Diabetic Emergencies

Introduction

- Endocrine system affects nearly every:
  - Cell
  - Organ
  - Bodily function
- Endocrine disorders can have many signs and symptoms.

Introduction

Hematologic emergencies
- Rare in most EMS systems
- Difficult to assess and treat
- EMT offers support and may save life

Anatomy and Physiology

- Endocrine system is a complex message and control system.
  - Glands secrete hormones.
  - Hormones are chemical messengers.
  - System maintains homeostasis

Pathophysiology

- Diabetes affects the body’s ability to use glucose (sugar) for fuel.
- Occurs in about 7% of the population
- Complications include blindness, cardiovascular disease, and kidney failure.

Pathophysiology

- As an EMT, you need to know signs and symptoms of blood glucose that is:
  - High (hyperglycemia)
  - Low (hypoglycemia)
- Central problem in diabetes is lack, or ineffective action, of insulin.
Identifying Diabetes
- Diabetes mellitus: “sweet diabetes”
- Diabetes insipidus: excessive urination
- Type 1 and type 2 diabetes both:
  - Are equally serious
  - Affect many tissues and functions
  - Require life-long management.

Defining Diabetes
- Diabetes mellitus
  - Metabolic disorder in which the body cannot metabolize glucose
  - Usually due to a lack of insulin.
- Glucose
  - One of the basic sugars in the body
  - Along with oxygen, it is a primary fuel for cellular metabolism
- Insulin
  - Hormone produced by the pancreas
  - Enables glucose to enter the cells
  - Without insulin, cells starve
- Hormone
  - Chemical substance produced by a gland
  - Has special regulatory effects on other body organs and tissues

Type 1 Diabetes
- Insulin-dependent diabetes
- Patient does not produce any insulin
- Insulin injected daily
- Onset usually in childhood

Type 2 Diabetes
- Type 2 patients produce inadequate amounts of insulin, or normal amount that does not function effectively.
  - Usually appears later in life
  - Treatment may be diet, exercise, oral medications, or insulin.

Types of Diabetes
- Severity of diabetic complications depends on patient’s average blood glucose level and when diabetes began.
- Obesity increases the risk of diabetes.

The Role of Glucose and Insulin
- Glucose is a major source of energy for the body.
- Insulin is needed to allow glucose to enter cells (except for brain cells).
  - A “cellular key”
The Role of Glucose and Insulin

Classic symptoms of uncontrolled diabetes (“3 Ps”):
- Polyuria: frequent, plentiful urination
- Polydipsia: frequent drinking to satisfy continuous thirst
- Polyphagia: excessive eating

When glucose is unavailable, the body turns to other energy sources.
- Fat is most abundant.
- Using fat for energy results in buildup of ketones and fatty acids in blood and tissue.

Hyperglycemia

Lack of insulin causes glucose to build-up in blood in extremely high levels.
- Kidneys excrete glucose.
- This requires a large amount of water.
- Without glucose, body uses fat for fuel.
- Ketones are formed.
- Ketones can produce diabetic ketoacidosis.

Diabetic ketoacidosis (DKA)
- A form of acidosis seen in uncontrolled diabetes
- Without insulin, certain acids accumulate.
- More common in type 1 diabetes
- Signs and symptoms:
  - Weakness
  - Nausea

Signs and Symptoms of Diabetic Ketoacidosis

- Vomiting
- Abdominal pain
- Kussmaul respirations
- Unconsciousness
The Role of Glucose and Insulin

- Hyperosmolar hyperglycemic (HHNC) nonketotic coma
  - More often caused by type 2 diabetes
  - Slower, more gradual onset than DKA
  - No sweet-smelling breath
  - Excessive urination results in dehydration.

