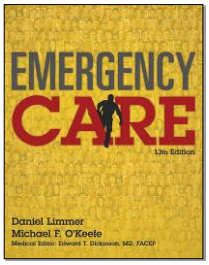
Emergency Care

THIRTEENTH EDITION



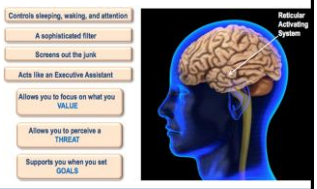
CHAPTER 19

Diabetic Emergencies and Altered Mental Status

Pathophysiology

Reticular Activating System (RAS)

- Where normal consciousness is regulated by a series of neurologic circuits
  - Staying awake
  - Paying attention
  - Sleeping



Pathophysiology

- Requirements for the brain tissue of the RAS to function
  - Oxygen - perfuse brain tissue
  - Glucose - nourish brain tissue
  - Water - keep brain tissue hydrated
- A lack in any 3 can cause AMS

Causes of Altered Mental Status

Mnemonic for Treatable Causes of AMS (AEIOU-TIPS)

- A Alcohol
- E Endocrine
  Electrolytes
  Encephalopathy
- I Insulin
- O O_2
  Opiates
- U Uremia
- T Trauma
- I Infection
  Intra-cranial
- P Poisoning
- S Seizure
  Stroke
  Sepsis
  Shock

Assessing the Patient with Altered Mental Status

Assessing the Patient with Altered Mental Status

- These patients can be dangerous
- Always consider scene safety
- 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.

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Primary Assessment

- Identify and treat life-threats
- Consider oxygen
- Airway positioning and suctioning
- Determine baseline mental status for patient.

Secondary Assessment

- Thoroughly examine patient exhibiting new, unusual behavior.
- Even slightly altered mental status indicates serious underlying issues.

Secondary Assessment

- Body systems exam
- History
- Family and bystanders (baseline mental state)
- Patient medications
- Bracelets and other clues at scene

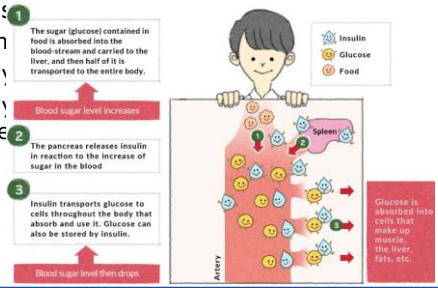
Pediatric Note

- Children may not be able to answer questions in the same manner as adults and therefore mental status is often difficult to establish.
- Ask parents or caregivers, "Are they acting differently than normal?"

Diabetes

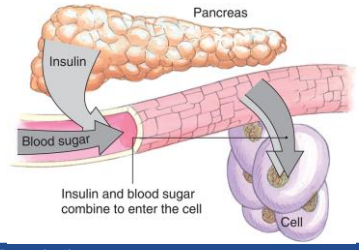
Glucose and the Digestive System

- Glucos
  - Forn
  - Body
  - Body alive



Glucose and the Digestive System

- Glucose molecule is large.
  - Will not pass into cell without insulin



Insulin and the Pancreas

- 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
    - 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

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Diabetes Mellitus

- Two types
  - Type 2
    - 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.

Diabetes—Etiology and Pathophysiology Video

Click on the screenshot to view a video on the etiology and pathophysiology of diabetes.

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Diabetic Emergencies

- Hypoglycemia
  - Low blood sugar
  - Causes
    - Diabetic takes too much insulin
    - Diabetic does not eat
    - Diabetic overexercises or overexerts
    - Diabetic vomits
    - Diabetic increases metabolic rate (fever or shivering)

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Diabetic Emergencies

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

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Diabetic Emergencies

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

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Diabetic Emergencies

- Hyperglycemia
  - High blood sugar
  - Causes
    - Decrease in insulin
      - May be due to body's inability to produce insulin
      - May exist because insulin injections not given in sufficient quantity

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Diabetic Emergencies

- Hyperglycemia
  - Causes
    - Stress
    - Increasing dietary intake
  - Signs
    - Develops over days or weeks
    - Chronic thirst and hunger
    - Increased urination
    - Nausea

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Diabetic Emergencies

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

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Diabetic Emergencies

- Diabetic ketoacidosis
  - Profoundly altered mental status
  - Shock (caused by dehydration)
  - Rapid breathing
  - Acetone odor on breath

Patient Assessment

- Ensure safe scene.
- Perform primary assessment.
  - Identify altered mental status.

