Chapter 21 -
Diabetic Emergencies and Altered Mental Status

OBJECTIVES


21.2 Consider several possible causes of altered mental status when given scenarios involving patients with alterations in mental status. Slide 14

21.3 Describe the basic physiological requirements for maintaining consciousness. Slides 13–14

21.4 Perform primary and secondary assessments on patients with altered mental status. Slides 19–23

21.5 Describe the pathophysiology of diabetes and diabetic emergencies. Slides 29–39

21.6 Determine a patient’s blood glucose level using a blood glucose meter, as allowed by local protocol. Slides 43–45

continued
OBJECTIVES

21.7 Develop a plan to manage patients with diabetic emergencies involving hyperglycemia and hypoglycemia. Slides 46–49

21.8 Recognize the signs, symptoms, and history consistent with other causes of altered mental status, including seizures, stroke, dizziness, and syncope. Slides 52–88

continued

OBJECTIVES

21.9 Given a variety of scenarios involving patients with seizures, search for potential underlying causes. Slides 52, 56

21.10 Develop a plan to assess and manage patients who are having or who have just had a seizure. Slides 58–63

21.11 Explain the causes of strokes. Slide 64

continued

OBJECTIVES

21.12 Develop a plan to assess and manage patients who are exhibiting signs and symptoms of a stroke. Slides 65–76

21.13 Given a scenario of a patient complaining of dizziness or syncope, search for potential underlying causes. Slides 77–84

continued
OBJECTIVES

21.14 Develop a plan to assess and manage patients with complaints of dizziness and syncope. Slides 85–88

MULTIMEDIA

- Slide 50 Diabetes—Etiology and Pathophysiology Video
- Slide 90 Transient Ischemic Attacks Video

CORE CONCEPTS

- General approaches to assessing the patient with an altered mental status
- Understanding the causes, assessment, and care of diabetes and various diabetic emergencies
- Understanding the causes, assessment, and care of seizure disorders

continued
Chapter 21 - Diabetic_Emergencies_and_Altered_Mental_Status

**CORE CONCEPTS**

- Understanding the causes, assessment, and care of stroke
- Understanding the causes, assessment, and care of dizziness and syncope

**Topics**

- Pathophysiology
- **Assessing the Patient with Altered Mental Status**
- Diabetes
- **Other Causes of Altered Mental Status**

**Pathophysiology**
Chapter 21 - Diabetic Emergencies and Altered Mental Status

Mental Status Regulation

- Regulated by neurologic circuits in brain that comprise reticular activating system (RAS)
- RAS responsible for functions of staying awake, paying attention, and sleeping
- RAS keeps person alert and oriented

Requirements to Maintain Mental Status

- Oxygen to perfuse brain tissue
- Glucose to nourish brain tissue
- Water to keep brain tissue hydrated

Causes of Altered Mental Status

- Deficiencies in oxygen, glucose, water to brain tissue
- Trauma, infection, chemical toxins harming brain tissue
- Primary brain problem (stroke)
- Problem within another system (hypoxia due to asthma)
Chapter 21 - Diabetic Emergencies and Altered Mental Status

Assessing the Patient with Altered Mental Status

Safety

- Patient with altered mental status can be dangerous to responders
- Always consider safety of yourself and your team before approaching a patient
- Use law enforcement when necessary
Primary Assessment

- Hypoxia is one of the most common causes of altered mental status
- Always consider the possibility of an airway and/or breathing problem

Primary Assessment

- Identify and treat life-threatening problems
- Consider oxygen administration
- Be alert to the need for positioning and suctioning if patient requires it or if mental status worsens

Secondary Assessment

- Thoroughly examine patient exhibiting new, unusual behavior
- Even slighty altered mental status indicates serious underlying issues
Secondary Assessment
• Body systems exam and complete history may reveal information about the suspected cause of altered mental status
• Interview family members and bystanders to obtain patient's baseline mental status
• Family may provide information patient is unable to give

Secondary Assessment
• Patient's medicines may point to relevant medical history
• Look for medic alert bracelets or other health-related items at scene

Think About It
• What kind of information about a patient's altered mental status might you obtain from the scene?
• How might bystanders help you identify the cause of altered mental status?
Chapter 21 - Diabetic Emergencies and Altered Mental Status

Diabetes

Glucose
- Form of sugar
- Body's basic source of energy
- Body cells require glucose to remain alive and create energy

