MSHVFAS - Blood Glucose Monitoring

1. Policy Statement:

- **Purpose**: Define when and how MSHVFAS personnel monitor blood glucose and perform quality control testing of glucometers.

- **Policy:** It is the policy of MSHVFAS to measure blood glucose levels in at risk patient populations. This policy will describe the procedure for blood glucose determination, quality control testing and limitations of the procedure.

- **Procedure:**

1. General

    a. The use of the patient's personal glucometer is not permitted for any treatment.

    b. The meters must be cleaned after every use. Acceptable cleaning agents include the following: alcohol-based wipes (alcohol prep pad or SaniCloth Plus) or SaniCloth Wipes with bleach.

    c. EMS units should always have a spare vial of strips on the ambulance.

2. Quality Control Testing

    a. Each glucometer will be quality control (QC) tested at the beginning of each shift (day and night).

    b. Crews will submit the QC check log as soon as possible after completing QC of each glucometer on the units.

    c. Assemble the necessary equipment including the glucometer, test strips and two test solutions (QC1 and QC2).

        i. Test strips expire 6 months (180 days) after opening, or manufacturer's expiration date, whichever comes first.

ii. Store in original vial closed tightly when not in use at room temperature.

iii. ALWAYS write the date opened and discard date on the vial.

iv. Two levels of QC solution are available.

1. Store at room temperature.
2. Keep vials tightly closed when not in use.
3. QC solutions are stable until printed manufacture's expiration date, or 3 months (90 days) after being opened, or whichever comes first.
4. ALWAYS write the date opened, or whichever comes first.

c. To begin the QC analysis and to turn the meter ON, insert a Glucose Test Strip into the meter. The strip is inserted into the strip-port at the bottom of the meter.

d. Shake the Assure Prism Control Solution bottle well before each test. Remove the cap and squeeze the bottle to discard the first 1 or 2 drops. Apply one drop of control solution to the top of the control solution cap.

e. After the blood symbol appears on the display, apply the solution to the narrow edge of the test strip until the meter beeps. Make sure the confirmation window fills completely.

f. A test result will appear after the meter counts down from 5 to 1.

g. After your control solution result appears on the display, press the "LEFT ARROW" button for 3 seconds until "check" appears on the display. When "check" is displayed, the result is stored in the meter's memory, but it is not included in the averages.

h. Remove the used test strip from the meter's test strip port. The meter will turn off automatically. Used test strips should be safely discarded in disposable containers.

3. Patient Testing
    a. Blood glucose level testing is indicated in the following patients:
        i. Diabetic patients regardless of complaint
        ii. Altered mental status patients including syncope, unconscious, and cardiac arrest patients
        iii. Patients that have had a seizure
        iv. Patients with neurological signs or symptoms including suspected stroke
        v. Any case where the EMS provider feels blood glucose level testing may benefit patient care
    b. Assemble necessary equipment and supplies: Glucometer, test strips, lancets, alcohol prep pad, gauze pads, appropriate PPE which at a minimum includes gloves.
    c. To begin patient analysis and to turn the meter on, insert a glucose test strip into the meter. The strip is inserted into the strip-port at the bottom of the meter.
    d. Once the strip is inserted, the meter screen will show a blood droplet with a test strip-indicating it is ready for analysis and sample application.
    e. Clean the patient's finger with an alcohol prep pad, dry thoroughly, and perform a finger stick using a lancet. (It is recommended to wipe away the first blood droplet).
    f. When the blood drop appears on the meter, touch the end of the test strip with the sample of blood making sure the test strip fills completely. Make sure the meter is held level or slightly downward. Do not touch the strip to the blood sample a second time. After five seconds a quantitative result will appear.
    g. Document results in the electronic patient care report within the activity log.

4. Results

a. Expected results:

   i. Fasting 70 – 110 mg/dL

   ii. Two hours postprandial < 140 mg/dL

b. In alert values, repeat the test to confirm:

   i. Adult blood glucose less than 50 mg/dL or greater than 350 mg/dL.

   ii. Pediatric blood glucose less than 50 mg/dL or greater than 200 mg/dL.

   iii. Neonatal blood glucose level less than 30 mg/dL or greater than 140 mg/dL.

   iv. Any result of "LO" which is a blood glucose level below 10 mg/dL.

   v. Any result of "HI" which is a blood glucose level above 600 mg/dL.

c. Analysis Related Error Codes

   i. Er1 – **A used test strip was inserted.** Repeat the test with a new test strip.

   ii. Er2 – **The blood or control solution sample was applied before the "blood" symbol appeared.** Repeat the test with a new test strip and wait until the "blood" symbol appears before applying the blood or control solution sample.

   iii. Er4 – **The blood sample has abnormally high viscosity or insufficient volume.** Repeat the test with a new test strip.

   iv. Er5 – **This error message may appear when the wrong blood glucose test strip is used instead of an Assure Prism multi Blood Glucose Test Strip.** Repeat the test with an Assure Prism multi Blood Glucose Test Strip

   v. Er6 – **There is a problem with the meter. Do not use the meter.** Contact Technical Customer Service at 800.818.8877, option 5, 24 hours a day, 7 days a week.

   vi. Er8 – An electronic error occurred during the test. Repeat the test with a new test strip. If the error messages persist, please contact Technical Customer Service at 800.818.8877, option 5, 24 hours a day, 7 days a week.

   vii. HIF — **The temperature during the test was above the operating range.**

   viii. LOF — **The temperature during the test was below the operating range.**

5. Limitations of the Procedure

   a. Flow errors may occur with:
      i. Extreme high or low Hematocrit, attempt to test with a new strip. If unsuccessful a lab draw will be needed.

      ii. Finger touching the strip which may slow the sample.

      iii. Failure to fill the strip on the first touch and then reapplying the strip to the blood.

      Erroneous results may occur with test strips:

      i. Used after the "Use By" date.

      ii. Not filled on the first touch of blood then applied to the blood again.

   c. In situations of decreased peripheral blood flow, finger stick testing may not reflect the true physiological state (e.g., severe dehydration due diabetic ketoacidosis or HHNK, hypotension, shock, or peripheral vascular disease)

   d. Capillary samples must be obtained from free-flowing blood. Excessive milking or squeezing of the puncture site may produce erroneous results.

   e. Glucose results less than 20 mg/dL or greater than 600 mg/dL are outside the linearity range and should not be considered accurate.

   f. Test results are best when obtained within an operating relative humidity of 10-90% (non-condensing). Testing outside of these ranges may produce inaccurate result.

Documentation:

1. MSHVFAS personnel document all patient blood glucose levels on the electronic patient care report in the activity log.
2. MSHVFAS personnel document all quality control testing levels on the daily check sheet