Blood Glucose Monitors

- Test strips
- Normal range 80-120 mg/dL
- Glucometer

Diabetic Coma

- Kussmaul respirations
- Dehydration
- “Fruity” breath odor
- Rapid, weak pulse
- Normal or slightly low blood pressure
- Varying degrees of unresponsiveness

Signs of Diabetic Coma

Hyperglycemic Crisis

- Can occur in diabetic patients:
  - Not under medical treatment
  - Who have taken insufficient insulin
  - Who have markedly overeaten
  - Under stress due to infection, illness, overexertion, fatigue, or alcohol

Hyperglycemic Crisis

- If untreated, can result in death
- Treatment may take hours in a well-controlled hospital setting.
Hypoglycemia

- Hypoglycemia: Blood glucose is below normal.
  - Untreated, results in unresponsiveness and hypoglycemic crisis
- Signs and symptoms of hyperglycemia and hypoglycemia are similar.

Hypoglycemic Crisis

- Hypoglycemic crisis (insulin shock) is caused by insufficient levels of glucose in the blood.
- Can occur in insulin-dependent patients:
  - Who have taken too much insulin
  - Who have taken a regular dose of insulin but have not eaten enough food

Insulin Shock

- Normal or rapid respirations
- Pale, moist skin
- Sweating
- Dizziness, headache
- Rapid pulse
- Normal to low blood pressure

Signs of Insulin Shock

- Altered mental status
- Aggressive or confused behavior
- Hunger
- Fainting, seizure, or coma
- Weakness on one side of the body

Hypoglycemic Crisis

- If untreated, it can produce unconsciousness and death.
- Quickly reversed by giving glucose

Diabetes and Alcohol Abuse

- Patients may appear intoxicated.
- Suspect hypoglycemia with any altered mental status.
- Be alert to the similarity in symptoms of acute alcohol intoxication and diabetic emergencies.
Primary Assessment

- Form a general impression.
  - Other medical or trauma emergencies may be responsible for diabetic patient’s symptoms

- Airway and breathing
  - Be alert for Kussmaul respirations and sweet, fruity breath (DKA).

Primary Assessment

- Airway and breathing (cont’d)
  - Hypoglycemic patients will have normal or shallow to rapid respirations.
  - Manage respiratory distress.

Primary Assessment

- Circulation
  - Dry, warm skin: hyperglycemia
  - Moist, pale skin: hypoglycemia
  - Rapid, weak pulse: hyperglycemic crisis

History Taking

- Investigate chief complaint
  - Obtain history of present illness from responsive patient, family, or bystanders.
  - If patient has eaten but not taken insulin, hyperglycemia is more likely.

History Taking

- Investigate chief complaint (cont’d)
  - If patient has taken insulin but not eaten, hypoglycemia is more likely.
  - Carefully observe signs and symptoms; determine whether hypo- or hyperglycemic.

History Taking

- SAMPLE history—Has the patient:
  - Taken insulin or pills to lower blood sugar?
  - Taken his or her usual dose today?
  - Eaten normally?
  - Experienced illness, unusual amount of activity, or stress?
Secondary Assessment

- Vital signs
  - Obtain complete set of vital signs.
    - Use available monitoring devices (e.g., glucometer, pulse oximeter).
    - Normal blood glucose: 80 to 120 mg/dL.

Emergency Medical Care

- Ask a patient with known diabetes:
  - Do you take insulin or any pills to lower blood sugar?
  - Have you taken your usual dose of insulin (or pills) today?
  - Have you eaten normally today?
  - Have you had any illness, unusual amount of activity, or stress today?

Emergency Medical Care (cont)

- Perform initial assessment.
- Obtain baseline vital signs and SAMPLE history.
- Check for emergency medical identification symbol.
- Always do a full, careful assessment.
- Ask patient or family about last meal or insulin dose.
- DO NOT administer anything to an unconscious patient.

Administering Glucose

- Names:
  - Glu tose
  - Insta-Glucose
- Dose equals one tube
- Glucose should be given to a diabetic patient with a decreased level of consciousness.
- DO NOT give glucose to a patient with the inability to swallow or unconscious.

Administering Oral Glucose

Complications of Diabetes

- Heart disease
- Visual disturbances
- Renal failure
- Stroke
- Ulcers
- Infections of the feet and toes
- Seizures
- Altered mental status
Seizures

- Consider hypoglycemia as the cause.
- Use appropriate BLS measures for airway management.
- Provide prompt transport.

Altered Mental Status

- Altered mental status is often caused by complications of diabetes.
- Ensure that airway is clear.
- Be prepared to ventilate and suction.
- Provide prompt transport.

