

# Summary Chart

## Critical Care Pediatrics Nursing Certification Exam Development Guidelines

<b>Structural Variables</b>			
Exam Length and Format	Approximately 180 objective questions (e.g., multiple-choice)		
Question Presentation	60-70% independent questions 30-40% case-based questions		
Cognitive Ability Levels	Knowledge/Comprehension	20-30% of questions	
	Application	25-35% of questions	
	Critical Thinking	45-55% of questions	
Competency Categories	Neurologic System	10-20% of questions	
	Cardiovascular System	17-27% of questions	
	Respiratory System	16-26% of questions	
	Gastrointestinal System	1-11% of questions	
	Renal System	2-12% of questions	
	Endocrine System	1-10% of questions	
	Immunology/Hematology Systems	1-10% of questions	
	Musculoskeletal/Integument Systems	2-12% of questions	
	Psychosocial	6-16% of questions	
<b>Contextual Variables</b>			
Patient Age and Gender		<b>Male</b>	<b>Female</b>
	Birth - 12 months	15 - 25%	15 - 25%
	13 months - 5 years	10 - 20%	10 - 20%
	6 - 16 years	10 - 20%	10 - 20%
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 Critical Care Pediatrics Nursing Certification Exam, the patient is viewed holistically. The patient health situations presented also reflect a cross-section of health situations encountered by pediatric critical care nurses.		
Health-Care Environment	It is recognized that critical care nursing is practiced primarily in the hospital setting. However, critical care nursing can also be practiced in other settings. Therefore, for the purposes of the Critical Care Pediatrics Nursing Certification Exam, the health-care environment is only specified where it is required for clarity or in order to provide guidance to the examinee.		

# ***The Critical Care Pediatrics Nursing Exam List of Competencies***

## **Neurologic System**

The critical care pediatrics nurse...

- 1.1 Interprets data related to the neurologic system including:
  - 1.1a Physical assessment (e.g., Glasgow Coma Scale, cranial nerve assessment, motor/sensory scales, pupils, head shape and circumference, fontanel, newborn reflexes (MORO, Babinski), achievement of normal developmental milestones, Cushing's triade);
  - 1.1b Laboratory results (e.g., serum and urine electrolytes and osmolality, cerebral spinal fluid [CSF], arterial blood gases [ABG's], specific gravity, glucose);
  - 1.1c Diagnostic results (e.g., CAT scan [CT], magnetic resonance imaging [MRI], electroencephalogram [EEG], angiography, brainstem auditory evoked response [BAER], somatosensory visual evoked potential [SSVEP]);
  - 1.1d Intracranial waveforms and pressures (e.g., troubleshooting inaccurate results, interpreting abnormal findings);
  - 1.1e Cerebral perfusion pressure; and
  - 1.1f Brain death criteria.
- 1.2 Recognizes actual or potential life-threatening alterations in the neurologic function including:
  - 1.2a Ineffective thermoregulation (e.g., hyperthermia, hypothermia);
  - 1.2b Motor and sensory function (e.g., Guillain-Barré, spinal cord injury, muscular dystrophy, myelomeningocele, Arnold Chiari);
  - 1.2c Cerebral tissue perfusion (e.g., seizures, meningitis, shock, cerebral vascular accident, cerebritis, arteriovenous [AV] malformation);
  - 1.2d Increased intracranial pressure (e.g., head injury, cerebral aneurysm, herniation, hydrocephalus, medulloblastoma, posterior fossa tumor, Shaken Baby Syndrome, near drowning); and
  - 1.2e Neurogenic shock.
- 1.3 Selects the appropriate nursing intervention to minimize or prevent motor and/or sensory deficits such as:
  - 1.3a Maintaining spinal cord integrity (e.g., positioning, immobilization devices, pharmacological agents, C-spine precautions)
  - 1.3b Intervening for spinal cord crises (e.g., spinal shock, autonomic dysreflexia).

