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**EMS SKILL**

PATIENT ASSESSMENT

**FINGER STICK BLOOD GLUCOSE TESTING**

**PERFORMANCE OBJECTIVES**

Demonstrate proficiency in recognizing the indications, contraindications, and criteria for administration of oral glucose administration and finger stick blood sugar testing for a patient having an altered level of consciousness and a suspected history of diabetes.

**CONDITION**

Establish that a simulated patient with an altered level of consciousness who meets the criteria for administration of oral glucose and Necessary equipment will be adjacent to the simulated patient.

**EQUIPMENT**

Simulated patient, oxygen tank with a flow meter, oxygen mask, blood pressure cuff, stethoscope, glucometer, lancets, tongue blade or bite stick, timing device, clipboard, PCR forms, pen, goggles, masks, gown, gloves, sharps container.

**PERFORMANCE CRITERIA**

• Items designated by a diamond (⧫) must be performed successfully to demonstrate skill competency.

• Items identified by double asterisks (\*\*) indicate actions that are required if indicated.

• Items identified by (§) should be practiced.

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| **PREPARATION** | |
| **Skill Component** | **Key Concepts** |
| ⧫ Establishes body substance isolation precautions | • Mandatory personal protective equipment - gloves  • Situational - long sleeves, goggles, masks, gown |
| ⧫ Complete a primary assessment  • General impression  • Life-threatening condition  • Assess mental status/stimulus response (AVPU)  • Assess/Manage airway  • Assess/Manage breathing |  |
| ⧫ Complete a secondary assessment   * SAMPLE history * Vital Signs * Obtain an oxygen saturation (SpO2) reading – if available | * Obtaining and documenting a baseline set of vital signs assists with determining if the patient is improving or deteriorating after medication delivery * Document the SpO2 reading on the provider report or ePCR. * A goal of oxygen administration is to deliver the minimum amount of oxygen to meet the needs of the patient and to maintain an oxygen saturation level at or above 94%. * When available, use pulse oximetry to guide oxygen delivery. The desired SpO2 for most non-critical patients is 94-98%. * **SPECIAL CONSIDERATION:** For chronic obstructive pulmonary disease (COPD), the goal is to titrate oxygen to keep the SpO2 at 88-92%. * A pertinent piece of information that must be determined for patients with asthma and allergic reaction is to ask “have you ever been intubated for your asthma/allergic reaction?” This provides you with information that may indicate the potential rapid deterioration. |
| ⧫ Verbalize the indications for finger stick blood sugar testing:   * + altered level of consciousness with suspected hypoglycemia   + unconscious with a suspected history of diabetes | * In order to perform finger stick blood sugar testing, EMTs must be on duty and working for a provider agency that has been approved by the EMS Agency Medical Director to carry a glucometer on the ambulance. * EMTs may assist the patient with the patient’s own glucometer. If the EMT is NOT knowledgeable in the use of the specific device, and the patient and/or family members are not present to assist the EMT, the device should not be used. |

