentation.

### **The Neonatal Nursing Process**

- The four domains of neonatal nursing include practice, education, research and leadership.
- Neonatal nursing practice includes therapeutic care, health surveillance, health promotion and illness prevention, and shared decision-making.
- Neonatal nursing practice involves continuous assessment, is comprehensive and holistic, and uses all available and appropriate resources for the neonate and family.
- Neonatal nursing practice involves the identification of actual and potential problems, the evaluation of outcomes of care, and the continuous revision of the plan of care in response to changes in the neonate's and family's status.
- Neonatal nursing practice is collaborative within the interprofessional team.

### **Environment**

- The neonatal care environment consists of a variety of settings, which may include the birthing room, newborn nursery, acute care, convalescent care, palliative care, interhospital transport, home care and neonatal follow-up clinics.
- The neonatal care environment is characterized by family involvement, complexity, rapid changes, interprofessional collaboration, use of technology, uncertainty and ethical challenges.

### **The Neonate and Family**

- The neonate refers to any infant in the care of the neonatal nurse.
- The neonate is cared for holistically within the context of the neonate's family.
- The family is the constant in a neonate's life and an integral part of the care team.
- The family collaborates in the plan and delivery of care to the neonate.
- The composition of the family is defined by the family.

### **Health**

- Health is a state of biological, psychological, social, cultural, developmental, environmental and spiritual well-being, not merely the absence of disease. Health exists within acute or chronic illness, disability, and development.
- Health is the extent to which an individual, group or community is able to realize aspirations and to function within their environment.
- Health is a concept and is viewed within the context of the family's personal, cultural, ethnic and spiritual value system.
- Health behaviours may be directed toward promotion, prevention, maintenance, rehabilitation and restoration, or palliation.

- Health is affected by social determinants, such as education, food insecurity, social safety network, gender, housing, income and income distribution.

## Competency Categories

The competencies are classified under a five-category scheme commonly used to organize neonatal nursing.

Some of the competencies lend themselves to one or more of the categories; therefore, these five categories should be viewed simply as an organizing framework. Also, it should be recognized that the competency statements vary in scope, with some representing global behaviours and others more discrete and specific nursing behaviours.

## Competency Sampling

Using the grouping and the guideline that the Neonatal Nursing Certification Exam will consist of approximately 165 questions, the categories have been given the following weights in the total examination.

Table 1: Competency Sampling

Categories	Approximate weights in the total examination
Assessment	15-25%
Foundation of Care	30-40%
Physiology and Pathophysiology	30-40%
Family Integration	3-7%
Professionalism	3-7%

## Technical Specifications

In addition to the specifications related to the competencies, other variables are considered during the development of the Neonatal Nursing Certification Exam. This section presents the guidelines for two types of variables: structural and contextual.

**Structural Variables:** Structural variables include those characteristics that determine the general appearance and design of the exam. They define the length of the exam, the format and presentation of the exam questions (e.g., multiple-choice format) and special functions of exam questions (e.g., case-based or independent questions).

**Contextual Variables:** Contextual variables specify the nursing contexts in which the exam questions will be set (e.g., patient culture, patient health situation and health-care environment).

### Structural Variables

**Exam Length:** The exam consists of approximately 165 multiple-choice questions.

**Question Presentation:** The multiple-choice questions are presented in one of two formats: case-based or independent. Case-based questions are a set of approximately four questions associated with a brief health-care scenario (i.e., a description of the patients' health-care situation). Independent questions stand alone. In the Neonatal Nursing Certification Exam, 60 to 70 per cent of the questions are presented as independent questions and 30 to 40 per cent are presented within cases.

**Taxonomy for Questions:** To ensure that competencies are measured at different levels of cognitive ability, each question on the Neonatal Nursing Certification Exam is aimed at one of three levels: knowledge/comprehension, application and critical thinking.<sup>2</sup>

#### 1. Knowledge/Comprehension

This level combines the ability to recall previously learned material and to understand its meaning. It includes such mental abilities as knowing and understanding definitions, facts and principles and interpreting data (e.g., knowing the effects of certain drugs or interpreting data appearing on a patient's record).

#### 2. Application

This level refers to the ability to apply knowledge and learning to new or practical situations. It includes applying rules, methods, principles and theories in providing care to patients (e.g., applying nursing principles to the care of patients).

<sup>2</sup> These levels are adapted from the taxonomy of cognitive abilities developed in Bloom (1956).

