



FACULTY	FACULTY OF HEALTH SCIENCES AND VETERINARY MEDICINES		
SCHOOL	SCHOOL OF NURSING AND PUBLIC HEALTH		
DEPARTMENT	GENERAL NURSING SCIENCE		
MODULE	CRITICAL CARE NURSING [PAPER 2]		
MODULE CODE	CCN 4850		
DATE	OCTOBER 2024		
DURATION	3 HOURS	MARKS	100

FIRST OPPORTUNITY EXAMINATION PAPER

Examiner: Mrs. Justa F. Davids (University of Namibia)
Internal Moderator: Dr K. Amakali (University of Namibia)
External moderator: Dr. M. Botes (University of Witwatersrand)

INSTRUCTIONS

1. Work in an orderly way and present your work as neatly as possible.
2. While most of the marks will be awarded for content, candidates must bear in mind the importance of presentation, i.e. insight and critical thinking.
3. Number your questions correctly and clearly.
4. This paper consists of 10 pages including the cover page.

QUESTION 1

1.1. Read through the questions and choose the correct answer. Write only e.g. 1.1.1 B.

(10 x 1 = 10)

1.1.1 The progression of acute lung injury can be described in which three phases?

- A. Exudative, proliferative, and resolution
- B. Exudative, fibro-proliferative, and resolution
- C. Exudative, regenerative, and resolution
- D. Exudative, reparative, and resolution

1.1.2 What triggers the release of inflammatory mediators in acute lung injury?

- A. Activation of surfactant production
- B. Increased oxygenation levels
- C. Injury to the alveolar epithelial cells
- D. Activation and accumulation of neutrophils, macrophages, and platelets in the pulmonary capillaries

1.1.3 During the exudative phase, what results from increased capillary membrane permeability?

- A. Leakage of fluid into the pulmonary interstitium
- B. Increased oxygenation in the alveoli
- C. Decrease in pulmonary artery pressures
- D. Formation of hyaline membranes in the interstitial space

1.1.4 What is the result of fluid being forced from the interstitial space into the alveoli?

- A. Decreased alveolar pressure
- B. Increased alveolar edema
- C. Increased surfactant production
- D. Reduced pulmonary hypertension

1.1.5 Asthma is a chronic inflammatory disorder of the airways involving which of the following cells?

- A. Mast cells, eosinophils, T lymphocytes, neutrophils, and epithelial cells
- B. Red blood cells, platelets, B lymphocytes, neutrophils, and epithelial cells
- C. Mast cells, B lymphocytes, macrophages, neutrophils, and endothelial cells
- D. Red blood cells, T lymphocytes, macrophages, eosinophils, and endothelial cells

1.1.6 An acute exacerbation of asthma can be characterized by which of the following symptoms?

- A. Persistent fever and chills
- B. Progressive wheezing, cough, chest tightness, shortness of breath
- C. Sudden weight gain and dizziness
- D. Chronic fatigue and muscle pain

1.1.7 As the diameter of the airways decreases during an asthma attack, what happens to airway resistance?

- A. Airway resistance decreases
- B. Airway resistance remains the same
- C. Airway resistance increases
- D. Airway resistance fluctuates

1.1.8 Guillain-Barré Syndrome (GBS) is characterized by what kind of onset?

- A. Gradual onset muscle weakness
- B. Rapid-onset muscle weakness
- C. Intermittent muscle weakness
- D. Chronic muscle weakness

1.1.9 GBS typically involves which pattern of nerve dysfunction?

- A. Descending peripheral nerve dysfunction
- B. Ascending peripheral nerve dysfunction
- C. Random pattern of nerve dysfunction
- D. Central nervous system dysfunction

1.1.10 Which type of muscle is primarily affected by the weakness in Myasthenia Gravis?

- A. Cardiac muscle
- B. Smooth muscle
- C. Skeletal muscle
- D. Involuntary muscle

1.2 Read through the scenario and answer the following questions based on the scenario.

Scenario: John Doe, a 65-year-old male, with a medical history of Hypertension and Type 2 Diabetes Mellitus was admitted to the ICU following hip replacement surgery. On the third post-operative day, he suddenly develops acute shortness of breath, chest pain, and a rapid heart rate. He appears anxious and diaphoretic. On examination, his respiratory rate is 30 breaths per minute, heart rate is 110 beats per minute, blood pressure is 90/60 mmHg, and oxygen saturation is 85% on room air.

