TITLE
GLYCEMIC MANAGEMENT - ADULT

OBJECTIVE

- To outline expectations and recommended strategies for glycemic management of adult patients presenting to or admitted to an Alberta Health Services (AHS) Acute Care setting.

PRINCIPLES

Glycemic management is required to support patients to meet their blood glucose targets, prevent exacerbation of acute illness, promote wound healing, prevent infections and avoid other complications. Appropriate glycemic management supports a smooth transition into hospital for patients with diabetes. It also supports a smooth transition out of hospital, and back into the community. Attention to recommended blood glucose targets in hospital is consistent with how patients are taught to manage their diabetes in the community.

Maintaining blood glucose within the recommended targets is necessary to ensure safety for patients, and mitigate the immediate risks associated with hypoglycemia. It is also necessary to decrease the risks associated with hyperglycemia including delayed wound healing, hospital acquired infections, mortality, increased length of hospital stay, and other complications.

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) working in Acute Care settings.
ELEMENTS

1. Points of Emphasis
   1.1 For the purposes of this policy suite only, Acute Care setting includes all AHS urban and rural hospitals (including the Emergency Department), psychiatric facilities, and Urgent Care facilities.
   1.2 This policy suite does not extend to Ambulatory care within a hospital setting, Addiction and Mental Health community clinics, community services and treatment centres; Correctional Health; Public Health settings; or Continuing Care.

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 five (5) – ten (10) millimoles per litre (mmol/L).
   a) Exceptions include, but may not be limited to:
      - Diabetes in pregnancy (where the individualized target range may be modestly lower);
      - patients with a guarded diagnosis (i.e., end of life); those who have been identified to have hypoglycemia unawareness; the frail elderly; and patients with multiple co-morbidities (where the individualized target range may be modestly higher).
   2.2 For critically ill patients blood glucose target range is eight (8) – ten (10) mmol/L.
   2.3 For frail elderly patients blood glucose target range is five (5) – 12 mmol/L.
   2.4 For patients whose blood glucose is anticipated to be outside of the recommended range, the most responsible health practitioner should identify the target range on the patient’s chart.

3. Glycemic Management Strategies
   3.1 Meeting glycemic targets requires a multidisciplinary approach, which involves an array of strategies.
   3.2 Appropriate blood glucose monitoring of patients with a known history of diabetes, newly diagnosed with diabetes, or an elevated blood glucose shall be performed:
      a) Minimum of four (4) times a day (QID) and as needed (prn), for acutely ill patients and patients receiving insulin;
b) patient specific testing regime 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 alternate level of care);

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

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

e) 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;

f) Include patient self-management and/or self-monitoring, in addition to in hospital point of care testing, where appropriate.

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

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

b) minimum of four (4) times a day (QID) if hyperglycemia 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 (SC) insulin prescription:

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

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

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

3.6 Timing of insulin administration should be coordinated with meals and blood glucose testing.

a) Blood glucose testing should be done within 30 minutes prior to meal; and

b) 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; and

(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); if the insulin pump is stopped, basal insulin must be replaced within two (2) hours to prevent diabetic ketoacidosis (DKA). Severe hyperglycemia and/or DKA can result when IPT is stopped for as little as two (2) to four (4) hours and the insulin is not replaced; even if blood glucose values are normal or low when the pump is discontinued.

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:

a) Early recognition;

b) treatment for all patients with a blood glucose less than four (4) mmol/L, even those asymptomatic;

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 most responsible health practitioner when indicated, as per AHS Treatment of Hypoglycemia Procedure.

3.9 Appropriate assessment and treatment of hyperglycemia includes, but may not be limited to:

a) Contacting the most responsible health practitioner for further orders, when the patient’s blood glucose is greater than 18 mmol/L and/or when otherwise indicated in the AHS Treatment of Hyperglycemia Procedure;

b) stat ketone testing is recommended:
(i) For patients with Type 1 diabetes when blood glucose is greater than 18 mmol/L;

(ii) for patients on insulin pump therapy when blood glucose is greater than 14 mmol/L; or

(iii) for patients on Sodium-glucose co-transporter two (2) (SGLT2) inhibitors when blood glucose is greater than 14 mmol/L or who display symptoms of diabetic ketoacidosis (DKA). SGLT2 inhibitor medications include: canagliflozin (Invokana), dapagliflozin (Forxiga) and empagliflozin (Jardiance).

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

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

3.11 Patients with diabetes should be in safe blood glucose range before physical activity or exercise.

3.12 Patients should not be sent off Unit, especially for physical activity, when their blood glucose is less than four (4) mmol/L.

3.13 Patients should not be sent off Unit, especially for physical activity, when their blood glucose is greater than 18 mmol/L without approval from the most responsible health practitioner.

3.14 Newly diagnosed patients (with diabetes) or those with unstable blood glucose levels, should be referred to a Certified Diabetes Educator (CDE) or diabetes specialist, when available.

DEFINITIONS

**Most responsible health practitioner** 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.

**Patient** for the purposes of this policy means an adult who receives or has requested health care or services from Alberta Health Services and its health services providers or individuals authorized to act on behalf of Alberta Health Services.
REFERENCES

- Alberta Health Services Governance Documents:
  - Treatment of Hypoglycemia Procedure (HCS-206-01)
  - Treatment of Hyperglycemia Procedure (HCS-206-02)
  - Point of Care Testing (POCT) Policy (PS-90)
- Non-Alberta Health Services Documents:
  - Canadian Diabetes Association 2013 Clinical Practice Guidelines

VERSION HISTORY

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