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Patient Assessment

- Perform secondary assessment.
  - SAMPLE
  - History of present episode
    - How and when it started
    - Duration of episode
    - Associated symptoms (fever, seizures)
    - Any trauma

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Patient Assessment

- Perform secondary assessment.
  - Determine history of diabetes
    - Question patient or bystanders.
    - Look for medical identification bracelet.
    - Look in refrigerator or elsewhere at scene for medications such as insulin.
  - Perform blood glucose monitoring if local protocols permit you to do so.

Blood Glucose Meters

- Measures amount of glucose in bloodstream
- Often used by patients at home
- Sometimes used by EMTs
  - Follow local protocol.

Blood Glucose Meters

- Blood glucose measurement
- Normal typically 60 to 100 mg/dL
  - Less than 60 mg/dL in symptomatic diabetic
    - Hypoglycemia
  - Less than 50 mg/dL
    - Significant alterations in mental status

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Blood Glucose Meters

- Blood glucose measurement
  - Greater than 140 mg/dL
    - Hyperglycemia
  - Greater than 300 mg/dL for prolonged time
    - Dehydration, other more serious symptoms

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Blood Glucose Meters

- 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

Patient Care

- Occasionally, one can treat person with mild hypoglycemia and minor altered mental status by simply giving something to eat.
- Never administer food or liquids to patients at risk for aspiration.

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Patient Care

- Oral glucose
  - Criteria for administration
    - History of diabetes
    - Altered mental status
    - Awake enough to swallow

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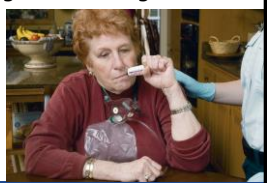
Patient Care

- 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.

Hypoglycemia and Hyperglycemia Compared

- Onset
  - Hyperglycemia - slower onset
    Hypoglycemia – more suddenly
- Skin
  - Hyperglycemic - warm, red, dry skin
    Hypoglycemic - cold, "clammy" skin
- Breath
  - Hyperglycemic patient – possibly a "fruity" breath odor

Other Causes of Altered Mental Status

Sepsis

- Collection of problems associated with response to infection
- Occurs when steps normally taken to fight infection move from the local site and become a systemic problem
- If severe enough, the microbes of the offending infection can release toxins that harm cardiac output.

Patient Assessment

- The following findings indicate severe sepsis:
  - Altered mental status
  - Increased heart rate
  - Increased respiratory rate
  - Low blood pressure
  - High blood glucose
  - Decreased capillary refill time

Seizure Disorders

- 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 (Aura)
- Seizure is a sign of underlying defect, injury, or disease and not a disease itself.

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Seizure Disorders

- Two types of seizures
  - Partial
    - Affect only one part, or one side, of brain; patient may not lose consciousness.
  - Generalized
    - Affect entire brain and affects the consciousness of the patient

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Seizure Disorders

- Tonic-clonic seizure
  - Unconsciousness and major motor activity
  - Tonic phase
    - Body rigid up to 30 seconds
  - Clonic phase
    - Body jerks violently for 1 to 2 minutes.

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Seizure Disorders

- Tonic-clonic seizure
  - Postictal phase
    - After convulsions stop; often slow period of regaining consciousness.
- 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.

Causes of Seizures

- Hypoxia
- Stroke
- Traumatic brain injury
- Toxins
- Hypoglycemia
- Brain tumor
- Congenital brain defects
- Infection
- Metabolic
- Epilepsy
- Measles, mumps, and other childhood diseases
- Eclampsia
- Heat stroke
- Idiopathic

Patient Assessment

- 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?

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Patient Assessment

- If you are present when a convulsive 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 Assessment

- After convulsions have ended
  - 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.

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Patient Assessment

- After convulsions have ended
  - Patient breathing adequately may be given oxygen by mask or nasal cannula.
  - Treat injuries patient may have sustained during convulsions.
  - Transport.

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Patient Assessment

- Status epilepticus
  - Two or more convulsive seizures in a row without regaining full consciousness or a single seizure lasting more than 10 minutes
  - High-priority emergency requiring immediate transport to hospital and possible ALS intercept

Types of Seizures

- Not all seizures present as generalized tonic-clonic.
- Partial seizures
  - Uncontrolled muscle spasm or convulsion while patient is fully alert
  - Complex partial seizure
    - Often preceded by an aura

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Types of Seizures

- Generalized seizures
  - Tonic-clonic seizure
  - Absence (petit mal) seizure
    - Brief, without dramatic motor activity
    - Temporary loss of concentration or awareness
    - May go unnoticed by everyone except the patient and knowledgeable members of their family

Stroke

- Death or injury of brain tissue from oxygen deprivation
- Causes
  - Blockage of artery supplying blood to part of the brain (85%)
  - Bleeding from a ruptured blood vessel in the brain (15%)