1.2.1 What is the most likely diagnosis given the patient's sudden onset of symptoms?

(1 x 1 = 1)

1.2.2 Explain the association of Virchow's triad with the diagnosis given the patient's sudden onset of symptoms in the scenario.

(6 x 1/2 = 3)

1.2.3 What preventive measures in the ICU could have reduced the patient's risk of developing the condition identified in question 1.2.1?

(3 x 1 = 3)

1.3 Read through the scenario and answer the questions based on the scenario.

Scenario: Sarah Johnson, a 58-year-old female with a medical history of chronic obstructive pulmonary disease (COPD) and hypertension, was admitted to the ICU due to a severe exacerbation of her COPD. She presents with increased shortness of breath, confusion,

lethargy, and a headache. On examination, her respiratory rate is 28 breaths per minute, heart rate is 95 beats per minute, blood pressure is 140/90 mmHg, and oxygen saturation is 88% on a 2L nasal cannula. An arterial blood gas (ABG) was done and the results are as follows:

pH: 7.25

PaCO₂: 60 mmHg

HCO₃⁻: 26 mmol/L

PaO₂: 55 mmHg

1.3.1 What type of acid-base imbalance does Sarah Johnson have based on her ABG results?

(1 x 1 = 1)

1.3.2 What is the likely cause of Sarah Johnson's acid-base disorder?

(3 x 1 = 3)

1.3.3 What are the clinical signs and symptoms associated with this acid-base disorder?

(Any 4 x ½ = 2)

1.3.4 What immediate treatment interventions are appropriate for managing Sarah Johnson's respiratory acidosis?

(4 x ½ = 2)

[25]

QUESTION 2

2.1 Read through the scenario and answer the questions based on the scenario.

Scenario: Michael White, a 45-year-old male, presents to the ICU with severe epigastric abdominal pain radiating to his back, nausea, and vomiting. The pain started suddenly and has been persistent for the past 24 hours. On examination, he is febrile (38.5°C), tachycardic (heart rate 110 bpm), hypotensive (blood pressure 90/60 mmHg), and has a distended, tender abdomen with guarding.

Patient information	Laboratory and Imaging results
Medical history: History of gallstones, frequent alcohol use Current admission: Severe abdominal pain and vomiting	Serum Amylase: 950 U/L (Normal: 30-110 U/L) Serum Lipase: 1200 U/L (Normal: 0-160 U/L) White Blood Cell Count: 18,000/mm ³ (Normal: 4,000-11,000/mm ³) Serum Calcium: 7.5 mg/dL (Normal: 8.5-10.5 mg/dL) CT Scan: Shows enlarged pancreas with peripancreatic fluid collections.