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| **Skill Component** | **Key Concepts** |
| ⧫ Verbalize the signs and symptoms of hypoglycemia   * Rapid onset * Cool, pale, and moist skins * Rapid (tachycardia) and weak pulse * Confusion/disorientation * Unconsciousness * Seizures * Weakness/paralysis on one (1) side | * The signs and symptoms of hypoglycemia are due to the release of endogenous epinephrine while the blood sugar is decreasing. * The brain is the only organ that does not require the use of insulin as a glucose transport mechanism into the cell. * When there are low levels of insulin in the blood, the cells will uptake glucose at a slower rate * The brain is extremely sensitive to low levels of sugar in the blood. Therefore, signs and symptoms of hypoglycemia occur rapidly. |
| ⧫ Verbalize the signs and symptoms of hyperglycemia   * Gradual onset (6-12 hours) * Warm and dry skin * Rapid and deep respirations (Kussmaul) * Fruity breath * Rapid, weak, and thready pulse * Polydipsia – excessive thirst * Polyphagia - hunger * Polyuria – excessive urination * Restlessness - progressing to coma | * When there is a lack of insulin in the system, the cells starve for energy and will begin to break down fat, which leads to the increase of acid within the body systems. The pH of the body decreases. In an attempt to bring the body back to the state of homeostasis, the body attempts to compensate by attempting to breathe off the excess acid. This will be accomplished by rapid and deep respirations known as “Kussmaul” respirations. The breath smells “fruity.” * When the blood sugar reaches 185mg/dL, the kidneys can no longer reabsorb the excess glucose. When the level reaches around 225mg/dL, sugar is spilled into the urine. Additionally, glucose is a large molecule that draws water that is urinated out of the system. This leads to severe dehydration. The patient experiences hunger (polyphagia) because the cells are starving, |
| ⧫ Verbalize the normal and abnormal low blood glucose levels:   * Normal –70 -120mg/dL * Low - < 60mg/dL * High - > 120mg/dL   **NOTE: In Los Angeles County, blood sugar reading of < 60mg/dL are treated** | * The following are the most common causes of hypoglycemia: * The patient takes his/her insulin but does not eat * The patient takes his/her insulin but exercises beyond their normal level * The patient takes too much insulin * Diabulimia – This is a media coined term that refers to an eating disorder in which a person with diabetes purposefully restricts their use of insulin in order to lose weight * In Los Angeles County, prehospital providers should treat a blood sugar of < 60mg/dL. However, EMTs may treat a patient with oral glucose in the field without a blood glucose reading if the patient is suspected to be hypoglycemic based upon his/her presenting signs and symptoms. |
| ⧫ Calls for an Advanced Life Support Unit | * If the use of a glucometer is required, an ALS Unit must be contacted and be enroute. However, if the ETA for the responding ALS unit exceeds the ETA to the most appropriate emergency department, the EMT should consider transporting the patient. |
| ⧫ Prepare the equipment required for blood glucose determination by following the manufacturer’s directions | * There are numerous devices on the market. Therefore, it is essential to follow the manufacturer’s directions for that specific device. |
| **PROCEDURE** | |
| **Skill Component** | **Key Concepts** |
| ⧫ Turn on the glucometer |  |
| ⧫ Ensure the device is calibrated | * Calibration must be in accordance with the manufacturers recommendations |