### 3. Critical Thinking

The third level of the taxonomy deals with higher-level thinking processes. It includes the abilities to judge the relevance of data, to deal with abstraction and to solve problems (e.g., identifying priorities of care or evaluating the effectiveness of interventions). The neonatal nurse with at least two years of experience should be able to identify cause-and-effect relationships, distinguish between relevant and irrelevant data, formulate valid conclusions and make judgments concerning the needs of patients.

The following table presents the distribution of questions for each level of cognitive ability.

Table 2: Distribution of Questions for Each Level of Cognitive Ability

Cognitive Ability Level	Percentage of questions on Neonatal Nursing Exam
Knowledge/Comprehension	15-25%
Application	40-50%
Critical Thinking	30-40%

### Contextual Variables

**Patient Culture:** Questions are included that measure awareness, sensitivity and respect for different cultural values, beliefs and practices, without introducing stereotypes.

**Patient Health Situation:** In the development of the Neonatal Nursing Certification Exam, the neonate and family are viewed holistically.

**Health-Care Environment:** It is recognized that neonatal nursing is practised in a variety of settings and for the purposes of the Neonatal Nursing Certification Exam, the health-care environment is only specified where it is required for clarity or in order to provide guidance to the candidate.

## Conclusions

The blueprint for the Neonatal Nursing Certification Exam is the product of a collaborative effort between CNA, ASI and a number of neonatal nurses across Canada. Their work has resulted in a compilation of the competencies required of practising neonatal nurses and has helped determine how those competencies will be measured on the neonatal Nursing Certification Exam. A summary of these guidelines can be found in the summary chart Neonatal Nursing Certification Development Guidelines.

Neonatal nursing practice will continue to evolve. As this occurs, the blueprint may require revision so that it accurately reflects current practices. CNA will ensure that such revision takes place in a timely manner and will communicate any changes in updated editions of this document.

# Summary Chart

## Neonatal Nursing Exam Development Guidelines

<b>Structural Variables</b>											
Exam Length and Format	Approximately 165 multiple-choice questions										
Question Presentation	60-70% independent questions 30-40% case-based questions										
Cognitive Ability Levels of Questions	<table> <tr> <td>Knowledge/Comprehension</td> <td>15-25% of questions</td> </tr> <tr> <td>Application</td> <td>40-50% of questions</td> </tr> <tr> <td>Critical Thinking</td> <td>30-40% of questions</td> </tr> </table>	Knowledge/Comprehension	15-25% of questions	Application	40-50% of questions	Critical Thinking	30-40% of questions				
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# *The Neonatal Nursing Exam*

## *List of Competencies*

### 1. Assessment

#### 1-1 Maternal Factors Affecting Neonatal Outcomes

The neonatal nurse:

- 1-1a identifies antepartum and intrapartum factors that place neonates at risk (e.g., oligohydramnios, polyhydramnios, placental issues, fetal heart rate abnormalities, multiple gestation, malpresentation, premature rupture of membranes (PROM), chorioamnionitis, medications); and
- 1-1b applies knowledge of maternal and fetal physiology and pathophysiology to plan care for neonates (e.g., hypertension, HELLP syndrome, infections, substance use, coagulopathies, diabetes, thyroid conditions, cardiac disease, renal disease).

#### 1-2 Physical and Gestational Age Assessment

The neonatal nurse:

- 1-2a performs physical, gestational age and neurobehavioural/developmental exams to systematically assess neonates;
- 1-2b recognizes normal and abnormal physical assessment findings;
- 1-2c interprets biophysical monitoring data to identify normal and abnormal findings (e.g., temperature, cardiorespiratory and oxygen saturation monitoring); and
- 1-2d identifies normal and abnormal laboratory and diagnostic data for the most common tests in the neonatal period (e.g., complete blood count (CBC), blood gas, electrolytes, C-reactive protein (CRP), glucose, bilirubin, newborn screen, X-rays, ultrasound).

## 2. Foundations of Care

### 2-1 Resuscitation

The neonatal nurse:

- 2-1a understands normal fetal circulation and normal transition to extrauterine life;
- 2-1b applies the Neonatal Resuscitation Program (NRP) standards to care for neonates at birth; and
- 2-1c selects appropriate nursing interventions to respond to urgent and emergent situations (e.g., medication, cardiopulmonary resuscitation (CPR), seeking help).