- 2.1.1 What is the likely diagnosis for Michael White based on his clinical presentation and laboratory results? (1 x 1 = 1)
- 2.1.2 Indicate the most common causes of acute pancreatitis. (Any 2 x 1 = 2)
- 2.1.3 Discuss the initial management steps that are necessary for Mr. White in the ICU. (Any 5 x 1 = 5)
- 2.2 Discuss how the gastric mucosa is protected from the digestive effects of gastric secretions. (14 x ½ = 7)
- 2.3 Read through the questions and choose the correct answer. Write only e.g. 2.3.1 C. (10 x 1 = 10)
- 2.3.1 Identify which laboratory findings are most likely to indicate hepatic encephalopathy in a patient with liver failure.
- A. Elevated blood urea nitrogen (BUN) and creatinine
 - B. Decreased serum albumin and increased INR
 - C. Elevated serum ammonia and decreased clotting factors
 - D. Increased bilirubin and normal alkaline phosphatase
- 2.3.2 A 45-year-old woman with chronic alcoholism presents with jaundice, ascites, and confusion. Which of the following is the least likely primary cause of her liver failure?
- A. Hepatitis B
 - B. Cirrhosis due to alcohol abuse
 - C. Autoimmune hepatitis
 - D. Metastatic liver cancer
- 2.3.3 In assessing a patient with acute liver failure, integrating which of the following signs and symptoms would most likely support the need for an urgent liver transplant evaluation?
- A. Mild jaundice and fatigue
 - B. Ascites and peripheral edema
 - C. Encephalopathy and coagulopathy
 - D. Abnormal liver function tests but asymptomatic presentation
- 2.3.4 During the management of a patient with liver failure, which strategy would be best to apply in order to monitor and prevent hepatic encephalopathy?
- A. Administer additional diuretics to reduce ascites
 - B. Implement a low-protein diet to decrease ammonia production
 - C. Increase salt intake to correct hyponatremia
 - D. Encourage regular resistance exercise to improve muscle mass
- 2.3.5 Create a care plan for a patient with liver failure who has developed ascites. Which of the following interventions would be most appropriate to include for improving patient outcomes?

- A. Restricting sodium intake and using aldosterone antagonists
 - B. Increasing fluid intake and supplementing with potassium
 - C. Administering high doses of corticosteroids and antibiotics
 - D. Recommending bed rest and high-calorie diet with protein supplements
- 2.3.6 Given a patient presenting with acute abdominal pain, fever, and elevated white blood cell count, which diagnostic step would be most appropriate to evaluate the likelihood of peritonitis?
- A. Conducting an abdominal ultrasound
 - B. Performing a physical examination with palpation of the abdomen
 - C. Ordering a complete blood count (CBC) panel
 - D. Administering an MRI scan
- 2.3.7 A 45-year-old female diagnosed with peritonitis resulting from a ruptured appendix is not responding to broad-spectrum antibiotics. What is the next best step in the management of this patient?
- A. Increasing the dose of antibiotics
 - B. Switching to a different class of antibiotics
 - C. Observing for another 24 hours before deciding on surgery
 - D. Performing a laparotomy for surgical intervention
- 2.3.8 Evaluate the efficacy of prophylactic antibiotics in preventing peritonitis following elective major abdominal surgery. Which statement most accurately reflects current medical practice?
- A. Prophylactic antibiotics are ineffective and not recommended.
 - B. Prophylactic antibiotics are effective and reduce the incidence of postoperative peritonitis.
 - C. Prophylactic antibiotics often lead to antibiotic resistance and should be used sparingly.
 - D. The use of prophylactic antibiotics is beneficial only in pediatric patients.
- 2.3.9 Assess the following treatment plan for a patient with peritonitis secondary to bacterial peritonitis: Initiation of broad-spectrum antibiotics and pain management with the exclusion of surgical intervention. What critical aspect of the treatment plan is being overlooked?
- A. The inclusion of anti-inflammatory medication
 - B. The potential need for fluid resuscitation
 - C. The importance of surgical consultation and possible intervention
 - D. The assessment of patient nutritional status
- 2.3.10 What pharmacologic strategy should be employed to prevent recurrent bleeding in a patient with a history of peptic ulcer disease who is now presenting with gastrointestinal bleeding?
- A. Long-term antibiotic therapy
 - B. High-dose corticosteroids
 - C. Antiplatelet therapy
 - D. Proton pump inhibitor therapy