- 1.4 Selects the appropriate nursing intervention to correct alterations in cerebral tissue perfusion such as:
  - 1.4a Using techniques to prevent obstruction and promote venous and cerebral spinal fluid (CSF) drainage (e.g., positioning, elevate head of bed);
  - 1.4b Manipulating PCO<sub>2</sub>;
  - 1.4c Administering pharmacologic agents (e.g., anticonvulsants, diuretics, barbiturates, analgesics, sedatives, neuromuscular blocking agents, high dose steroids, hyperosmolar therapy);
  - 1.4d Managing invasive intracranial pressure monitoring or ventricular drainage devices (e.g., set up, drainage, positioning of device);
  - 1.4e Using techniques that minimize elevations in intrathoracic pressures (e.g., minimize airway stimulation, effect of positive end expiratory pressure [PEEP], gastric decompression);
  - 1.4f Managing vasospasm (e.g., calcium channel blockers, triple therapy – hypervolemia – hypertension – hemodilution [3H]);
  - 1.4g Controlling metabolic rate (e.g., invasive and noninvasive warming/cooling devices or fluids, pharmacologic agents, minimize stimulation);
  - 1.4h Managing seizure activity; and
  - 1.4i Preventing secondary injury (e.g., oxygen therapy, fluid management, blood pressure management and neuromuscular blockade).

## Cardiovascular System

The critical care pediatrics nurse...

- 2.1 Interprets data related to the cardiovascular system including:
  - 2.1a Physical assessment (e.g., pulses, skin temperature, heart sounds, hepatosplenomegaly, capillary refill, periorbital edema, 4 limb blood pressure, cyanosis, mottling);
  - 2.1b Laboratory results (e.g., CBC, coagulation, electrolytes, lactate, drug levels);
  - 2.1c Information from technological supports (e.g., pacemakers, pre and post ductal saturations);
  - 2.1d Intra-cardiac pressures and waveforms (e.g., right atrial [RA], left atrial [LA], pulmonary artery pressure [PAP]);
  - 2.1e Venous pressures and waveforms (e.g., central venous pressure [CVP]);
  - 2.1f Arterial pressures and waveforms;
  - 2.1g Hemodynamic parameters (e.g., cardiac index [CI], systemic vascular resistance index [SVR(I)], pulmonary vascular resistance index [PVR(I)]); and
  - 2.1h Cardiac rhythm (e.g. rate rhythm, ST elevation, T wave configuration, sinus bradycardia, sinus tachycardia, supraventricular tachycardia, ventricular tachycardia, ventricular fibrillation, junctional ectopic tachycardia).

- 2.2 Intervenes based on observation of signs and symptoms of the following actual or potential life-threatening alteration in cardiac perfusion and output:
  - 2.2a Cardiogenic shock (e.g. cardiomyopathy, congenital heart defects);
  - 2.2b Hypovolemic shock (e.g. dehydration, post-cardiopulmonary bypass capillary leak, chest tube losses > 5cc/kg/h);
  - 2.2c Congenital heart defects (e.g., decreased pulmonary blood flow lesion, increased pulmonary blood flow lesions, obstructions);
  - 2.2d Cardiac tamponade (e.g., cardiac surgery, trauma, effusion);
  - 2.2e Congestive heart failure (e.g., increased pulmonary blood flow defects); and
  - 2.2f Hypertension post-cardiac surgery (e.g., coarctation of the aorta, systemic vascular resistance [SVR] and pulmonary vascular resistance [PVR]).
  
- 2.3 Selects appropriate intervention to correct alterations in cardiovascular perfusion such as:
  - 2.3a Administering oxygen (e.g., oxyhood, nasal prongs, differentiating cardiac versus respiratory cyanosis and consequences of O<sub>2</sub> administration);
  - 2.3b Administering vasopressors;
  - 2.3c Administering vasodilators (e.g., nitrates);
  - 2.3d Administering thrombolytic agents;
  - 2.3e Administering anti-coagulants; and
  - 2.3f Caring for a child on extracorporeal membrane oxygenation (ECMO).
  
- 2.4 Selects appropriate interventions to correct alterations in cardiac output such as:
  - 2.4a Manipulating preload (e.g., pharmacologic agents, fluid administration);
  - 2.4b Manipulating afterload (e.g., fluid administration, pharmacologic agents);
  - 2.4c Manipulating contractility (e.g., fluid administration, pharmacologic agents);
  - 2.4d Manipulating heart rate or rhythm: fluid administration, pharmacologic agents;
  - 2.4e Manipulating heart rate or rhythm: pacing;
  - 2.4f Manipulating heart rate or rhythm: cardioversion (joules/kg);
  - 2.4g Manipulating heart rate or rhythm: defibrillation (joules/kg); and
  - 2.4h Managing a cardiac arrest (e.g., PALS protocols, intraosseous and ETT administration of drugs).
  
