Diabetic Emergencies

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Class Outline

- Diabetic emergency/Glucometer training
- Identify the different signs of insulin shock
- Diabetic coma, and HHNK
- Participants will understand the treatment plan of action for a 2-hour transport period for each of these conditions.

Diabetes Emergencies

- Insulin Shock
- Diabetic Coma
- Hyperglycemic Hyperosmolar Nonketotic Coma (HHNC)

Anatomy and Physiology

- Glucose
  - Primary source of energy for the body
  - Source
    - Diet
    - Produced in liver
  - Requires insulin to enter most cells
- Insulin
  - Produced in B-Cells in pancreas
  - Controlled by blood sugar levels

Diabetes Mellitus

- Type 1 Diabetes (10%)
  - Insufficient Insulin
  - Usually earlier onset (childhood)
- Type 2 Diabetes (90%)
  - Insulin Resistant (body unable to utilize insulin)
  - Highly correlated with obesity
  - Usually later onset
    - Increase in childhood obesity is changing this

Diabetes Mellitus

- Type 1 Diabetes
  - Always requires insulin for treatment
  - Route
    - Injections several times each day
    - Continuous infusion using a pump
- Type 2 Diabetes
  - Oral medications
  - Injections
    - Insulin
    - Exenatide

Diabetic Emergencies

- Hypoglycemia
  - Insulin Coma
  - Low blood sugar (<80mg/dL) with symptoms
- Hyperglycemia
  - Hyperosmolar Hyperglycemic State (HHS)
  - Diabetic Ketoacidosis (DKA)

Diabetic Emergencies

- Diabetic Coma
  - Diagnostic dilemma of an unconscious patient known to have diabetes
  - Possible causes related to diabetes
    - Severe hypoglycemia
    - HHNC
    - DKA

Diabetic Emergencies

- Unconscious Diabetic Patient
  - Don't forget other causes
    - Uremia (from kidney failure)
    - Hyperammonemia (liver failure)
    - Intoxication (narcotics, ethanol, etc)
    - Sepsis (severe infection)
    - Seizure
    - Hypotension (blood loss, dehydration, etc)
    - Head trauma
    - Stroke
    - Electrolyte disorders
    - Heart arrhythmia
    - Hypoxia

Diabetic Emergencies

- Hypoglycemia
  - Normal blood sugar
    - 80-120mg/dL
  - Hypoglycemia
    - <55mg/dL in men
    - <45mg/dL in women
    - <40mg/dL in infants and children
  - Consider treating if <80mg/dL with symptoms

Diabetic Emergencies

- Hypoglycemia
  - Causes
    - Overdose of insulin or oral diabetic medications
    - Regular medications but missed meal(s)
    - Renal or liver failure (altered insulin metabolism)
    - Sepsis
    - Insulin producing tumor
    - Excessive exercise
    - Vomiting

Diabetic Emergencies

- Hypoglycemia
  - Physical Signs
    - Sweating
    - Tremulousness
    - Tachycardia
    - Respiratory Distress
    - Abdominal Pain
    - Vomiting
    - Combative or agitated
    - Coma (insulin coma)
  - Symptoms
    - Anxiety
    - Nervousness
    - Confusion
    - Personality changes
    - Nausea

Diabetic Emergencies

- Identifying Hypoglycemia
  - Glucometry
- Treatment
  - ABC's
  - Supplemental Oxygen
  - Vitals
  - Glucometry
    - <80mg/dL consider treating for hypoglycemia

Diabetic Emergencies

- Hypoglycemia
  - Treatment
    - Glucose Supplementation (if conscious and able to drink)
      - Oral Glucose
        - Juice, Non- Diet Soda
        - Oral Glucose Solution
    - D10
      - 250cc Bolus, IV
    - D50
      - 25 gram glucose in 50ml water, IV
  - Glucagon
    - <20kg, 0.5mg SC/IM
    - >20mg, 1mg SC/IM

Diabetic Emergencies

- Hyperglycemia
  - Glucose >250
- Causes
  - Medication noncompliance
  - New-onset diabetes
  - Medical illness
    - Infection
    - Heart attack
    - Stroke
    - GI bleed
  - Alcohol abuse
  - Pregnancy

Diabetic Emergencies

- Hyperosmolar Hyperglycemia
  - Only affects Type 2 Diabetics
  - Elevated Blood sugar increases serum osmolarity
    - Translation: High blood sugar makes blood more concentrated
  - Water flows to the area of highest solute concentration (i.e. sugar)
  - This causes the body to become dehydrated as water enters the blood stream only to be lost as the sugar leaks into the urine

Diabetic Emergencies

- Hyperosmolar Hyperglycemia
  - Loss of water leads to extreme dehydration

- Physical Signs
  - Tachycardia
  - Orthostatic Vitals
  - Poor Skin Turgor
  - Drowsiness and lethargy
  - Delirium
  - Coma

- Symptoms
  - Nausea/vomiting
  - Fatigue and malaise
  - Abdominal pain
  - Polydipsia
  - Polyuria

Diabetic Emergencies

- Diabetic Ketoacidosis (DKA)
  - Mainly in type 1 diabetics and insulin dependent type 2 diabetics
  - Similar to HHNC with a few important differences
    - Absence of insulin causes cellular starvation
    - Compensation leads to break down in fats and proteins
    - Production of Ketone bodies (can be used for energy by heart and brain)
    - Excessive Ketones leads to build up of acid byproduct causing acidosis

Diabetic Emergencies

- Diabetic Ketoacidosis (DKA)
  - Signs: similar to HHNC with some important additional findings
    - Rapid and deep breaths (Kussmaul Respirations)
    - Acetone odor to breath (from excessive serum acids)
    - Weight loss
  - Problems secondary to severe dehydration **AND** acidosis

Diabetic Emergencies

- Identifying DKA or HHNC
  - Glucometry
  - Usually blood sugar is >250
  - May read as “high” if severely elevated

Diabetic Emergencies

- Treatment: DKA and HHNC
  - No different for EMS
    - ABC's
    - Supplemental oxygen
    - IV fluids
      - Normal Saline
      - Patient's often down 9+ liters
    - Vitals

Diabetic Emergencies

- Summary
  - Known Diabetic
    - ABC's
    - Oxygen
    - Check glucose
      - Hypoglycemia
        - » Give glucose (oral or IV depending on the patient)
      - Hyperglycemia
        - » Fluids
    - Keep open mind for co-existing conditions