### 2-2 Thermoregulation

The neonatal nurse:

- 2-2a identifies neonates at risk for thermal instability (e.g., prematurity, impaired skin integrity, environment);
- 2-2b selects appropriate nursing interventions for neonates to support normothermia (e.g., skin-to-skin contact, hat, warming devices such as incubator, open bed warmer, chemical mattress);
- 2-2c recognizes the signs and symptoms of hyperthermia and hypothermia in neonates (e.g., apnea, hypoglycemia, bradycardia, poor feeding, hypoxia, hypotension); and
- 2-2d understands the implications of hyperthermia and hypothermia in neonates (e.g., poor growth, coagulopathy).

### 2-3 Fluids and Electrolytes

The neonatal nurse:

- 2-3a identifies neonates at risk of fluid and electrolyte imbalances (e.g., low birth weight (LBW), n.p.o., renal failure, gastrointestinal losses, phototherapy);
- 2-3b monitors fluid and electrolyte status of neonates (e.g., weight, electrolytes, intake, urine output);
- 2-3c recognizes the effects of electrolyte imbalances (e.g., hyponatremia, hypernatremia, hypokalemia, hyperkalemia, hypocalcemia, hypercalcemia, hypermagnesemia); and
- 2-3d manages neonates receiving fluid and electrolyte replacement (e.g., intravenous therapy, electrolyte infusions, total parenteral nutrition (TPN), medications).

### 2-4 Pharmacologic Principles and Drug Therapies

The neonatal nurse:

- 2-4a applies the principles of pharmacodynamics and pharmacotherapeutics in the care of neonates;
- 2-4b identifies indications, side effects, administration and dosing of common neonatal medications (e.g., analgesics, antibiotics, anticonvulsants, cardiovascular agents, central nervous system (CNS) stimulants, diuretics); and
- 2-4c performs calculations to safely administer drugs to neonates.

2-5 Nutrition and Feeding

The neonatal nurse:

- 2-5a recognizes indications for and implications of enteral and parenteral nutrition;
- 2-5b identifies nutritional requirements for neonates (e.g., calories, protein, fats, carbohydrates, vitamins, minerals);
- 2-5c recognizes the effects of nutritional imbalances (e.g., bone density, growth failure);
- 2-5d selects nursing interventions to promote, sustain and protect breastfeeding for the maternal-infant dyad (e.g., skin-to-skin contact, cue-based feeding, hand expression and pumping support);
- 2-5e understands factors that could affect maternal milk supply (e.g., maternal health, prematurity, multiple gestation);
- 2-5f selects the appropriate evidence-informed nursing interventions for neonates receiving enteral feeding (e.g., donor milk, fortified feeding, supplements, minimal enteral nutrition (MEN), oral immune therapy (OIT), bolus or continuous gavage feeding, bottle feeding);
- 2-5g manages neonates with complex nutritional needs (e.g., bronchopulmonary dysplasia (BPD), extremely low birth weight (ELBW), short gut, cardiac and metabolic conditions, micrognathia, cleft lip and palate); and
- 2-5h assesses the response of neonates to feeding interventions.

2-6 Developmental Care

The neonatal nurse:

- 2-6a recognizes the impact of the environment on the neurodevelopmental status of neonates (e.g., noise, light, touch, handling, temperature, smell, pain, sleep);
- 2-6b identifies interventions to promote self-regulatory behaviours and decrease stress responses (e.g., skin-to-skin contact, containment, non-nutritive sucking, positioning, cue-based care);
- 2-6c recognizes the importance of adequate pain management;
- 2-6d performs pain assessment using validated tools (e.g., N-PASS, PIPP); and
- 2-6e facilitates non-pharmacologic interventions to reduce neonatal pain (e.g., skin-to-skin contact, containment, non-nutritive sucking, positioning, breastfeeding).

### 3. Physiology and Pathophysiology

#### 3-1 Neurologic System

The neonatal nurse:

- 3-1a understands the physiology and pathophysiology of neonatal neurologic conditions (e.g., birth injuries, hydrocephalus, hypoxic ischemic encephalopathy, neural tube defects, intraventricular hemorrhage, periventricular leukomalacia, seizures, retinopathy of prematurity, hearing loss);
- 3-1b selects the appropriate evidence-informed nursing interventions in the care of neonates with neurologic conditions;
- 3-1c recognizes the implications of therapeutic interventions for neurologic conditions (e.g., continuous electroencephalogram (EEG), therapeutic hypothermia, medications); and
- 3-1d provides individualised care to neonates following intrauterine substance exposure (e.g., fetal alcohol spectrum disorder (FASD), neonatal abstinence syndrome (NAS), nicotine, selective serotonin reuptake inhibitors (SSRIs), benzodiazepines).