- 2.4 Selects appropriate nursing intervention to manage hemodynamic systems such as:
  - 2.4a Managing invasive hemodynamic catheters (e.g., set up, leveling, patency)
  - 2.4b Troubleshooting invasive hemodynamic pressures and waveforms (e.g., inaccurate results, interpreting abnormal findings).

## Respiratory System

The critical care pediatrics nurse...

- 3.1 Interprets data related to the respiratory system including:
  - 3.1a Physical assessment (e.g., auscultation, palpation, inspection, signs of respiratory distress, retractions, grunting, use of accessory muscles, nasal flaring, apnea);
  - 3.1b Laboratory results including: arterial blood gases;
  - 3.1c Laboratory results including: venous blood gases;
  - 3.1d Laboratory results including: capillary blood gases;
  - 3.1e Diagnostic test results: chest x-rays;
  - 3.1f Oxygen delivery (e.g., A/a ratio);
  - 3.1g Pulse oximetry and noninvasive CO<sub>2</sub> monitoring;
  - 3.1h Weaning parameters (e.g., work of breathing); and
  - 3.1i Ventilation information (e.g., ventilatory parameters, airway pressures, end-tidal CO<sub>2</sub>, ventilatory modes).
- 3.2 Recognizes an actual or potential life-threatening alteration of the respiratory system including:
  - 3.2a Ineffective gas exchange including (e.g. chylothorax, pleural effusions);
  - 3.2b Tension pneumothorax;
  - 3.2c Flail chest;
  - 3.2d Impaired gas exchange including: upper airway disease (e.g., foreign body, croup, epiglottis, postextubation stridor, laryngospasm);
  - 3.2e Impaired gas exchange including: lower airway disease (e.g., RSV, bronchiolitis, pneumonia, acute respiratory distress syndrome);
  - 3.2f Impaired gas exchange including: inhalation injuries (e.g., thermal, carbon monoxide, aspiration, near drowning);
  - 3.2g Impaired gas exchange including: status asthmaticus;
  - 3.2h Impaired gas exchange including: mixed obstructive and restrictive disease.
- 3.3 Selects appropriate nursing interventions to correct alterations in respiratory function such as:
  - 3.3a Positioning (e.g., prone);
  - 3.3b Managing airway (e.g., jaw thrust/chin lift, artificial airways, sniffing position);
  - 3.3c Managing the endotracheal tube/tracheostomy (e.g., appropriate size, vagal response, hyperoxygenation, suctioning, tracheobronchial toilet);
  - 3.3d Managing secretions (e.g., chest percussion, vibration, postural drainage);
  - 3.3e Administering pharmacologic agents (e.g., analgesics, reversal agents, sedatives, nitric oxide);

- 3.3f Administering pharmacologic agents (e.g., bronchodilators, steroids);
  - 3.3g Administering neuromuscular blocking agents;
  - 3.3h Troubleshooting mechanical supports (e.g., ventilator, BIPAP mask);
  - 3.3i Assisting with medical interventions (e.g., intubation, extubation, chest tube insertion);
  - 3.3j Managing changes to oxygenation (e.g., oxygen, continuous positive airway pressure [CPAP], positive end expiratory pressure [PEEP]);
  - 3.3k Managing changes to manipulate minute ventilation (e.g., assist control [AC], synchronized intermittent mandatory ventilation [SIMV]);
  - 3.3l Managing changes to adjust pressure support ventilation (PSV); and
  - 3.3m Managing changes to manipulate pressure controlled ventilation (PCV) or high frequency ventilation or inverse ratio ventilation.
- 3.4 Selects appropriate nursing interventions to promote successful weaning (e.g., adequate nutrition, pain management, promoting rest).

## Gastrointestinal System

The critical care pediatrics nurse...