Geriatric Needs

- Patient may have undiagnosed diabetes.
- Certain symptoms suggest poorly controlled or uncontrolled diabetes.
  - Nonhealing wounds
  - Blindness
  - Renal failure
- Obtain a SAMPLE history.

Hematologic Emergencies

- Hematology is the study and prevention of blood-related diseases.
- Blood is “the fluid of life.”
  - Understanding it helps understand disorders.

Anatomy and Physiology

- Blood is made up of cells and plasma.
  - Red blood cells contain hemoglobin, which carries oxygen to the tissues.
  - White blood cells “clean” the body.
  - Platelets are essential for clot formation.
  - Plasma transports blood cells.

Pathophysiology

- Sickle cell disease
  - Inherited disorder, affects red blood cells
  - Predominant in African Americans and persons of Mediterranean descent
  - Red blood cells are sickle or oblong shaped, contain hemoglobin S, are poor oxygen carriers, and live for only 16 days.
Pathophysiology

Sickle cell disease
May cause hypoxia; swelling or rupture of blood vessels or spleen; and death
• Four main types of sickle cell crises:
  • Vaso-occlusive crisis
  • Aplastic crisis
  • Hemolytic crisis
  • Splenic sequestration crisis

Pathophysiology

Sickle cell disease (cont’d)

– Vaso-occlusive crisis
  • Blood flow to organs is restricted
– Aplastic crisis
  • Worsening of baseline anemia
– Hemolytic crisis
  • Acute, accelerated drop in hemoglobin level
– Splenic sequestration crisis
  • Acute enlargement of spleen

Pathophysiology

Sickle cell disease (cont’d)

– Complications:
  • Cerebral vascular attack
  • Gallstones
  • Jaundice
  • Avascular necrosis

Pathophysiology

Sickle cell disease (cont’d)

– Complications (cont’d)
  • Splenic infections
  • Osteomyelitis
  • Opiate tolerance
  • Leg ulcers

Pathophysiology

Sickle cell disease (cont’d)

– Complications (cont’d)
  • Retinopathy
  • Chronic pain
  • Pulmonary hypertension
  • Chronic renal failure
Pathophysiology

- Clotting disorders
  - Thrombosis
    - Development of blood clot in blood vessel
  - Thrombophilia
    - Tendency to develop blood clots
    - Blood-thinning medications used to treat

Pathophysiology

- Clotting disorders (cont’d)
  - Thrombophilia (cont’d)
    - Not common in pediatric patients
    - Risk factors:
      - Recent surgery, impaired mobility, congestive heart failure, cancer, respiratory failure, infectious diseases, over 40 years of age, being overweight/obesity, smoking, oral contraceptive use

Pathophysiology

- Clotting disorders (cont’d)
  - Hemophilia
    - Congenital; impaired ability to form blood clots
    - Predominant in males (1 per 5,000–10,000)
    - Hemophilia A most common
    - Hemophilia B second most common

Pathophysiology

- Clotting disorders (cont’d)
  - Hemophilia (cont’d)
    - Signs and symptoms:
      - Spontaneous, acute, chronic bleeding
      - Intracranial bleeding (major cause of death)
    - During assessment, seriously consider injury/illness that can cause bleeding.

Primary Assessment

- Airway and breathing
  - Sickle cell crisis patients may have increased respirations or signs of pneumonia
    - Manage respiratory distress.

Primary Assessment

- Circulation
  - Sickle cell patients: increased pulse rate
  - Hemophilia patients:
    - Be alert for signs of acute blood loss.
    - Note bleeding of unknown origin.
    - Be alert for signs of hypoxia.
  - Make a transport decision.
History Taking

- Investigate chief complaint.
  - Obtain history of present illness from responsive patients, family, or bystanders.
  - Physical signs indicating sickle cell crisis:
    - Swelling of fingers and toes
    - Priapism
    - Jaundice

- Obtain SAMPLE history from responsive patient or family member.
  - Have you had a crisis before?
  - When was the last time you had a crisis?
  - How did your last crisis resolve?
  - Recent illness, unusual amount of activity, or stress?

QUESTIONS?