

CentraCare Health (CCH) adopts the following policy/procedure for:
St. Cloud Hospital

Original: 5/02

Minor Revision: 9/15

Full Review: 1/15

Replaces: 1/15

Responsible Person: Point of Care Laboratory Specialist

Approving Committee: Clinical Nurse Practice Committee

Category: Patient Care

Cross Reference: Patient Identification policy

Type: Procedure

I. PURPOSE

To provide on-site measurement of blood glucose. The results are in mg/dl glucose in capillary, arterial or venous whole blood and will be used to:

- A. Provide provider with information necessary to adjust insulin and/or oral hypoglycemic.
- B. Assist the nurse in assessing the patient, along with symptoms of hyper-hypoglycemic episode.

II. POLICY

- A. Blood glucose testing will be performed by patient care staff.
 - B. To be competent in the procedure patient care staff will complete initial training with a designated trainer. This will consist of hands-on training and completion of the validation checklist. To remain a valid operator, competency will be assessed with a written test and/or the online education module, performing at least one low and one high control, and review of the procedure on an annual basis. Laboratory personnel will also monitor operator performance on a continuous basis with the data management system. Volume of patient and quality control testing done by each operator, quality control failures, entry errors, and patient testing errors will all be monitored. Frequent errors may require an evaluation with repeat hands-on training. If the system does not recognize an operator as being valid, they will be locked out of the meter and unable to perform patient testing.
 - C. Two levels of quality control (QC) tests and downloading of each meter will be done minimally every 24 hours. Repeat QC tests will be done:
 - 1. if a patient test has been repeated and the blood glucose results are still lower or higher than expected
 - 2. when troubleshooting the system
 - 3. if the meter is dropped.
 - D. Download the meter to resume function. Cleaning will be done as needed and after each patient use.
 - E. Patient care staff will participate in proficiency testing from CAP (College of American Pathology).
 - F. When patient care units are having problems with a meter, Lab will be called as a guide for troubleshooting and maintenance. Do not send the meter to Clinical Engineering. Fill out an MDFR and bring the meter to Lab.
 - G. A provider order is required for blood glucose testing.
 - H. Capillary blood may be obtained from puncturing the fingertip or heel using approved lancets. Fresh whole blood – capillary, venous, arterial, and neonatal blood may be used. Venous and capillary blood may differ in concentration by as much as 70 mg/dL, depending on the time of blood collection after food intake. Shock, administration of vasoactive agents, and other factors affecting the peripheral circulation may also cause discrepancies between venous and capillary glucose results.
- I. When performing a bedside glucose test on medically managed patients (a***

mean arterial pressure of <60 with clinical nurse judgment regarding factors affecting peripheral perfusion), only a venous or arterial whole blood sample will be used with the Nova StatStrip glucose meter. Capillary whole blood samples will not be used. A plasma or serum glucose test may be performed in the central lab when applicable.

- J. When not analyzing from a lancing device, whole blood should be analyzed within 30 minutes of collection. Storing samples on ice is not recommended. Sodium, lithium, and ammonium heparin are the recommended anticoagulants when sampling with syringes or vacutainer tubes.
- K. For neonates in the Family Birthing Center and the NICU, the Newborn Glucose Algorithms will be used. Any neonate glucose value above 200 mg/dL will be verified with laboratory serum/plasma glucose. For all other patients, a meter reading below 50 or above 400 mg/dL is a critical value and will be verified with laboratory serum/plasma glucose. The provider will be notified when blood glucose levels are critical. Patient care staff will initiate a lab order for a STAT glucose.

III. STANDARD OF PRACTICE

Patient care staff is responsible for obtaining, reporting, and treating blood glucose as indicated.

IV. OUTCOME STANDARD

Patient can expect blood glucose levels to be monitored and treated per provider order.