- 4.1 Interprets data related to the gastrointestinal function including:
  - 4.1a Physical assessment (e.g., auscultation, palpation, inspection);
  - 4.1b Laboratory results (e.g., liver profile, blood sugar, gastric pH, occult blood, bilirubin [total, indirect and direct]); and
  - 4.1c Nutritional assessment (e.g., head circumference, length, nutritional intake).
- 4.2 Recognizes actual or potential life-threatening alterations to the gastrointestinal system including:
  - 4.2a Obstructed/ischemic/infarcted bowel or peritonitis
  - 4.2b Hepatic failure (e.g. biliary atresia, hepatitis).
- 4.3 Selects the appropriate nursing intervention to manage the patient poisoned with drugs such as anti-depressants, ASA, acetaminophen, methanol and ethylene glycol.
- 4.4 Selects the appropriate nursing interventions to correct alterations in gastrointestinal functions such as:
  - 4.4a Promoting early and safe enteral feeding (e.g., positioning to prevent aspiration, frequency of feeding, intestinal or gastric feeding, maintaining gut integrity, tube position);
  - 4.4b Promoting early and safe parenteral nutrition;
  - 4.4c Administering pharmacologic agents (e.g., histamine-reducing agents, motility enhancers); and
  - 4.4d Controlling gastric bleeding (e.g., pharmacologic agents, gastric tubes, lavage).

## Renal System

The critical care pediatrics nurse...

- 5.1 Interprets data related to the renal system including:
  - 5.1a Physical assessment (e.g., edema, urine, hematuria, weight, hydration status);
  - 5.1b Laboratory results (e.g., electrolytes, urea, creatinine, urinalysis, osmolality, drug levels, specific gravity); and
  - 5.1c Laboratory results (e.g., electrolytes, urea, creatinine, urinalysis, osmolality, drug levels, specific gravity).
- 5.2 Recognizes effects of nephrotoxic agents (e.g., diuretics, vasopressors, aminoglycosides, radiographic dyes, transplant drugs).
- 5.3 Recognizes potential life-threatening alterations in renal function (e.g. hyperkalemia).
- 5.4 Selects appropriate nursing interventions to correct electrolytes and acid-base imbalances.
- 5.5 Selects appropriate interventions to optimize renal function such as:
  - 5.5a Administering pharmacological agents (e.g., diuretics, vasodilators);
  - 5.5b Maintaining & troubleshooting invasive interventions: Continuous Renal Replacement Therapies (CRRT); and
  - 5.5c Maintaining & troubleshooting invasive interventions: Intermittent Renal Replacement Therapies (IRRT) (e.g., peritoneal dialysis).

## Endocrine System

The critical care pediatrics nurse...

- 6.1 Interprets data related to the endocrine system including laboratory tests (e.g., blood sugar, osmolality, electrolytes, urine ketones, acid-base balance sweat chlorides).
- 6.2 Recognizes actual or potential life-threatening alterations in endocrine function such as:
  - 6.2a Antidiuretic hormone (e.g., diabetes insipidus [DI], syndrome of inappropriate antidiuretic hormone [SIADH])
  - 6.2b Diabetes (e.g., ketoacidosis [DKA]).
- 6.3 Selects appropriate nursing interventions to correct alterations in endocrine function such as:
  - 6.3a Administering pharmacologic agents (e.g. insulin, steroids, dextrose, antidiuretic hormone, electrolyte replacement)
  - 6.3b Fluid management.

## Immunology/Hematology Systems

The critical care pediatrics nurse...

- 7.1 Interprets data related to the immunologic/hematologic systems including:
  - 7.1a Physical assessment (e.g. petechiae, pallor, cold extremities, melena, prolonged capillary refill, delayed hemostasis)
  - 7.1b Laboratory results (e.g., cultures, CBC, drug levels, coagulation profile, human immunodeficiency virus [HIV] screening, cytomegalovirus [CMV], fibrinogen degradation products [FDP], fibrin split products [FSP]).
- 7.2 Recognizes the potential for risk of infection (e.g., immunosuppression, invasive devices, age, Di George syndrome, asplenia).
- 7.3 Recognizes the potential life-threatening alterations in immunologic defense (e.g., septic shock, multiorgan dysfunction syndrome, systemic inflammatory response syndrome (SIRS), graft vs. host disease, transplant).
- 7.4 Recognizes the potential life-threatening alterations in the hematologic functions such as:
  - 7.4a Heparin-induced thrombocytopenia (HIT) syndrome, leukemia;
  - 7.4b Disseminated intravascular coagulation (DIC); and
  - 7.4c Deep vein thrombosis (DVT).
- 7.5 Selects appropriate interventions to prevent alterations in the immunologic system including maintaining aseptic technique, providing adequate nutrition, manipulating the environment to minimize exposure to organisms, alleviating stress and administering agents to promote immune function (e.g., intravenous immune globulin [IVIG], immunization and anti-rejection agents).
- 7.6 Selects appropriate interventions to correct alterations in the hematologic system such as use of fluids and pharmacologic agents, vitamin K, antithrombin III.
- 7.7 Selects appropriate interventions to correct alterations in the hematologic system such as administration of blood and blood products (e.g. FFP, PRBC, cryoprecipitate, Factor VIII, calculate blood transfusion volume).