Glucose and the Digestive System
- Glucose molecule is large
- Will not pass into cell without insulin
Insulin

- Produced by pancreas
- Binds to receptor sites on cells
- Allows large glucose molecule to pass into cells
- Sugar intake–insulin production balance allows body to use glucose effectively as energy source

Diabetes Mellitus

- Two types
- Type 1
  - Underproduction of insulin by pancreas
- Type 2
  - Inability of body’s cells to use insulin properly

Type 1 Diabetes

- Pancreatic cells do not function properly
- Insulin not secreted normally
- Not enough insulin to transfer circulating glucose into cells
- Synthetic insulin typically prescribed to supplement inadequate natural insulin
Type 2 Diabetes
- Body's cells fail to utilize insulin properly
- Pancreas is secreting enough insulin, but body is unable to use it to move glucose into cells
- Condition often controlled through diet and/or oral antidiabetic medications

Diabetic Emergencies
- Hypoglycemia (low blood sugar)
- Hyperglycemia (high blood sugar)

Hypoglycemia: Causes
- Diabetic takes too much insulin
- Diabetic does not eat
- Diabetic overexercises or overexerts
- Diabetic vomits
Chapter 21 -
Diabetic Emergencies and Altered Mental Status

Hypoglycemia: Signs

- Very rapid onset
- May present with abnormal behavior mimicking drunken stupor
- Pale, sweaty skin
- Tachycardia
- Seizures

Hypoglycemia: Results

- Starvation of brain cells
- Altered mental status
- Unconsciousness
- Permanent brain damage

Hyperglycemia: Causes

- Decrease in insulin
  - May be due to body’s inability to produce insulin
  - May exist because insulin injections not given in sufficient quantity
- Infection
- Stress
- Increasing dietary intake
Hyperglycemia: Signs
- Develops over days or weeks
- Chronic thirst and hunger
- Increased urination
- Nausea

Hyperglycemia: Results
- Profound dehydration
- Excessive waste products released into system
- Diabetic ketoacidosis (DKA)

Diabetic Ketoacidosis: Signs and Symptoms
- Profoundly altered mental status
- Shock (caused by dehydration)
- Rapid breathing
- Acetone odor on breath
Assessment

• Scene safety
• Primary assessment
  – Identify altered mental status

continued

Assessment

• Secondary assessment
  – History of present episode
  – How episode occurred, time of onset, duration, associated symptoms, any MOI or other evidence of trauma, any interruptions to episode, seizures, or fever

continued

Assessment

• Secondary assessment
  – SAMPLE
  – Determine if history of diabetes
    • Question patient or bystanders
    • Look for medical identification bracelet
    • Look in refrigerator or elsewhere at scene for medications such as insulin

continued
Assessment

• Blood glucose meter
  – Measures amount of glucose in bloodstream
  – Often used by patients at home
  – Sometimes used by EMTs (follow local protocol)

• Blood glucose measurement
  – Less than 60–80 mg/dL in symptomatic diabetic: hypoglycemia
  – Less than 50 mg/dL: significant alterations in mental status
  – Over 140 mg/dL: hyperglycemia
  – Over 200–300 mg/dL for prolonged time: dehydration, other more serious symptoms

• Special glucometer readings
  – May display word instead of number
  – “High” or “HI”: indicates extremely high level, usually greater than 500 mg/dL
  – “LOW”: indicates extremely low level, often less than 15 mg/dL
Chapter 21 - Diabetic Emergencies and Altered Mental Status

Patient Care

• Occasionally—can treat person with mild hypoglycemia and minor altered mental status by simply giving something to eat
• Never administer food or liquids to patient at risk for aspiration

Patient Care

• Oral glucose—criteria for administration
  – History of diabetes
  – Altered mental status
  – Awake enough to swallow

Patient Care

• Oral glucose—criteria for administration
  – History of diabetes
  – Altered mental status
  – Awake enough to swallow

• Oral glucose
  – Patient squeezes glucose from tube directly into mouth
  – EMT can administer glucose using tongue depressor
Patient Care

- Oral glucose
  - Reassess after administration
  - If condition does not improve, consult medical direction about whether to administer more
Seizure Disorder

- If normal brain function is upset by injury, infection, or disease, the brain’s electrical activity can become irregular
- Irregularity can bring about seizure: sudden change in sensation, behavior, or movement
- Seizure is a sign of underlying defect, injury, or disease

