Alberta Health Services

POLICY

TITLE
GLYCEMIC MANAGEMENT - ADULT

SCOPE
Provincial: Acute Care

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NOTE: The first appearance of terms in bold in the body of this document (except titles) are defined terms – please refer to the Definitions section.

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OBJECTIVES

- To outline expectations and recommended strategies for glycemic management of adult **patients** presenting to or admitted to any Alberta Health Services (AHS) Acute Care setting, including Intensive Care Units, Emergency Departments, Urgent Care Centres, Day Wards, and Addiction and Mental Health Inpatient Units.

PRINCIPLES

Glycemic management is required to support patients to meet their recommended blood glucose targets while in hospital. Maintaining blood glucose targets is necessary to ensure **patient safety**, and to mitigate the immediate risks associated with hypoglycemia. Optimizing glycemic management has been shown to decrease the risks associated with hyperglycemia, which includes delayed wound healing, hospital-acquired infections, mortality, increased length of hospital stay, as well as other related complications.

Meeting glycemic targets requires a collaborative and multidisciplinary approach, which should include patient involvement through collaborative conversations, when possible. These recommended glycemic management strategies are intended to provide consistent support to the patient during hospital admissions and to ensure a smooth transition out of hospital, by emphasizing best practice and patient safety while in hospital.

APPLICABILITY

Compliance with this document is required by all Alberta Health Services employees, members of the medical and midwifery staffs, students, volunteers, and other persons acting on behalf of Alberta Health Services (including contracted service providers as necessary).

ELEMENTS

1. Points of Emphasis

1.1 This Policy may be used in non-Acute Care settings. Site or Unit Managers are responsible for determining whether this Policy in whole or in part is appropriate for their patient care setting and communicating relevant messaging out to **AHS representatives**.

1.2 **Health care professionals** shall perform blood glucose **point-of-care testing (POCT)** with the AHS blood glucose meter to determine:

a) administration of medication doses;

b) adjustment of insulin doses and/or other diabetes medication(s); and

c) the treatment for hypoglycemia.

d) Patient refusal of POCT with the AHS blood glucose meter shall be documented as per the AHS *Consent to Treatment/Procedure(s)* Policy.

(i) Patients who refuse POCT with an AHS blood glucose meter should be provided with education regarding safety concerns associated with use of home glucose monitors during a hospital admission. Refer to the patient handout *Checking your blood glucose (sugar) level while you're in the hospital* (MyHealth.Alberta.ca*).*

1.3 Patients may continue to use their home glucose monitors for personal record retention.

a) If the patient chooses to use their own home glucose monitoring device, the values should not be used to determine:

(i) administration of medication doses;

(ii) adjustment of insulin doses and/or other diabetes medication(s); or

(iii) the treatment for hypoglycemia.

b) Home glucose monitors include personal blood glucose meters (BGM), continuous glucose monitors (CGM), and flash glucose monitors (Flash).

(i) CGM and Flash devices measure the glucose levels found in the interstitial fluid; results may not be the same as capillary or lab blood glucose results.

c) An **order** is required from the **most responsible health practitioner (MRHP)** for an exception, upon review with the health care team (including specialty consultation) and with the patient/family.

d) Patient-reported self-monitored glucose values and trends from a home glucose monitoring device should be reviewed and discussed with the multidisciplinary health care team, in addition to the in-hospital POCT blood glucose values, where appropriate.

2. Blood Glucose Target Ranges

2.1 For the majority of non-critically ill patients, random blood glucose should be in the target range of 5.0 – 10.0 millimoles per litre (mmol/L).

a) Exceptions may include patients with a guarded prognosis (e.g., end of life), those who have been identified to have hypoglycemia unawareness, and patients with multiple co-morbidities (where the individualized target range may be modestly higher).

2.2 For women with diabetes in pregnancy, the blood glucose target range is:

a) Antepartum:

(i) fasting and pre-prandial: 3.8 – 5.2 mmol/L; and

(ii) one (1) hour post-prandial: below 7.8 mmol/L; and

(iii) two (2) hour post prandial: below 6.7 mmol/L;

or

(iv) individualized targets determined by the MRHP.

b) During active labour, targets are 4.0 – 7.0 mmol/L.

2.3 For critically ill patients, the blood glucose target range is 6.0 – 10.0 mmol/L.

Exception: For patients with acute coronary syndrome, the blood glucose target range is 7.0 – 10.0 mmol/L.

2.4 For frail, elderly, and/or those patients with dementia, the blood glucose target range is 5.0 – 12.0 mmol/L.

2.5 For patients whose blood glucose is anticipated to be outside of the recommended range, the MRHP should define the target range on the patient's **health record**.

