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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. The glucometer has been

**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** |
| ⧫ Establish body substance isolation precautions | • Mandatory personal protective equipment - gloves• Situational - 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

***\*\*Place the patient on oxygen in accordance with Los Angeles County EMS Agency Reference Number 1302*** | * 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 of 94-98%.
* **SPECIAL CONSIDERATION:** For chronic obstructive pulmonary disease (COPD), the goal is to titrate oxygen to keep the SpO2 at 88-92%.
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| ⧫ 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.
* Once a provider agency has been approved to carry glucometers on a basic life support apparatus, EMTs may assist the paramedic by obtaining a blood glucose level.
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| ⧫ Ensure the device has been calibrated | * Calibration must be in accordance with the manufacturers recommendations
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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
* Stroke-like symptoms
 | * 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.
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| ⧫ 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,
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| ⧫ Verbalize the normal and abnormal low blood glucose levels:* Normal –70 -120mg/dL
* Low - < 60mg/dL
* High - > 120mg/dL
 | * 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
* **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.
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| ⧫ 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.
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| ⧫ 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.
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| **PROCEDURE** |
| **Skill Component** | **Key Concepts** |
| ⧫ Turn on the glucometer |  |
| ⧫ Place the patient’s 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.
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| **Skill Component** | **Key Concepts** |
| ⧫ 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.
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| ⧫ Cleanse the 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.
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| ⧫ 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.
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| ⧫ 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 that will alter the result of the reading due to dilution.
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| ⧫ 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.
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| ⧫ Re-squeeze the fingertip gently 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
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| ⧫ Place the blood into the glucometer using thedevice-specific receptacle at the appropriate time.  | * Follow the manufacturer’s directions.
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| ⧫ 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
 |
| ⧫ 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.
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| ⧫ 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 the patient is alert and is able to follow commands.
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| **Skill Component** | **Key Concepts** |
| ⧫ Dispose the lancet and test strip into a sharps container  | * The lancet and test strip should be placed directly into an approved sharps container. If the container is over-stuffed with needles, replace it with a new container as over-stuffed containers may cause a needle to penetrate the plastic and cause an inadvertent needle stick. Replace the sharps disposal container when it is ¾ full.
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| ⧫ Turn the machine off |  |
| **RE-ASSESSMENT****(Ongoing Assessment)** |
| **Skill Component** | **Key Concepts** |
| § Re-assesses the patient at least every **5 minutes**:* Primary assessment
* Relevant portion of the secondary assessment
* Vital signs: Blood Pressure, Pulse, Respirations
* SpO2 reading
* Response to oral glucose – *if administered*

***§ Manage patient’s condition as indicated.*** | * 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.
* Evaluating and comparing results from a prior assessment assists in trending the patient’s condition. This helps to facilitate rapid interventions - if required.
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|  **PATIENT REPORT AND DOCUMENTATION**  |
| **Skill Component** | **Key Concepts** |
| § Verbalize/Document* Blood glucose reading
* Assessment findings before and after administration of oral glucose
* Drug: Name, dose, route, time,

 • Patient’s response to medication • Respiratory/Cardiovascular status • Mental status • Vital signs: Blood pressure, pulse, and respirations | • Documentation of the results of blood sugar testing must be on 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. |

 Developed: 10/2017 Revised 11/2018



**FINGER STICK BLOOD GLUCOSE TESTING**

**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:**

• 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.
* The three (3) hallmark signs and symptoms of Diabetes include:
	+ **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: **NOTE:** Medication names a subject to change.
	+ 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