Tonic-Clonic Seizure

- Unconsciousness and major motor activity
- Tonic phase—body rigid up to 30 seconds
- Clonic phase—body jerks violently for 1–2 minutes
- Postictal phase—after convulsions stop; often slow period of regaining consciousness

Aura

- Some seizures preceded by aura (sensation patient has just before it is about to happen)
- Patient may note smell, sound, or just a general feeling right before seizure
Partial Seizure

- Not all seizures present as generalized tonic-clonic
- Partial seizure: uncontrolled muscle spasm or convulsion while patient is fully alert

Causes of Seizure

- Hypoxia
- Stroke
- Traumatic brain injury
- Toxins
- Hypoglycemia

Causes of Seizure (continued)

- Brain tumor
- Congenital brain defects
- Infection
- Idiopathic
- Epilepsy
Scene Safety: Seizure Disorder

- Multiple patients seizing at the same time—major red flag
- Possibility of chemical weapon or similar weapon of mass destruction
- Take appropriate precautions

Assessment: Seizure Disorder

- What was person doing before seizure started?
- Exactly what did person do during seizure?
- How long did seizure last?
- What did person do after seizure?

Patient Care: When Seizure Occurs

- Place patient on floor or ground
- Loosen restrictive clothing
- Remove objects that may harm patient
- Protect patient from injury, but do not try to hold patient still during convulsions
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Patient Care: After Convulsions End
• Protect airway
• If no possibility of spine injury, position patient on side
• If patient is cyanotic, ensure open airway and provide artificial ventilations with supplemental oxygen

continued

Patient Care: After Convulsions End
• Seizure usually only 1–3 minutes long
• Patient breathing adequately may be given oxygen by mask or nasal cannula
• Treat injuries patient may have sustained during convulsions
• Transport

continued

Status Epilepticus
• Two or more convulsive seizures lasting 5–10 minutes or more without regaining full consciousness
• High-priority emergency requiring immediate transport to hospital and possible ALS intercept

continued
Stroke

• Death or injury of brain tissue from oxygen deprivation
• Causes
  – Blockage of artery supplying blood to part of the brain
  – Bleeding from a ruptured blood vessel in the brain

Signs of Stroke

• One-sided weakness (hemiparesis): very common
• Headache caused by bleeding from ruptured vessel: less common, but very important

Other Signs and Symptoms of Stroke

• Confusion
• Dizziness
• Numbness, weakness, or paralysis (usually on one side of body)
• Loss of bowel or bladder control
• Impaired vision
• High blood pressure

continued
Other Signs and Symptoms of Stroke

- Difficult respiration or snoring
- Nausea or vomiting
- Seizures
- Unequal pupils
- Headache
- Loss of vision in one eye
- Unconsciousness (uncommon)

Communicating with a Stroke Patient

- Often difficult to communicate with a stroke patient
- Damage to brain can cause partial or complete loss of the ability to use words
- Aphasia: general term meaning difficulty in communication

Transient Ischemic Attack (TIA)

- Small clots temporarily block circulation to part of brain
- Causes stroke-like symptoms
- Symptoms resolve when clots break up
- Complete resolution of symptoms without treatment within 24 hours (usually much sooner)
Assessment: Stroke

• Cincinnati Prehospital Stroke Scale
  – Ask patient to grimace or smile
  – Stroke patient more likely to show abnormal response

continued

Assessment: Stroke

• Cincinnati Prehospital Stroke Scale
  – Ask patient to close eyes and extend arms straight out in front for 10 seconds
  – Stroke patient is more likely to show an abnormal response

continued

Assessment: Stroke

• Cincinnati Prehospital Stroke Scale
  – Ask patient to say something: “The sky is blue in Cincinnati.”
  – Stroke patient is more likely to give abnormal or no response
Patient Care: Stroke

• For conscious patient who can maintain airway
  – Calm and reassure patient
  – Monitor airway
  – Administer high-concentration oxygen
  – Transport patient in semi-sitting position

continued

Patient Care: Stroke

• For unconscious patient or patient who cannot maintain airway
  – Maintain open airway
  – Provide high-concentration oxygen
  – Transport with patient lying on affected side

continued

Patient Care: Stroke

• Transport suspected stroke patient to hospital with capabilities for managing stroke patient
• Capabilities must include CT scan at minimum

continued
Patient Care: Stroke

- Determine and document exact time of onset of symptoms
- Document contact information if person other than patient provides time of onset

