UNIT TERMINAL OBJECTIVE

5-3 At the completion of this unit, the EMT-Critical Care Technician student will be able to utilize the assessment findings to formulate a field impression and implement a treatment plan for the patient with a diabetic emergency.

COGNITIVE OBJECTIVE

At the completion of this unit, the EMT-Critical Care Technician student will be able to:

5-3.1 Define hormone (C-1)
5-3.2 Discuss hormone production, including function and the single most important factor influencing production (C-1)
5-3.3 Describe the pathophysiology of diabetes mellitus. (C-1)
5-3.4 Describe the effects of decreased levels of insulin on the body. (C-1)
5-3.5 Correlate abnormal findings in assessment with clinical significance in the patient with a diabetic emergency. (C-3)
5-3.6 Discuss the management of diabetic emergencies. (C-1)
5-3.7 Describe the mechanism of ketone body formation and its relationship to ketoacidosis. (C-1)
5-3.8 Describe the effects of decreased levels of insulin on the body. (C-1)
5-.3.9 Recognize the signs and symptoms of the patient with diabetic ketoacidosis. (C-1)
5-3.10 Discuss the pathophysiology of hypoglycemia. (C-1)
5-3.11 Recognize the signs and symptoms of the patient with hypoglycemia. (C-1)
5-3.12 Describe the management of a hypoglycemic patient. (C-1)
5-3.13 Integrate the pathophysiological principles and the assessment findings to formulate a field impression and implement a treatment plan for the patient with hypoglycemia. (C-3)
5-3.14 Discuss the pathophysiology of hyperglycemia. (C-1)
5-3.15 Recognize the signs and symptoms of the patient with hyperglycemia. (C-1)
5-3.16 Describe the management of the hyperglycemic patient. (C-1)
5-3.17 Differentiate between diabetic emergencies based on assessment and history. (C-3)
5-3.18 Correlate abnormal findings in the assessment with clinical significance in the patient with a diabetic emergencies. (C-3)
5-3.19 Develop a patient management plan based on field impression in the patient with a diabetic emergency. (C-3)

AFFECTIVE OBJECTIVES

None identified for this unit.

PSYCHOMOTOR OBJECTIVES

None identified for this unit.

DECLARATIVE

I. Introduction
- **A. Hormone**
  - **1. A substance secreted by an endocrine gland that has effects upon other glands or systems of the body**
  - **2. Hormone production**
  - **3. greatly influenced by stress**
- **B. Pancreas**
  - **1. Location: retroperitoneally adjacent to the duodenum on the right and extends to the spleen on the left**
  - **2. Function**
    - **a. Endocrine and exocrine gland**
    - **b. Islets of Langerhans secretes regulating hormones**
      - **i) Insulin**
      - **ii) Glucagon**
  - **3. Insulin**
    - **a. Description**
    - **b. Function**
  - **4. Glucagon**
    - **a. Description and effects of secretion**
    - **b. Function**
- C. Define
  - 1. Diabetes mellitus
  - 2. Hypoglycemia
  - 3. Hyperglycemia

II. Specific illnesses
- A. Diabetes mellitus
  - 1. Epidemiology
    - a. Incidence
    - b. Morbidity/ mortality
    - c. Long term complications
    - d. Risk factors
  - 2. Pathophysiology
    - a. Types
      - (1) Type I-insulin dependent
      - (2) Type II-non insulin dependent
    - b. A chronic system syndrome characterized by hyperglycemia caused by a decrease in the secretion or activity of insulin
    - c. Normal insulin metabolism
    - d. Abnormal metabolism/ ketone formation
      - (1) When insulin supply is insufficient, glucose cannot be used for cellular energy
      - (2) Response to cellular starvation
      - (3) Body releases and breaks down stored fats and protein to provide energy
      - (4) Fatty acids produce ketones

(5) Excess ketones upset pH balance and acidosis develops (DKA)