#### 3-2 Cardiovascular System

The neonatal nurse:

- 3-2a understands the physiology and pathophysiology of neonatal cardiovascular conditions (e.g., arrhythmias, congestive heart failure, congenital heart defects, hypertension, hypotension, patent ductus arteriosus, shock);
- 3-2b selects the appropriate evidence-informed nursing interventions in the care of neonates with cardiovascular conditions; and
- 3-2c recognizes the implications of therapeutic interventions for cardiovascular conditions (e.g., medications, central venous and arterial lines).

#### 3-3 Respiratory System

The neonatal nurse:

- 3-3a understands the physiology and pathophysiology of neonatal respiratory conditions (e.g., apnea, respiratory distress syndrome, bronchopulmonary dysplasia, transient tachypnea, air leaks, pulmonary hypoplasia, meconium aspiration, persistent pulmonary hypertension, pulmonary hemorrhage, congenital anomalies);
- 3-3b prevents hypoxemia and hyperoxemia;
- 3-3c selects the appropriate evidence-informed nursing interventions in the care of neonates with respiratory conditions; and
- 3-3d recognizes the implications of therapeutic interventions for respiratory conditions (e.g., oxygen administration, non-invasive ventilation, mechanical ventilation, high-frequency ventilation, medications, assisting with intubation and extubation).

3-4 Gastrointestinal System

The neonatal nurse:

- 3-4a understands the physiology and pathophysiology of neonatal gastrointestinal conditions (e.g., congenital malformations, necrotizing enterocolitis (NEC), gastroesophageal reflux, Hirschsprung's disease, meconium ileus, malrotation and volvulus, short gut, bloody stools);
- 3-4b selects the appropriate evidence-informed nursing interventions in the care of neonates with gastrointestinal conditions; and
- 3-4c recognizes the implications of therapeutic interventions for gastrointestinal conditions (e.g., ostomy care, gastric decompression, medications).

3-5 Genitourinary System

The neonatal nurse:

- 3-5a understands the physiology and pathophysiology of neonatal genitourinary conditions (e.g., congenital malformations, renal failure);
- 3-5b selects the appropriate evidence-informed nursing interventions in the care of neonates with genitourinary conditions; and
- 3-5c recognizes the implications of therapeutic interventions for genitourinary conditions (e.g., medications, catheterization).

3-6 Hematologic System

The neonatal nurse:

- 3-6a understands the physiology and pathophysiology of neonatal hematologic conditions (e.g., anemia, coagulopathies, hyperbilirubinemia, polycythemia, Rh and ABO incompatibility);
- 3-6b identifies the differences between fetal and adult hemoglobin;
- 3-6c selects the appropriate evidence-informed nursing interventions in the care of neonates with hematologic conditions; and
- 3-6d recognizes the implications of therapeutic interventions for hematologic conditions (e.g., medications, transfusion of blood products, exchange transfusions, phototherapy).

3-7 Immune System

The neonatal nurse:

- 3-7a understands the physiology and pathophysiology of the neonatal immune system (e.g., sepsis, meningitis, pneumonia, gastroenteritis, urinary tract infection, congenital infections, skin infections, hospital-acquired infections);
- 3-7b applies infection control principles to the care of neonates;
- 3-7c selects the appropriate evidence-informed nursing interventions in the care of neonates with infectious conditions; and
- 3-7d recognizes the implications of therapeutic interventions for infectious conditions (e.g., medications, blood cultures, lumbar puncture).

3-8 Metabolic/Endocrine System

The neonatal nurse:

- 3-8a understands the physiology and pathophysiology of neonatal metabolic/endocrine conditions (e.g., hyperglycemia, hypoglycemia, thyroid disorders, adrenal disorders, inborn errors of metabolism);
- 3-8b recognizes the implications of newborn screening;
- 3-8c selects the appropriate evidence-informed nursing interventions in the care of neonates with metabolic/endocrine conditions; and
- 3-8d recognizes the implications of therapeutic interventions for metabolic/endocrine conditions (e.g., medications, specialized diets).