Dizziness and Syncope

- Can indicate serious or life-threatening problems
- May be impossible to diagnose true cause of syncope

Dizziness

- Common term meaning different things to different people
- Vertigo: sensation of surroundings spinning around you
- Lightheadedness: sensation you are about to pass out (pre-syncope)
Syncope

• Brief loss of consciousness with spontaneous recovery
• Typically very short—a few seconds to a few minutes
• Patients often have some warning that syncopal episode (fainting spell) is about to occur

Causes of Dizziness and Syncope

• Hypovolemic
• Metabolic
• Environmental/toxicological
• Cardiovascular

Hypovolemic Causes

• Low fluid/blood volume causes dizziness or syncope, especially when patient attempts to sit up or stand
• Source of bleeding may not be obvious
### Metabolic and Structural Causes
- Alterations in brain chemistry or structure can lead to diminished level of consciousness
- Inner and middle ear problems also cause dizziness or syncope

### Environmental/Toxicological Causes
- Alcohol and drugs can cause fluctuations in consciousness

### Cardiovascular Causes
- Bradycardia and tachycardia can cause decreased cardiac output and syncope
- Vasovagal syncope is thought to be the result of stimulation of the vagus nerve, which signals the heart to slow down; decreased cardiac output causes syncope
Assessment: Dizziness and Syncope

• Rapidly identify and treat life threats
• Gather important information that will assist in overall treatment
• Ask:
  – Have you had any similar episodes in the past?
  – What do you mean by “dizziness”?

continued

Assessment: Dizziness and Syncope

• Ask:
  – Did you have any warning?
  – When did it start?
  – How long did it last?
  – What position were you in when the episode occurred?

continued

Assessment: Dizziness and Syncope

• Ask:
  – Are you on medication for this kind of problem?
  – Did you have any other signs or symptoms; nausea?
  – Did you witness any unpleasant sight or experience a strong emotion?
  – Did anyone witness involuntary movements of the extremities (like seizures)?
Patient Care: Dizziness and Syncope

- Administer high-concentration oxygen
- Call for ALS
- Loosen tight clothing around neck
- Lay patient flat
- Treat associated injuries patient may have incurred from fall

Think About It

- Is the seizure or syncope a symptom of a larger problem?

Transient Ischemic Attacks Video

Click here to view a video on the subject of transient ischemic attacks.
Chapter Review

• Diabetic emergencies are usually caused by poor management of the patient's diabetes.
• Diabetic emergencies are often brought about by hypoglycemia, or low blood sugar.
• The chief sign of this hypoglycemia is altered mental status.

continued

Chapter Review

• Whenever a patient has an altered mental status and a history of diabetes, and can swallow, administer oral glucose.
• Seizures may have a number of causes. Assess and treat for possible spinal injury, protect the patient's airway, and provide oxygen as needed.

continued
Chapter Review

- Gather information about the seizure to give to hospital personnel.
- A stroke is caused when an artery in the brain is blocked or ruptures.

continued

Chapter Review

- Signs and symptoms of stroke include altered mental status, numbness or paralysis on one side, speech difficulty.
- For stroke patients, ensure open airway and provide supplemental oxygen. Determine exact time of onset of symptoms and transport promptly.

continued

Chapter Review

- Dizziness and syncope (fainting) may have a variety of causes.
- For syncope, administer oxygen, loosen clothing around neck, and place patient flat with raised legs if there is no reason not to. Treat injuries and transport.
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Remember

• Determine if the patient’s altered mental status is being caused by hypoxia.
• In a patient with a hypoglycemic emergency, determine whether the mental status will allow the administration of oral glucose.

Remember

• Assess the seizure patient to determine the need for artificial ventilation.
• Determine when the symptoms of the stroke began.

Questions to Consider

• List the chief signs and symptoms of a diabetic emergency.
• Explain how you can determine a medical history of diabetes.
• Explain what treatment may be given by an EMT for a diabetic emergency and the criteria for giving it.
Questions to Consider

• Explain the care that should be given to a conscious and to an unconscious patient with suspected stroke.
• Explain the care that should be given to a patient who has experienced dizziness or syncope.

Critical Thinking

• A 62-year-old male is witnessed to have a tonic-clonic seizure. You find him actively seizing. His skin is pale and moist and slightly cyanotic. Discuss the immediate treatment necessary.

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