V. PROCEDURE

A. Nova StatStrip® Glucose Meter



B. Quality control and cleaning

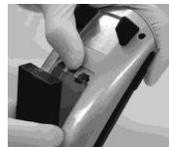
1. Cleaning the meter
 - a. Clean the meter with a cloth that has been dampened with a 10% bleach solution or see manufacturers approved cleansing solution list. Immediately following the appropriate wet contact time of the disinfectant wipe use a water-dampened cloth and/or an alcohol wipe to remove all cleaning residue. Dry thoroughly with a soft cloth or lint-free tissue. CAUTION: DO NOT immerse the meter or hold the meter under running water. DO NOT spray the meter with a disinfectant solution.
 - b. The outside of the meter/tote will be cleaned between each patient using an approved disinfectant wipe.
2. Running a QC Sample
 - a. From the Patient Test screen, press the QC soft key.
 - b. The Enter Strip Lot screen displays. Enter the Strip Lot Number or scan the barcode. To scan the barcode, press the Scan soft key. NOTE: If the Strip Lot Number is invalid, the screen displays the invalid number with "is not a valid Strip Lot # Try again."
 - c. Press the Accept soft key if the lot number is correct.
 - d. The Enter QC Lot screen displays. Enter the QC lot number, select from the QC Lot List screen (press the List soft button), or scan the barcode. To scan the barcode, press the Scan soft key.

- e. Press the Accept soft key of the lot number is correct.
 - f. The Insert Strip screen displays. Insert the gold tip into the meter and the Apply Sample screen displays.
 - g. Gently mix the StatStrip Glucose Control Solution.
 - h. Discard the first drop of control solution from the bottle to avoid contamination.
 - i. Place a drop of control solution from the bottle at the end of the test strip until the solution is drawn into the well of the test strip. When enough sample has been drawn into the strip, an audible beep is sounded by the meter.
 - j. The Testing Sample screen displays. The screen shows a clock with seconds remaining below the clock.
 - k. When the meter completes the test, the QC Result screen displays with the results in mg/dL. NOTE: Result is displayed either as PASS or FAIL.
 - l. To add a comment to the result, press the Comment soft key.
 - m. To accept the result, press the Accept soft key. NOTE: Acceptable control assay ranges are printed on the Nova Glucose Control Solutions vial label. If a QC test does not fall within the specified range, verify that the Nova Glucose Stat Strips and Control Solutions are not past their expiration dates. Repeat the test with a new strip
- C. Storage requirements:
1. Store the StatStrip® Glucose Test Strips at 15 to 30° C. Opened bottles of strips are good for 180 days after opening.
 1. Store the StatStrip® Glucose Control Solutions at 15 to 30° C. Opened bottles of control vials are good for 90 days after opening.
- D. Running a Patient Sample
1. From the Patient Test screen, press the Accept soft key.
 2. Enter Patient ID by either scanning the barcode ID from Patient ID List screen (press List soft key), or by pressing numeric/alphanumeric soft keys.
 - a. To scan the patient ID, press the Scan soft key on the screen. Or press one of the sides Scan buttons. Then scan the patient's barcode with the bottom of the meter.
 3. Once the Patient's ID has been entered, press the Accept soft key.
 4. The Enter Strip Lot screen displays. Enter or scan the strip lot number.
 5. Once the Lot Number has been added, press the Accept soft key.
 6. The Insert Strip screen displays. Insert a test strip as shown on the meter screen.
 7. Prepare the puncture site. Use alcohol pads to clean area. Alternatively, use water to wash the patient's hand; dry thoroughly after cleaning.
 8. Using an approved safety lancet, puncture the finger (not on the pads of the finger) or heel.
 9. Gently squeeze the site to form a drop of blood (excess tissue fluid may affect the result).
 10. Wipe away the first drop of blood to prevent testing a contaminated drop of blood.
 11. The Apply Sample screen should be displaying. When the blood drop appears, touch the end of the test strip to the blood drop until the well of the test strip is full and the meter beeps.
 - a. The test strip must fill completely upon touching the blood droplet. If the test strip does not fill completely, do not touch the test strip to the blood droplet a second time. Discard the test strip and repeat the test with a new strip.
 - b. When applying the sample to the strip ALWAYS point the test strip downwards to avoid blood running into the meter.
 12. The test results will appear in 6 seconds. Do not remove the test strip while the countdown is in progress.

