

A guide to surgical diabetes management:

Prescribing subcutaneous insulin for patients with Diabetes

In Alberta, there is a clinical practice change movement towards the use of Basal Bolus Insulin Therapy (BBIT) for patients requiring subcutaneous insulin. BBIT is a proactive way of treating diabetes in hospital that is more physiologic, and better prevents blood glucose variability. While BBIT may seem more complex at first glance, feedback from other adoption sites has proven that the process becomes quite straight forward after becoming familiar with the order set. Concerns raised from surgical care providers, indicate there is a lack of clarity regarding how to manage certain groups of surgical/perioperative patients. The retirement of subcutaneous sliding scale insulin order sets and the use of BBIT results in less hyperglycemia (without increasing the risk of hypoglycemia) and a shorter length of stay. This document aims to clarify and provide guidelines to support the surgical care group in the medical management of patients with diabetes.

Clarification and Guidelines:

1. Target blood glucose range for most non-critically ill patients with diabetes in-hospital is **5-10 mmol/L**. If patients are not meeting these targets, blood glucose monitoring should occur QID and medication management reviewed. A minimum of QID testing is recommended for all patients on insulin.
2. For the patients who have type 1 diabetes (insulin-dependent and prone to Diabetic Ketoacidosis):
 - a. These patients require ongoing **basal** insulin + correction in the perioperative period when NPO.
 - b. When eating, they will be on a full BBIT protocol, with bolus insulin to cover their meals.
 - c. If these patients are managed with the assistance of general internal medicine/ endocrinology/ pre-operative assessment clinic at your centre, this process will not change.
3. For the patients with type 2 diabetes, who are on only 1-2 diabetes medications (insulin naïve), with good control (i.e. HbA1C 8% or less):
 - a. These patients will have their oral/injectable agents held, typically the morning of surgery.
 - b. Over short periods of time (i.e. 24-48 hours), it is uncommon for these well controlled patients to become significantly hyperglycemic while fasting.
 - c. It is reasonable to administer a correction dose of insulin only if blood glucose rises above the target range of 5-10 mmol/L. The **correction** scale can be determined by first calculating the total daily dose (TDD) using the BBIT order set. The TDD is calculated by using 0.3 mg/kg/day X the patient's weight. Select the correction scale recommended for the patient's TDD. The correction insulin is administered at typical mealtimes.
 - d. If the corrective insulin is required repeatedly within a 24 hour period for blood glucose above the recommended targets of 5-10 mmol/L, adding basal insulin is recommended based on the TDD and recommended calculations in the order set.
 - i. Guidelines and clinical trials show these patients will benefit from the addition of a low dose of basal insulin, even when fasting, to prevent high blood glucose during this physiologically stressful time, rather than relying solely on corrective insulin, which only reacts to a high blood glucose that has already occurred.
 - e. Insulin will be discontinued when the patient is able to resume their usual home diabetes medication(s).
4. For the patients with type 2 diabetes, who are on 3 or more diabetes medications, with good control (i.e. HbA1C 8% or less), or who are on any combination of diabetes medications and have poor control (i.e. HbA1C over 8%):

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- a. These patients will have their oral/injectable agents held, typically the morning of surgery.
 - b. These patients are likely to benefit from **basal** insulin + correction in the perioperative period when NPO.
 - i. These patients experience hyperglycemia due to the stress response of surgery. To prevent poor outcomes associated with hyperglycemia (i.e. poor wound healing, infection, dehydration, increased morbidity, mortality, increased length of stay), guidelines and clinical trials support using a pro-active approach whereby a basal dose of insulin is given to the patient to match the liver's endogenous glucose production, and a correction dose is given if blood glucose is above target.
 - c. The total daily dose (TDD) is calculated by multiplying 0.5 units/kg/day (may vary by patient specific characteristics) X the patient's weight. The order set helps to determine the dose of basal and bolus insulin based on this TDD of insulin.
 - d. Insulin doses are titrated to meet the 5-10 mmol/L in hospital glucose target.
 - e. When the patient begins receiving nutritional intake (PO, PN, Enteral), a bolus dose is added to cover this carbohydrate intake. If there are no contraindications, they may be able to resume their home medications and BBIT can be stopped. ***For patients with poor control on their home medications, doses may need to be increased and/or insulin may need to be continued.**
5. For patients with type 2 diabetes on insulin at home:
- a. These patients will typically require **basal** insulin + correction in the perioperative period when NPO. You may use their home TDD (if on basal+bolus at home), or 0.5 units/kg/day to determine BBIT dosing in hospital.
 - b. When eating, they should be on a full BBIT protocol, with bolus insulin to cover their meals.

SUMMARY:

	Fasting	Eating	Discharge
Type 1 diabetes	Basal + Correction TDD= sum of all usual home insulin doses in a 24 hour period	Basal+Bolus+Correction	Home meds/doses (unless otherwise specified)
Type 2 diabetes, good control, on 1-2 home meds (insulin naïve)	Correction only. If over target → add basal insulin TDD = 0.3 units/kg/day	Home meds	Home meds/doses (unless otherwise specified)
Type 2 diabetes, good control on 3+ home meds (insulin naïve)	Basal+ Correction TDD = 0.5 units/kg/day	Basal+Bolus+Correction OR Home meds	Home meds/doses (unless otherwise specified)
Type 2 diabetes, poor control	Basal+ Correction TDD = 0.5 units/kg/day	Basal+Bolus+Correction OR increased doses of Home meds	Increased doses of Home meds OR Home meds + insulin
Type 2 diabetes, on insulin	Basal + Correction TDD= 0.5 units/kg/day or home TDD	Basal+Bolus+Correction	Home meds/doses

- ❖ These are only guidelines and should not replace clinical judgement.
- ❖ When restarting home medications, ensure that there are no contraindications to the use of the specific drugs and consider risk of hypoglycemia, see [Diabetes Canada interactive medication tool](#) for support.