3. Assessment findings
   a. History
      (1) Has insulin dosage changed recently?
      (2) Has the patient had a recent infection?
      (3) Has the patient suffered any psychologic stress?
      (4) Are you taking oral medications for diabetes?
   b. Signs and symptoms
      (1) Altered mental status
      (2) Abnormal respiratory pattern (Kussmaul's breathing)
      (3) Tachycardia
      (4) Hypotension
      (5) Breath has a distinct fruity odor
      (6) Abnormal increase in urination
      (7) Warm dry skin
      (8) Weight loss
      (9) Weakness
      (10) Dehydration
   c. Blood glucose analysis
      (1) Finger stick
      (2) Draw blood
4. Management
   a. Airway and ventilation
   b. Circulation
   c. Pharmacological interventions
   d. Non-pharmacological interventions
   e. Transport considerations
      (1) Appropriate mode
      (2) Appropriate facility
   f. Psychological support/ communication strategies

B. Hypoglycemia
1. Epidemiology
   a. Morbidity/ mortality
   b. Risk factors
2. Pathophysiology
   a. Blood glucose levels fall below that required for normal body functioning
   b. Cellular/ organ death can occur
3. Assessment
   a. History
      (1) Diabetes
      (2) Prolonged fasting
      (3) Alcoholism
      (4) Previous hypoglycemic episodes
   b. Signs and symptoms
      (1) Weakness
      (2) Irritability
      (3) Hunger
      (4) Confusion
      (5) Anxiety

(6) Bizarre behavior
(7) Tachycardia
(8) Normal respiratory pattern
(9) Cool, pale skin
(10) Diaphoresis

c. Blood glucose analysis

4. Management
   a. Airway and ventilation
   b. Circulation
   c. Pharmacological interventions
      (1) Oral glucose
      (2) D50
      (3) Glucagon
      (4) Thiamine
   d. Non-pharmacological interventions
   e. Transport considerations
      (1) Appropriate mode
      (2) Appropriate facility
   f. Psychological support/ communication strategies

C. Hyperglycemia
1. Epidemiology
   a. Mortality/ morbidity
   b. Risk factors
2. Pathophysiology
   a. Occurs in patients with diabetes who are able to produce enough insulin to prevent DKA but not enough to prevent severe hyperglycemia
   b. Hyperosmolar non-ketotic coma is characterized by severe hyperglycemia, hyperosmolality, and dehydration, but no ketoacidosis
3. Assessment
   a. History
      (1) Diabetes
      (2) Inadequate fluid intake
   b. Signs and symptoms
      (1) Altered level of consciousness
      (2) Coma
      (3) Seizures
      (4) Hemiparesis
      (5) Aphasia
      (6) Increasing mental depression
      (7) Dehydration **<u>(Increase thirst)</u>**
      (8) Abnormal increase in urination
   c. Management
      (1) Airway and ventilation
      (2) Circulation
      (3) Pharmacological interventions
         (a) Rehydration
      (4) Non-pharmacological interventions
      (5) Transport considerations
         (a) Appropriate mode

(b) Appropriate facility
(6) Psychological support/ communication strategies

D. Diabetic ketoacidosis
1. Epidemiology
a. Incidence
b. Mortality/ morbidity
c. Risk factors
d. Prevention strategies
e. Anatomy and physiology review
2. Pathophysiology
a. Hyperglycemia
b. Ketonemia
c. Relative insulin insufficiency
d. Counterregulatory hormone excess
3. Assessment findings
a. History
(1) General health
(2) Previous medical conditions
(3) Medications
(4) Previous experience with complaint
(5) Time of onset
b. Physical
(1) Dehydration
(2) Hypotension
(3) Reflex tachycardia
(4) Acetone (fruity) odor on breath
(5) Nausea
(6) Vomiting
(7) Abdominal pain
(8) Hyperventilation
(9) Kussmall's respiration
4. Management
a. Airway and ventilation
(1) Oxygen
(2) Positioning
(3) Suction
(4) Assisted ventilation
(5) Advanced airway devices
b. Circulatory support
(1) Venous access
(2) Blood analysis
c. Pharmacological interventions
(1) Rehydration
d. Non-pharmacological interventions
(1) General comfort measures
e. Transport considerations
(1) Appropriate mode
(2) Appropriate facility
f. Psychological support/ communications strategies

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