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| **Skill Component** | **Key Concepts** |
| ⧫ Place hand in dependent position for 10-15 seconds | * Pricking the fingers to obtain a blood sugar reading can lead to discomfort. Therefore, using a non-dominant hand is recommended. * Placing the hand in a dependent position allows blood to pool in the fingertips making it easier to obtain a drop of blood. |
| ⧫ Grasp the patient’s finger | * The best locations for a finger stick are generally the 3rd and 4th fingers of the non-dominant hand. * If possible, avoid the 1st (thumb), 2nd (index), and 5th (little) fingers.The 1st finger has a pulse, the 2nd finger is sensitive and may be callused, and the 5th finger has insufficient tissue depth to prevent bone injury. * Fingers that are swollen, cold, cyanotic, or scarred should be avoided. |
| ⧫ Cleanse site using aseptic technique:   * Use an alcohol wipe to cleanse the fingertip in a circular motion from inner to outer * Allow the fingertip to air-dry | * Allowing alcohol to dry on the fingertip is an essential step to receiving an accurate reading. Excess water or alcohol may result in diluting the blood sample thereby altering your reading. |
| ⧫ Puncture the lateral aspect of the fingertip with a single  use lancet device  \\EMSGroup1\Home\JLockwood\My Pictures\Finger stick BS.jpg  <http://poct.duhs.duke.edu/wysiwyg/downloads/fingerstick> Training.ppt. | | * Never use the center of the finger pad or the tip of the finger. * Puncture the fingertip in the fleshy part of the finger slightly to the side of the center and across the groves. This enables the blood to form as a drop on the fingertip. If the puncture is parallel to the lines of the fingertip, the blood will not form as a drop but will run down the finger making blood collection difficult. * A single use lancet device is spring loaded that activates when a button is pressed. Once activated, the lancet is projected forward and then retracts back into the device. * Use caution to avoid placing the lancet device into contact with the rescuers finger as opposed to the patient’s finger to avoid an inadvertent needle stick. * The fingers of the hand are the only approved sites for obtaining a blood glucose reading. |
| ⧫ Squeeze the fingertip gently to form a drop of blood | | * Free-flowing blood is necessary to obtain a reliable result. Increased pressure beyond that necessary to hold the finger can result in inaccurate results. * Milking the end the finger pad must not be performed as this may result in hemolysis or increased tissue fluid in the blood leading to an incorrect blood glucose result. |
| ⧫ Wipe away the first drop of blood using a 2 X 2 dressing  or cotton ball | | * The first drop of blood tends to contain excess fluid from the tissues. Wiping away the first drop of blood assist with obtaining an accurate reading. |
| ⧫ Gently re-squeeze the fingertip to form a drop of blood | | * Apply light pressure to the site, only if necessary, to obtain another drop of blood that is large enough to fill the test strip. * Avoid milking the fingertip as this may result in hemolysis or causing an increased amount of fluid in the blood that will alter the result of the reading due to dilution. |
| ⧫ Place the blood into the glucometer using the  device-specific receptacle at the appropriate time. | | * Follow the manufacturer’s directions. * Various devices require that the blood sample be applied to either the test strip or cartridge before or after it is inserted into the glucometer. Newer devices will guide the EMS provider in the process. |
| ⧫ Interpret the results of the blood sugar testing from the  device | | * The normal range for blood sugar is 70-120mg/dL. * Administration of oral glucose is recommended for a blood glucose level of 60mg/dL or less. * If error codes are noted, they must be addressed and reported |
| **Skill Component** | **Key Concepts** |
| ⧫ Apply a sterile adhesive bandage on the finger stick site | | * Application of direct pressure with gauze or cotton ball is always the first step in bleeding control. * Patients with a bleeding disorder or taking blood thinners including aspirin, coumadin, and lovenox may bleed for a longer period. |
| ⧫ Interpret the results of the blood sugar testing from the  device  \*\*Administer oral glucose for blood sugar readings of  < 60mg/dL | | * The normal range for blood sugar is 70-120mg/dL. * Administration of oral glucose is recommended for a blood glucose level of 60mg/dL or less as this is typically when the patient becomes symptomatic. * Oral glucose may be administered in the absence of a glucometer reading if the EMT suspects hypoglycemia. |
| ⧫ Dispose the lancet and test strip into a sharps container | |  |
| **REASSESSMENT**  **(Ongoing Assessment)** | | |
| **Skill Component** | | **Key Concepts** |
| ⧫ Repeat an ongoing assessment at least every **5 minutes**:   * Primary assessment * Relevant portion of the secondary assessment * Vital signs * Pain Scale | | * A patient with an altered mental status must be re-assessed every 5 minutes. * The purpose of the ongoing assessment is to recognize signs and symptoms of improvement or deterioration of the patient’s condition. |  |
| ⧫ Evaluate response to treatment | | • Patients must be re-evaluated at least every 5 minutes any time treatment, was rendered, medication was administered, or the patient’s condition changes or is anticipated to change. |  |
| ⧫ Evaluate results of re-assessment and note any changes from patient’s previous condition and vital signs  ***\*\*Manage patient’s condition as indicated.*** | | • Evaluating and comparing results from a prior assessment assists in trending the patient’s condition. This helps to facilitate rapid interventions - if required. |
| **PATIENT REPORT AND DOCUMENTATION** | | |
| **Skill Component** | | **Key Concepts** |
| § Verbalize/Document   * Blood glucose reading * Assessment findings before and after administration * Drug:   + name   + dose   + route   + site   + time   + who administered medication   Continued…  • Patient’s response to medication  • Respiratory/Cardiovascular status  • Mental status  • Vital signs | | • Documentation of the results of blood sugar testing must be on either the Provider’s form, or an ePCR.  • Document administration only in the comment section on the Los Angeles County EMS Report,  • Documenting re-assessment information provides a comprehensive picture of patient’s response to treatment.  • Last re-assessment information (before patient care is transferred) should be documented in the appropriate section of the EMS form. |