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Stroke

- Signs
  - One-sided weakness (hemiparesis) very common
  - Difficulty speaking or complete inability to speak
  - Headache caused by bleeding from ruptured vessel
    - Less common, but very important

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Stroke

- Other signs and symptoms
  - Confusion
  - Dizziness
  - Numbness, weakness, or paralysis
    - Usually on one side of body
  - Loss of bowel and/or bladder control
  - Impaired vision
  - High blood pressure

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Stroke

- Other signs and symptoms
  - Difficult respiration or snoring
  - Nausea or vomiting
  - Seizures
  - Unequal pupils
  - Headache
  - Loss of vision in one eye
  - Unconsciousness
    - Uncommon

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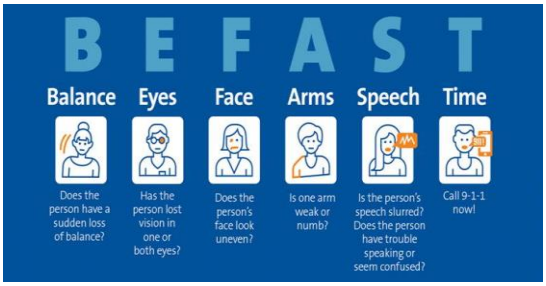
Stroke

- 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

- 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, but usually much sooner

Patient Assessment



Patient Assessment

- Cincinnati Prehospital Stroke Scale
  - Stroke patient more likely to show abnormal response.
  - Ask patient to grimace or smile.

Patient Assessment

- Cincinnati Prehospital Stroke Scale
  - Ask patient to close eyes and extend arms straight out in front for 10 seconds.


Patient Assessment

- Cincinnati Prehospital Stroke Scale
  - Ask patient to say something.
    - "You can't teach an old dog new tricks."

Patient Care

- For conscious patients who can maintain airway
  - Calm and reassure patient.
  - Monitor airway.
  - Administer high-concentration oxygen is oxygen saturation is below 94 percent of if signs of hypoxia or respiratory distress present.
  - Transport.

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Patient Care

- For unconscious patient or patient who cannot maintain airway
  - Maintain open airway.
  - Provide high-concentration oxygen.
  - Transport.

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Patient Care

- Transport to a stroke center (Capabilities must include CT scan)
- 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

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Dizziness and Syncope

- Dizziness
  - Common term meaning different things to different people
  - Vertigo
    - Sensation of surroundings spinning around you
  - Light-headedness
    - Sensation you are about to pass out (presyncope)

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Dizziness and 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 a syncopal episode (fainting spell) is about to occur

Causes of Dizziness and Syncope

- 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.

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Causes of Dizziness and Syncope

- 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.

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Causes of Dizziness and Syncope

- Metabolic and structural causes
  - Inner and middle ear problems also cause dizziness or syncope.
- Environmental/toxicological causes
  - Alcohol and drugs can cause fluctuations in consciousness.
- Other causes
  - In half of the cases, no cause is ever found.

Patient Assessment

- 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"?

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Patient Assessment

- Ask:
  - Did you have any warning?
  - When did it start?
  - How long did it last?
  - What position were you in when the episode occurred?
  - Are you on medication for this kind of problem?

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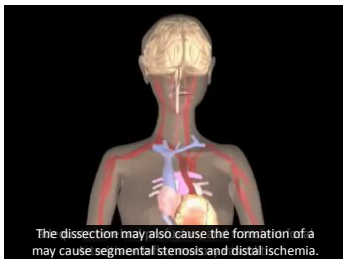
Patient Assessment

- Ask:
  - Did you have any other signs or symptoms; nausea?
  - Did you witness any unpleasant sight or experience a strong emotion?
  - Did you hurt yourself?
  - Did anyone witness involuntary movements of the extremities, like seizures?

Patient Care

- Administer oxygen based on oxygen saturation levels and patient's level of distress.
- Call for ALS.
- Loosen tight clothing around neck.
- Lay patient flat.
- Treat associated injuries patient may have incurred from fall.

Transient Ischemic Attacks Video



Click on the screenshot to view a video on the topic of transient ischemic attacks.

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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.

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Chapter Review

- Whenever a patient has an altered mental status, 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.

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Chapter Review

- S/S of stroke commonly include:
  - An altered mental status,
  - Numbness or paralysis on one side, and
  - Difficulty with speech.
- For stroke patients:
  - Ensure an open airway and provide supplemental oxygen.
  - Determine the exact time of onset of symptoms and transport promptly.

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Chapter Review

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

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.

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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.

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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.