3. Glycemic Management Strategies

3.1 Appropriate blood glucose monitoring of patients with a known history of diabetes, newly diagnosed with diabetes, or an elevated blood glucose shall be performed as follows:

a) a minimum of four (4) times a day and as needed (pro re nata [PRN]), for acutely ill patients and patients receiving insulin;

b) a patient-specific testing regimen in consultation with the health care team if the patient's blood glucose is stable and well-controlled, and they are not acutely ill (e.g., patients awaiting an alternate level of care);

c) a patient-specific testing regimen in consultation with the health care team for patients with diabetes in pregnancy (antepartum as well as labour and delivery); and/or

d) more frequent monitoring (hourly or every two [2] hours) for patients receiving intravenous insulin.

3.2 PRN testing may be indicated (prior to the patient leaving the unit) when the patient will be off unit at a location where blood glucose testing is not readily available and/or the patient will be engaging in physical activity.

3.3 Appropriate blood glucose monitoring of patients without diabetes who are prescribed and taking medications known to cause hyperglycemia (e.g., steroids) shall be performed:

a) a minimum of two (2) times a day (BID) at lunch and supper scheduled meal times; and

b) a minimum of four (4) times a day (QID) if hyperglycemia is present.

3.4 Capillary blood is not recommended for blood glucose testing for patients with severely impaired peripheral circulation (e.g., hypovolemia, shock).

3.5 Appropriate subcutaneous insulin **medication orders:**

a) Insulin is the most appropriate agent for effectively controlling hyperglycemia in hospital, including when oral and non-insulin injectable agents are not safe or effective for patients with type 2 diabetes.

b) A proactive approach using a scheduled basal, bolus, and correction (supplemental) insulin regimen is the preferred method.

c) Sliding scale insulin alone should be avoided in preference of a basal bolus insulin regimen to improve patient outcomes.

3.6 Timing of insulin administration should be coordinated with meals and blood glucose testing in the following order:

a) blood glucose testing should be done within 30 minutes prior to meals; and

b) meal/bolus and correction insulin should be administered based on this test no more than 30 minutes prior to meals in most instances.

(i) Short-acting insulin should be given 30 minutes prior to a meal.

(ii) Rapid-acting insulin should be given just before a meal.

(iii) Meal/bolus insulin may be given immediately after the meal/feed in certain situations (e.g., gastroparesis or concern that the patient may not be able to ingest or retain the full meal).

c) Consideration of the effects of other anti-hyperglycemic medication may also be necessary when timing meals and blood glucose testing.

3.7 For patients with insulin pump therapy (IPT):

a) If the insulin pump is stopped, basal insulin shall be replaced within two (2) hours to prevent diabetic ketoacidosis (DKA).

(i) Severe hyperglycemia and/or DKA can result when IPT is stopped for as little as two (2) – four (4) hours and the insulin is not replaced, even if blood glucose values are not elevated or are low when the pump is discontinued.

b) Refer to the AHS *Guidelines for the Safe Management of Insulin Pump Therapy in Hospital* for more information.

3.8 Appropriate assessment and treatment of asymptomatic and symptomatic hypoglycemia (most often drug-induced from insulin or insulin secretagogues) includes, but may not be limited to the following (refer to the AHS *Treatment of Hypoglycemia - Adult* Procedure):

a) early recognition;

b) treatment for all patients with a blood glucose less than 4.0 mmol/L who meet the criteria below:

(i) patients with diabetes or gestational diabetes, even those who have no symptoms, who are on at least one (1) of the following medications: insulin or insulin secretagogues (e.g., glyburide, gliclazide, glimepiride, or repaglinide); or

(ii) patients without diabetes who have symptomatic hypoglycemia due to insulin or insulin secretagogue overdose (e.g., glyburide,

gliclazide, glimepiride, or repaglinide), malnutrition, liver failure, or more rare conditions (e.g., insulinoma, late dumping syndrome).

(iii) This hypoglycemia protocol should not be applied to:

- patients with diabetes who are not taking insulin or insulin secretagogues (e.g., glyburide, gliclazide, glimepiride, or repaglinide); and
- patients who do not have diabetes except those who have symptomatic hypoglycemia due to insulin or insulin secretagogue overdose (e.g., glyburide, gliclazide, glimepiride, or repaglinide), malnutrition, liver failure, or more rare conditions (e.g., insulinoma, late dumping syndrome).

c) avoiding overtreatment of hypoglycemia to prevent rebound hyperglycemia;

(i) 15 grams of fast-acting carbohydrates is usually sufficient for managing hypoglycemia for patients who are able to have oral intake (e.g., four [4] dextrose tablets or 3/4 cup of juice).

d) decreasing insulin doses rather than holding or discontinuing to promote glycemic management; and

e) contacting the MRHP when indicated, as per the AHS *Treatment of Hypoglycemia - Adult* Procedure.

