Interprofessional Clinical Practice Standard – Procedure

Title: Blood Glucose Monitoring (BGM) – Patient Testing

Professional Responsible/ for use by:

Physicians, Registered Midwives, Registered Nurse Practitioners, Registered Nurses, Medical Laboratory Technologists, Licensed Practical Nurses and nursing students within their scope of their practice.

All personnel performing BGM are required to complete Point of Care Testing (POCT) training and certification for glucose meters. Only trained personnel may perform testing.

The profession performing BGM is responsible for ensuring the quality and reliability of testing by following VIHA and glucose meter manufacturer policies and procedures. This includes the complete path of workflow which consists of patient identification, specimen collection and assessment, analysis, and documentation of results.

Indications/Care Outcomes:

BGM provides an efficient, quantitative measurement of the concentration of blood glucose in whole blood.

Appropriate BGM is associated with tighter glycemic control and improved patient outcomes.

Equipment:

- Clean gloves
- Hand towel/cloth, soap, and basin
- Cotton ball
- Blood glucose meter
- Glucose Meter – test strip inserted
- Sterile lancet

Related Policies and Standards:

- Positive Patient Identification at Point of Care (PPID): 16.5.2PR
- Adult Hypoglycemia Treatment Guideline: 12.2.15G
### Procedure - Steps

1. Determine if capillary blood glucose sample collection and testing by meter is appropriate:

<table>
<thead>
<tr>
<th>IF</th>
<th>THEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient has a Low or High Hematocrit. *See test strip package insert for specific glucose meter Hematocrit limitations.</td>
<td>• Glucose meter testing may provide inaccurate results. • Testing by another method is indicated (i.e.: Lab glucose).</td>
</tr>
<tr>
<td>Patient has impaired peripheral circulation. (i.e.: severe dehydration, hypotension, shock.).</td>
<td>• Glucose meter testing may provide inaccurate results. • Testing by another method is indicated (i.e.: Lab glucose).</td>
</tr>
<tr>
<td>Patient is taking substances which may interfere with capillary BGM. *See test strip package insert for specific glucose meter interfering substances</td>
<td>• Glucose meter testing may provide inaccurate results. • Testing by another method is indicated (i.e.: Lab glucose).</td>
</tr>
<tr>
<td>Blood sample is arterial or venous</td>
<td>• There can be physiological variation between capillary, venous and arterial blood. • Documentation in chart must indicate source of the sample (i.e.: arterial/venous), and if required, that a discard occurred.</td>
</tr>
<tr>
<td>Patient is a neonate (&lt;1yrs).</td>
<td>• Heel punctures are required for patients &lt; 1 year of age. • Heel punctures are a specialized skill. Specific training is required. • Glucose values in neonates suspect for galactosemia are to be confirmed by the Laboratory</td>
</tr>
<tr>
<td>Patient is &gt;1year old and there are no known limitations to performing meter testing.</td>
<td>• Proceed with sample collection.</td>
</tr>
</tbody>
</table>
### Procedure - Steps

2. **Assess patient’s allergies** (i.e.: latex sensitivity).

3. **Explain procedure** to patient and gain verbal consent.

4. **Verify glucose meter is ready for patient testing.**
   - Ensure **Quality Control** requirements are fulfilled.
   
   Refer to procedure: *Bedside Glucose Monitoring (BGM), Performing Quality Control (QC)*

5. **Perform hand hygiene and apply clean gloves.**
   - Standard precautions must be used when handling blood.

6. **Positively Identify Patient:**
   
   Verify patient’s identity using a minimum of **TWO** of the following unique identifiers:
   - Patients first and last name.
   - Date of Birth (DOB).
   - Medical Record Number (MRN).
   - Provincial Health Number (PHN).

   Positive patient identification **must** be performed prior to the collection of **ANY** patient sample. See *Positive Patient Identification (PPID) at Point of Care* 16.5.2PR

   ![Link to PPID document](https://intranet.viha.ca/pnp/pnpdocs/positive-patient-identification-ppid-point-care.pdf)

7. **Position Patient** comfortably in chair / semi-Fowler position in bed.
   - Ensures easy accessibility to puncture site; enhances patient comfort.

8. **Select Area for Puncture:**
   
   **Note:** **ONLY** fingerstick and heelstick collections are validated within VIHA

   **General Considerations** for Site Selection:
   - Warm, pink, normal color.
   - Free of scars, cuts, bruises, or rashes.
   - Not cyanotic, edematous or infected.
   - Avoid previously punctured sites to prevent skin breakdown and callusing.
   - Heel punctures are required for patients < 1 year of age.
     - **This is a specialized skill. Specific training is mandatory.**

   **Fingerstick Site Selection:**
   - Middle and ring fingers are the preferred sites.
   - Index finger may be used as an alternative site yet can be more sensitive or calloused.
   - Do not use thumb or fifth finger.
   - Do not attempt to puncture a swollen, bruised, or previously punctured site.
   - Tips and pads of fingers should be avoided as they are denser with nerve supply and can be more painful.
9. **Employ techniques to improve blood flow/ enhance sample size:**
   - Wrap site in warm, moist towel (or other warming device) at a temperature no higher than 42°C for three to five minutes.
   - Gently massage finger or apply intermittent pressure.
   - Place hand in a dependent position (i.e.: dangle arm over the bedside or chair).

10. **Clean and AIR-DRY site.**
    - Clean site well with soap & warm water.
    - Dry area completely!
    - Failure to remove contaminates prior to sample collection will interfere with test results.

    **Note:**
    - The use of alcohol for site cleansing is discouraged because repeated use of alcohol is associated with callusing, and skin breakdown.
    - If alcohol is used, ensure it has dried completely before performing puncture. Allowing alcohol to dry ensures proper disinfectant & prevents possible sample contamination due to blood mixing with alcohol.