3-9 Musculoskeletal System

The neonatal nurse:

- 3-9a understands the physiology and pathophysiology of neonatal musculoskeletal conditions (e.g., developmental dysplasia of the hip, neuromuscular conditions, birth trauma, contractures, congenital anomalies);
- 3-9b selects the appropriate evidence-informed nursing interventions in the care of neonates with musculoskeletal conditions; and
- 3-9c recognizes the implications of therapeutic interventions for musculoskeletal conditions (e.g., casting, braces, range of motion, positioning).

3-10 Integumentary System

The neonatal nurse:

- 3-10a understands the physiology and pathophysiology of neonatal integumentary conditions (e.g., skin injury, congenital anomalies, birth trauma, rashes);
- 3-10b provides an environment to protect skin integrity (e.g., humidity, minimizing adhesive use);
- 3-10c selects the appropriate evidence-informed nursing interventions in the care of neonates with integumentary conditions; and
- 3-10d recognizes the implications of therapeutic interventions for integumentary conditions (e.g., medications, wound care).

3-11 Genetics

The neonatal nurse:

- 3-11a understands the physiology and pathophysiology of neonatal genetic conditions (e.g., trisomy 13, 18 and 21, DiGeorge syndrome, Turner syndrome);
- 3-11b recognizes the Mendelian inheritance patterns (autosomal recessive, autosomal dominant, sex-linked);

- 3-11c selects the appropriate evidence-informed nursing interventions in the care of neonates with genetic conditions; and
- 3-11d provides support for the family of a neonate with a genetic condition (e.g., collaboration, support group, advocacy, referral).

#### **4. Family Integration**

##### **4-1 Family-Centred Care**

The neonatal nurse:

- 4-1a develops an individualized plan of care with the family for neonates to promote health during hospitalization and following discharge;
- 4-1b facilitates the family as participants in shared decision-making and provision of care; and
- 4-1c assesses the neonate's family and environment to determine risks (e.g., substance use, postpartum depression (PPD), living conditions, violence, literacy, stressors, mental health).

##### **4-2 Discharge Planning and Follow-Up**

The neonatal nurse:

- 4-2a initiates timely discharge planning; and
- 4-2b organizes an individualized discharge teaching plan in collaboration with families (e.g., safe sleep, cardiopulmonary resuscitation (CPR), immunizations, feeding, medications, follow-up, shaken baby syndrome).

##### **4-3 Loss and Grief**

The neonatal nurse:

- 4-3a recognizes stages and behaviours related to the grieving process (e.g., denial, anger, bargaining, depression, incongruent grieving);
- 4-3b identifies factors that impede or enhance the grieving process (e.g., infertility, family support, chronic sorrow, multiple gestation, repeated loss);
- 4-3c identifies hospital and community supports available for grieving families; and
- 4-3d provides care and support to neonates and their families experiencing loss and grief.

## 5. Professionalism

### 5-1 Professional Practice

The neonatal nurse:

- 5-1a practises in accordance with professional neonatal nursing standards;
- 5-1b participates in continuing education;
- 5-1c provides culturally-sensitive care; and
- 5-1d promotes a respectful workplace environment (e.g., speaking up against lateral violence and bullying, promoting interprofessional collaboration).

### 5-2 Quality and Evidence-Based Practice

The neonatal nurse:

- 5-2a contributes to quality improvement initiatives (e.g., identifying areas for improvements, participating in quality improvement projects, integrating families' feedback, collaborating with interprofessional team members).

### 5-3 Patient Safety

The neonatal nurse:

- 5-3a integrates safety practices into daily nursing activities (e.g., hand hygiene, independent double check, safety checklist);
- 5-3b recognizes adverse or near miss events (e.g., medication errors, name alerts, patient deterioration); and
- 5-3c prevents occurrence of adverse or near miss events (e.g., effective communication, team work, participation in simulation, education, safety alerts, product updates, "no blame" culture, reporting, debriefing).

### 5-4 Ethics

The neonatal nurse:

- 5-4a understands the ethical principles of autonomy, beneficence, non-maleficence and justice; and
- 5-4b practises according to the CNA Code of Ethics.

### 5-5 Research

The neonatal nurse:

- 5-5a utilizes current research to optimize practice;
- 5-5b differentiates levels of evidence; and
- 5-5c participates in research initiatives.