- a. **Document sample type by pressing the Comment soft key, and selecting Capillary, Venous, or Arterial. Add comments as indicated.**
 - b. To accept the result, press the Accept soft key.
 - c. To reject the result, press the Reject soft key.
 - d. All data are stored into memory.
13. Remove the test strip and dispose of it in a sharps container. Also dispose of the lancet in a sharps container.
14. By placing the meter in a docking station either with the wall mount unit or the wireless tote, all results (patient and quality control) will download into a central laboratory computer which is interfaced with the Laboratory Information System (Sunquest) which is interfaced with the Hospital Information System.
15. All patient results will download into the electronic medical record (EMR).
- E. Docking/Charging Station:
- 1. When the meter is not in use, place it into the Docking/Wireless tote. This enables the meter to remain fully charged and connects the meter to the computer network.
 - 2. Docking – See the 3 methods of charging/docking below
 - a. Every 15 minutes the meter is updated when in a docking station or wireless tote.
 - b. Charges the battery with the meter
 - c. Life of the battery is 8 hrs or 40 test strips



- F. Battery Replacement:
- 1. If you have a spare fully charged battery, it can be changed to allow for continuous operation.
 - a. Press the Power Button to place the meter into Sleep Mode. This allows the operator approximately 20 seconds to change the battery without losing the Date/Time settings.
 - b. Push down on the two cover latches to release the cover. Take the battery cover the back of the meter. (Fig. 1)
 - c. Push up on the battery latch. Remove the drained battery. (Fig 2)
 - d. Replace with a fully charged battery. (Fig 3)
 - e. Replace the battery cover.
 - f. Place the drained battery into the Charging Station.
 - g. Dock the meter.



G. Reference Ranges:

1. Blood glucose levels for people without diabetes are as follows:
 - Adult Fasting 70-100 mg/dL
 - Expected values for neonates (1 to 7 days old): 47 - 110 mg/dL
2. The operating range or Linearity of the StatStrip Glucose Meter is 10 - 600 mg/dL.
3. Additional Precautions for Neonatal Testing
 - a. All abnormal neonatal values should be confirmed by a clinical laboratory test method. All neonates exhibiting hypoglycemic symptoms, regardless of blood glucose monitoring results, should have their glucose tested by a clinical laboratory test method.
 - b. Use caution when interpreting neonatal blood glucose results which are less than 50 mg/dL.

H. Limitations:

1. If needed, sodium, lithium, and ammonium heparin are the recommended anticoagulants for use with the StatStrip® Glucose Meter.
 - a. Depending on the amount of heparin used in the collection syringe and whether it is filled to capacity with blood, the concentrations of heparin may be 20 I.U. per mL to over 100 I.U. per mL. When liquid heparin is present in excess, it may cause dilution errors.
 - b. A lyophilized lithium heparin giving a final concentration in blood of not more than 20 I.U. per mL is acceptable.
 - 1) EDTA, citrate, oxalate, and sodium fluoride are NOT recommended for use.
 - 2) Glucose Interferences:
 - a) The StatStrip Glucose Meter exhibits no interference from the following substances up to the following concentration levels:

| Tested Interfering Substances | Tested Concentration Level |
|-------------------------------|----------------------------|
| Acetaminophen | 10.0 mg/dL |
| Ascorbic Acid | 10.0 mg/dL |
| Bilirubin | 15.0 mg/dL |
| Cholesterol | 500.0 mg/dL |
| Creatinine | 6.0 mg/dL |
| Dopamine | 10.0 mg/dL |
| Ephedrine | 0.9 mg/dL |
| D(+) Galactose | 350.0 mg/dL |
| Hematocrit (RBC) | 20% - 65% |
| Ibuprofen | 48.0 mg/dL |
| L-Dopa | 100.0 mg/dL |
| D(+) Maltose Monohydrate | 240.0 mg/dL |
| D(+) Maltotetraose | 240.0 mg/dL |
| D(+) Maltotriose | 240.0 mg/dL |
| Methyl-Dopa | 1.0 mg/dL |
| Oxygen | All Concentrations |
| Salicylate | 30.0 mg/dL |
| Tetracycline | 30.0 mg/dL |
| Tolazamide | 15.0 mg/dL |
| Tolbutamide | 45.0 mg/dL |
| Triglycerides | 750.0 mg/dL |
| Uric Acid | 20.0 mg/dL |

2. For technical assistance inside the United States, call Nova Biomedical Technical Services at: U.S.A.: 1-800-545-NOVA 1-781-894-0800 or FAX: 1-781-894-0585

VI. REFERENCES

Literature

Burtis, Carl A. and Ashwood, Edward R., ed. 1999. *Tietz Textbook of Clinical Chemistry*. Philadelphia, PA: W. B. Saunders Co.

Manufacturer's Guidelines

NOVA biomedical Instructions for use Manual, Printed in the U.S.A. Copyright 2011, Nova Biomedical Corporation, Waltham, MA 02454-9141

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