11. **Perform Patient Testing.**
    - Refer to ACCU-CHEK Inform II or Performa Quick Reference Guide

    **Key Points to Obtaining a good Quality Sample:**
    1) Clean and Dry puncture site. Avoid use of alcohol.
    2) Always **WIPE AWAY FIRST DROP OF BLOOD** with dry gauze.
       - The first drop of blood contains additional serous fluid which can cause specimen dilution, hemolysis and clotting.
       - Ensures sample is free of contamination (i.e. alcohol, soap residue, fruit juice, saliva)
    3) Avoid milking/ excessive squeezing of puncture site.
       - May cause hemolysis and/or tissue fluid contamination of the specimen.

12. **Apply direct pressure to puncture site** with a dry gauze pad (assists site to coagulate).

13. **Document patient results.**
    - Transcribe results in a timely manner with the fewest number of transcriptions as possible (decreases the potential for error).
    - Record: (a) procedure (i.e. by meter), (b) glucose level, (c) action taken for abnormal range, (d) patient response, including appearance of puncture site, (e) patient and family education.
    - If sample was obtained from arterial or venous line, document source of sample and that a discard occurred.
14. **Interpret and Identify if result is unexpected, requires confirmation, or other follow up:**

<table>
<thead>
<tr>
<th>IF</th>
<th>THEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result is unexpected or inconsistent with patient’s symptoms/clinical presentation.</td>
<td>• Confirm with Laboratory glucose.</td>
</tr>
<tr>
<td>Result is less than 4.0 mmol/L and patient is symptomatic for hypoglycemia</td>
<td>• Follow protocol and treat patient for hypoglycemia. <a href="https://intranet.viha.ca/pnp/pnpdocs/adult-hypoglycemia-low-blood-sugar.pdf">https://intranet.viha.ca/pnp/pnpdocs/adult-hypoglycemia-low-blood-sugar.pdf</a></td>
</tr>
<tr>
<td>Result is greater than 11.0 mmol/L and patient is symptomatic for hyperglycemia.</td>
<td>• Diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state (HHS) should be suspected in all ill patients with diabetes. • Provide appropriate follow up and treatment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IF</th>
<th>THEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result is CRITICAL VALUE:</td>
<td>IMMEDIATE action is required:</td>
</tr>
<tr>
<td>• <strong>Child/ Adolescent (&lt;17yrs)</strong> Less than 2.0 mmol/L Greater than 11.1 mmol/L</td>
<td>• Ensure good sample quality. • Verify correct sample application. • Verify results with STAT laboratory glucose or repeat with meter if on-site laboratory is not available. • Treat as per facilities procedures/protocols (i.e.: hypoglycemia). • Notify physician.</td>
</tr>
<tr>
<td>• <strong>Adult:</strong> Less than 2.0 mmol/L Greater than 30.0 mmol/L</td>
<td>• Glucose meter testing may provide inaccurate results. • Testing by another method is indicated (i.e.: Lab glucose).</td>
</tr>
<tr>
<td>Patient has a High/Low Hematocrit (Hct) *See test strip package insert for specific glucose meter Hematocrit limitations.</td>
<td></td>
</tr>
<tr>
<td>An error code or message appears instead of a result.</td>
<td>• Document any error code, citing specifics of problem. • Consider limitations and correct potential sources of error. Repeat test. Confirm results with Laboratory glucose if result is discrepant from patient clinical presentation</td>
</tr>
</tbody>
</table>

**Never make significant changes to your patient’s medication program or ignore physical symptoms without consulting physician.**

15. **Dispose equipment** in proper receptacle.  
  • Lancets→sharps/ biohazard waste.  
  • Test strip and Gloves→garbage.
16. Perform hand hygiene.

Appendix A

Interpreting Patient Results

Recommended Plasma Glucose (PG) Targets for Glycemic Control.
(Canadian Diabetes Association, 2008, *Clinical Practice Guidelines*)

<table>
<thead>
<tr>
<th>Age</th>
<th>Preparandial (fasting)</th>
<th>Postprandial (2-hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;6 yrs.</td>
<td>6.0-12.0 mmol/L</td>
<td>Not routinely monitored</td>
</tr>
<tr>
<td>6 - 13 yrs.</td>
<td>4.0-10.0 mmol/L</td>
<td>Not routinely monitored</td>
</tr>
<tr>
<td>13 - 18 yrs.</td>
<td>4.0-7.0 mmol/L</td>
<td>5.0-10.0 mmol/L</td>
</tr>
<tr>
<td>&gt;18 yrs.</td>
<td>4.0-7.0 mmol/L</td>
<td>5.0-10.0 mmol/L</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>3.8-5.25 mmol/L</td>
<td>1 h → 5.5-7 mmol/L; 2 h → 5.0-6.6 mmol/L</td>
</tr>
</tbody>
</table>

Appendix B

Source of Error

1. Deterioration of test strips due to contact with air and moisture.
2. Incorrect sample collection (i.e., insufficient quantity, contaminated puncture site, excessive squeezing).
3. Incorrect sample application to test strip.
4. Meter not kept horizontal, and fluid has entered test strip port.
5. Meter is dirty.
6. There is residual disinfectant on meter.

Limitations

1. Sample source (i.e., capillary, venous or arterial) and timing of blood collection after food ingestion will affect glucose concentration.
2. Excessive water loss or dehydration can affect hematocrit and therefore glucose meter results.
3. Certain substances can interfere with test results. Refer to meter specific test strip package insert.
4. Low or High hematocrit. Refer to meter specific test strip package insert.
5. Circulatory problems (i.e., shock, administration of vasoactive agents, other factors affecting peripheral circulation). Refer to meter specific test strip package insert.
References