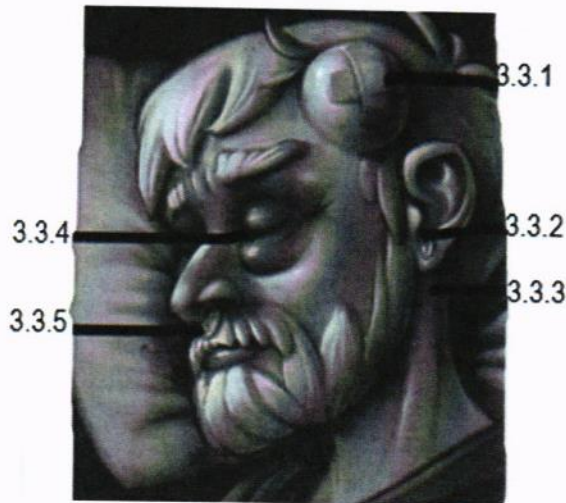
QUESTION 3

3.1 Match the concepts in Column A with the statements in column B. Write only e.g. 3.1.1.C
(10 x 1 = 10)

Column A	Column B
3.1.1 Epidural hematoma	A. Acts as a shock absorber and a fluid buffer to brain tissue protecting it from injury.
3.1.2 Circle of Willis	B. Damage to only one side of the spinal cord that produces loss of voluntary motor movement on the same side as the injury, with loss of pain, temperature and sensation on the opposite side.
3.1.3 Intracerebral hemorrhage	C. The delicate inner layer is a thin layer that's held tightly to the surface of the brain and spinal cord rich in blood vessels.
3.1.4 Brown-séquard syndrome	D. Spinal cord injury which results in a mixed loss of voluntary motor activity and sensation below the level of the lesion.
3.1.5 Incomplete spinal cord injury	E. The tough outer layer of meninges directly beneath the skull which is made up of fibrous tissue.
3.1.6 Decerebrate posturing	F. A collection of blood that forms between the inner surface of the skull and outer layer of the dura
3.1.7 Decorticate posturing	G. Abnormal flexion
3.1.8 Dura mater	H. Abnormal extension
3.1.9 Arachnoid mater	I. Damage to the posterior columns of the spinal cord
3.1.10 Pia mater	J. Serves as a safety valve function for the brain, allowing collateral circulation or flow of blood through an alternate route to take place if the flow is reduced to one area.
	K. Bleeding within the brain tissue or ventricles
	L. The middle layer of meninges, a web-like structure filled with fluid that cushions the brain.

3.2 Cushing's triad is a clinical syndrome indicating increased intracranial pressure and consists of three primary signs. Explain the three signs and the pathophysiology behind each component.
(16 x ½ = 8)

- 3.3 Identify the five numbered clinical signs of the base of skull fracture illustrated in the picture below. (5 x 1 = 5)



3.4 Define the following concepts:

3.4.1 Vasogenic cerebral edema

(2 x ½ = 1)

3.4.2 Cytotoxic cerebral edema

(2 x ½ = 1)

[25]

QUESTION 4

4.1 Read through the scenario and answer the questions based on the scenario.

Scenario: Mr. Benson, a 45-year-old male patient with a history of type 1 diabetes mellitus is admitted to the ICU with severe dehydration, confusion, and rapid breathing. His blood glucose level is 24 mmol/L, and a urine dipstick test is positive for ketones. Arterial blood gas analysis reveals a pH of 7.1.

4.1.1 What is the likely diagnosis for Mr. Benson based on his clinical presentation and arterial blood gas results? (1 x 1 = 1)

4.1.2 Identify the primary cause for the abovementioned diagnosis. (5 x 1 = 5)

4.1.3 Explain the significance of the patient's blood glucose level being 24 mmol/L. (4 x 1 = 4)

4.1.4 Discuss immediate interventions that are necessary for this patient in the ICU. (5 x 1 = 5)

4.2 Explain the difference between Type I and Type 2 Diabetes Mellitus. (10 x ½ = 5)

4.3 Fill in the missing word (s). (5 x 1 = 5)

4.3.1 _____ is a powerful, complex polypeptide compound and is responsible to regulate water and electrolyte balance in the body.

4.3.2 _____ is a medication used for managing diabetes insipidus that helps to regulate the amount of water in the body.

4.3.3 _____ is a hormone that is produced by alpha cells in the islets of Langerhans.

4.3.4 The endocrine gland referred to as the “master gland” is the _____.

4.3.5 The largest endocrine gland that produces 3 hormones that affect the metabolism is the _____.

[25]