Developed: 10/2017 Revised 2/2018



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**Supplemental Information**

**DEFINITION:**

**Diabetes mellitus (DM):** Diabetes is a metabolic disorder in which the body is in-capable of metabolizing simple carbohydrates (glucose). Mellitus is a Greek word meaning “sweet.” It is a reference to the presence of glucose spilling out of the kidneys into the urine.

**ASSESSMENT: ALTERED LEVEL OF CONSCIOUSNESS / SEIZURE / WEAKNESS / DIZZINESS / SYNCOPE**

• Causative event and if acute or chronic

• Time of onset

• Duration of event

• Orientation level (name, place, and time)

• Associated symptoms (neuro deficits, pupil response)

• Position found in

• Length of time unconscious

• Incontinence

• Dysrhythmia

• Possible causes: (not all inclusive)

- **A** alcohol, anoxia, allergic reaction, arrhythmia (dysrhythmia)

- **E** epilepsy, electrolyte imbalance

- **I** insulin (hyper-hypoglycemia)

- **O** overdose

- **U** uremia, under-dose

- **T** trauma

- **I** infection

- **P** psychiatric, post-ictal, poisoning (ingestion, inhalation), palpitation (dysrhythmias)

- **S** stroke

**NOTES:**

* EMTs may carry a glucometer on the ambulance if it they are employed by, and are on duty for, a Provider Agency that has been approved by the Los Angeles County EMS Medical Director.

• In life-threatening situations, an ALS Unit must be enroute or BLS should consider transport if ALS arrival is longer than transport

time.

• Glucose is the basic sugar in the body. Glucose and oxygen are the primary fuels required by the body for cellular metabolism.

* Adults with diabetes have a higher incidence of kidney failure and heart disease. It also effects walls of vessels and leads to a condition known as microangiopathy. Diabetes also leads to nerve damage, which results in the loss of function and feeling to the areas innervated by that nerve. Couples with vessel damage, these patients’ wounds may occur that are not noted at the time and left uncared for they lead to gangrene of the affected extremity. Approximately 60% of amputations are attributed to Diabetes.
* Insulin is a hormone that is produced by specialized cells called the islets of Langerhans in the pancreas. These cells become damaged from viruses or over-consumption of sugar over years and the result is ceased or decreased production of insulin. The only cells in the body that are not dependent upon insulin to facilitate glucose from moving in to the cells are the brain cells.

* There are two (2) forms of diabetes mellitus: type 1 and type 2. Both types result in very serious medical conditions that can be life-threatening.
* Type 1 diabetes has once been referred to as “juvenile onset” diabetes because it typically occurs during childhood. Type 2 diabetes has been called “adult onset” because it typically manifests itself during adulthood. Type 1 diabetes always requires insulin while type 2 can be managed by oral medication or insulin, or a combination of both.
* Diabetes is characterized by:
  + Polyphagia – increased hunger due to the inability to transport glucose into the cell
  + Polydipsia – increased thirst due to large fluid losses caused by diuresis
  + Polyuria – increased urine output due to water being attracted to the excess glucose and diuresis

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**Supplemental Information**

* Examples of oral medications used to treat Type 2 diabetes:
  + Metformin (Glucophage)
  + Sitagliptin (Januvia)
  + Rosiglitazone (Avandia)
  + Pioglitazone (ACTOS)
  + Chlorpropamide (Diabinese)
  + Glyburide (Micronase)
* Examples of insulin used to treat Type 1 diabetes:
  + Humulin
  + Novolog
  + Lantus
  + Novolin
  + Exubera
  + Apidra
  + Toujeo
  + Tresiba
  + Levemir