3.9 Appropriate assessment and treatment of hyperglycemia includes, but may not be limited to the following (refer to the AHS *Treatment of Hyperglycemia - Adult* Procedure):

a) contacting the MRHP for further orders when the patient's blood glucose is greater than 18.0 mmol/L and/or when otherwise indicated in the AHS *Treatment of Hyperglycemia - Adult* Procedure;

b) stat ketone testing, which is recommended for:

(i) patients with type 1 diabetes when blood glucose is greater than 18.0 mmol/L and/or if displaying symptoms of DKA;

(ii) patients on IPT when blood glucose is greater than 14.0 mmol/L; and

(iii) patients on sodium-glucose co-transporter-2 (SGLT2) inhibitors when blood glucose is greater than 14.0 mmol/L or who display symptoms of DKA, regardless of glucose value.

- SGLT2 inhibitor medications include: canagliflozin (Invokana), dapagliflozin (Forxiga), empagliflozin (Jardiance), and ertugliflozin (Steglatro).

c) assessing for DKA if a patient with type 1 diabetes is displaying signs of DKA and/or if unable to decrease the patient's blood glucose.

(i) For more information, refer to the AHS Clinical Knowledge Topics:

- *Diabetic Ketoacidosis, Adult – Emergency Department (DKA, Diabetes, Hyperglycemia, Hyperglycemic Hyperosmolar State)*; and/or
- *Diabetic Ketoacidosis, Adult – Inpatient*.

Note: Available method of ketone testing varies across Acute Care sites and may be site-dependent.

3.10 Unless otherwise indicated, the MRHP shall ensure patients with diabetes receive a diabetic diet that provides meals and snacks to promote glycemic control.

3.11 The MRHP shall ensure patients with diabetes are in a safe blood glucose range before physical activity or exercise.

3.12 Some patients should not be sent off the unit, especially for physical activity. These include:

a) Patients with type 1 or type 2 diabetes when their blood glucose is less than 4.0 mmol/L

b) patients with type 1 diabetes when their blood glucose is greater than 18.0 mmol/L and positive ketones;

c) patients on an SGLT2 inhibitor and positive ketones, regardless of blood glucose value; and

d) patients on IPT when blood glucose is greater than 14.0 mmol/L and positive ketones.

3.13 Patients with diabetes or those with unstable blood glucose levels should be referred for diabetes education and/or to a diabetes specialist, when available and appropriate. The referral may also be to outpatient services (e.g., programs may include the Alberta Healthy Living Program).

DEFINITIONS

AHS representative means Alberta Health Services employees, members of the medical and midwifery staffs, students, volunteers, and other persons acting on behalf of Alberta Health Services (including contracted service providers as necessary).

Health care professional means an individual who is a member of a regulated health discipline, as defined by the *Health Professions Act* (Alberta), and who practices within scope and role.

Health record means the collection of all records documenting individually identifying health information in relation to a single person.

Medication orders

Most responsible health practitioner (MRHP) means the health practitioner who has responsibility and accountability for the specific treatment/procedure(s) provided to a patient and who is authorized by Alberta Health Services to perform the duties required to fulfill the delivery of such a treatment/procedure(s), within the scope of their practice.

Order means a direction given by a regulated health care professional to carry out specific activity(-ies) as part of the diagnostic and/or therapeutic care and treatment to the benefit of a patient. An order may be written (including handwritten and/or electronic), verbal, by telephone, or facsimile.

Patient means an adult or child who receives or has requested health care or services from Alberta Health Services and its health care providers or individuals authorized to act on behalf of Alberta Health Services. This term is inclusive of residents, clients and outpatients.

Patient safety means the reduction of harm associated with health care.

Point-of-care testing (POCT) means any testing that typically occurs outside a designated laboratory environment, and is completed nearer to, or at the site of the patient/client. This includes all testing performed by non-laboratory personnel regardless of the location of the examination.

REFERENCES

- Alberta Health Services Governance Documents:
  - *Consent to Treatment/Procedure(s)* Policy (#PRR-01)
  - *Point of Care Testing (POCT)* Policy (#PS-90)
  - *Treatment of Hyperglycemia – Adult* Procedure (#HCS-206-02)
  - *Treatment of Hypoglycemia – Adult* Procedure (#HCS-206-01)
- Alberta Health Services Resources:
  - *Diabetic Ketoacidosis, Adult – Emergency Department (DKA, Diabetes, Hyperglycemia, Hyperglycemic Hyperosmolar State)* Clinical Knowledge Topic
  - *Diabetic Ketoacidosis, Adult – Inpatient* Clinical Knowledge Topic
  - *Guidelines for the Safe Management of Insulin Pump Therapy in Hospital*

- *Safer Practice Notice: Safety Concerns Regarding Use of Home Glucose Monitoring Devices in the Acute Care Setting (October 27, 2020)*

- Non-Alberta Health Services Documents:
  - *Checking your blood glucose (sugar) level while you're in the hospital.* Patient Handout (https://myhealth.alberta.ca/Alberta/Pages/blood-glucose-hospital.aspx)
  - *Clinical Practice Guidelines 2018* (Diabetes Canada)
  - *Medication Guidelines 2019* (College and Association of Registered Nurses of Alberta [CARNA])
  - *Medication Guidelines 2018* (College of Licensed Practical Nurses of Alberta [CLPNA]