## Musculoskeletal/Integumentary Systems

The critical care pediatrics nurse...

- 8.1 Interprets data related to the musculoskeletal/integumentary systems including:
  - 8.1a Physical assessment (e.g., integrity, range of motion, circulation, skin temperature, sensation, petechiae, mobility, risk of skin breakdown);
  - 8.1b Laboratory results (e.g., cultures, ABG, electrolytes, CBC, myoglobin); and
  - 8.1c Diagnostic test results (e.g., x-rays).

- 8.2 Recognizes actual or potential life-threatening alterations of the musculoskeletal/ integumentary systems:
  - 8.2a Compartment syndrome;
  - 8.2b Burns (e.g., thermal, chemical or radiation, electrical);
  - 8.2c Wounds (e.g., post-operative wounds, post-trauma wounds, decubitus ulcers); and
  - 8.2d Multiple trauma.
- 8.3 Selects the appropriate nursing interventions to correct alterations of the musculoskeletal/integumentary systems such as administering pharmacologic agents (e.g., antibiotics, analgesics, wound care).
- 8.4 Selects appropriate nursing interventions to prevent complications related to immobility (e.g., range of motion, positioning, therapeutic beds, coughing, deep breathing, wound care, traction).

## Psychosocial

### Communicating with the Patient

The critical care pediatrics nurse...

- 9.1 Interprets data related to the patient's psychosocial needs including:
  - 9.1a Patient's experience of the health crisis as appropriate to age and developmental level
  - 9.1b Patient's response to the health care system (e.g., current and past experiences).
- 9.2 Selects appropriate interventions to facilitate optimal communication such as:
  - 9.2a Involving the family in identifying the patient's needs
  - 9.2b Providing opportunities for the patient/family to make choices about the care.

### Communicating with the Family

- 9.3 Interprets data related to each family's particular response to the health crisis and health care system (e.g., coping skills, hopelessness, powerlessness, grief, loss, sudden death, manifestations of abuse, family structure and function).
- 9.4 Selects appropriate interventions to facilitate optimal family processes such as:
  - 9.4a Promoting family-centred care;
  - 9.4b Facilitating communication between the patient and family given the existing physical, psychological and environmental barriers along with the patient's age and level of development considering age and developmental level;
  - 9.4c Implementing crisis intervention;

- 9.4d Facilitating decision-making related to end-of-life withdrawal of treatment and/or the execution of advanced directives; and
- 9.4e Supporting the patient's and/or the family's decision regarding organ donation and transplantation.

## **Promoting Comfort**

- 9.5 Interprets age-appropriate pain assessment data such as severity, location, duration, precipitating factors, radiation and alleviating factors.
- 9.6 Interprets data related to anxiety such as behavioural assessment data and physical assessment data (e.g., heart rate, grimace).
- 9.7 Interprets data related to level of sedation (e.g., sedation scale, respiratory rate).
- 9.8 Selects appropriate interventions to promote comfort such as:
  - 9.8a Implementing non-pharmacologic methods of pain management (e.g., communication, appropriate use of touch, noise control, music therapy, visualization, relaxation technique, use of personal mementos, positioning, family involvement, developmentally supportive care);
  - 9.8b Administering pharmacologic agents (e.g., analgesics, sedatives); and
  - 9.8c Facilitating appropriate pharmacologic administration methods (e.g., regional blocks, epidural, patient-controlled analgesia [PCA] and continuous infusions, topical anesthesia).
- 9.9 Selects appropriate interventions to prevent or minimize ICU psychosis such as management of the environment, promoting sleep and withdrawal from pharmacologic agents.

# ***BIBLIOGRAPHY***

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