

Inpatient Glycemic Management: Overview

Diabetes, Obesity & Nutrition Strategic Clinical Network™

The Issue

- 1 in 5 adult patients admitted to hospital in Alberta has diabetes (type 1 or type 2).
- When compared to the general population, patients with diabetes have longer hospital stays.
- BG that is too high (called hyperglycemia) increases the risk of complications in hospital including post-operative infections, pneumonia, diabetic ketoacidosis (DKA) and delayed wound healing. Chronic hyperglycemia also puts the patient at risk for long-term complications.

System Data and Patient Feedback

- Diabetes Canada recommends a blood glucose (sugar) level of 5-10mmol/L for most patients with diabetes while in hospital. In 2014, point-of-care testing (POCT) data revealed that more than one-third of blood glucose (BG) tests in Alberta hospitals were above 10mmol/L.
- In the same year (2014), a province-wide patient survey was conducted by the Diabetes, Obesity and Nutrition SCN™ (DON SCN) in conjunction with Alberta Health Services (AHS) Survey and Evaluation Services. Results of this survey (n=672 participants) showed that patients with diabetes were less satisfied with their hospital stay than patients without diabetes.

[Patients with Diabetes Survey Results – Summary Report](#)

Did you know?



1 in 5 patients in hospital have diabetes

90% of these patients have Type 2 diabetes

10% of these patients have Type 1 diabetes

40% of all patients with diabetes admitted to hospital use insulin to manage their diabetes at home

Type 1 Diabetes (T1 DM)

- Most often autoimmune in nature; the pancreas produces very little to no insulin
- These patients always require basal insulin
- At risk for Diabetic Ketoacidosis (DKA)
- At significant risk for Hypoglycemia

Type 2 Diabetes (T2 DM)

- A combination of insulin resistance and insulin deficiency
- The pancreas produces some insulin but the cells in the body fail to respond to the insulin properly (insulin resistance)
- Most patients benefit from insulin supplementation in hospital



Diabetes, Obesity
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Actions Taken

- In response, the DON SCN conducted an environmental scan of other health care jurisdictions across Canada to learn how they manage diabetes in their hospitals, to collaborate, and to gain insights.
- Since 2015, the DON SCN has been leading a multifaceted provincial quality improvement initiative in collaboration with provincial pharmacy, provincial Nutrition and Food Services, Alberta Precision Laboratories and Zone operational areas.
- This work involves a multidisciplinary approach to diabetes management with various healthcare providers working together, and with patients and families as key team members.

Our Goal

Our goal is to improve and standardize how patients with diabetes are cared for in Alberta hospitals.

Improving blood glucose control in hospital has been associated with better outcomes **shorter length of stay in hospital** and **decreased rates of readmission**.

Priority Initiatives

To achieve this objective, the DON SCN has identified 10 quality improvement projects that intersect as part of an overarching effort to improve inpatient glycemic management for patients with diabetes in Alberta hospitals.

[Priority Initiatives At-a-Glance](#)
[Project Descriptions and Achievements to Date](#)

Resources

Information about these priority initiatives – including project descriptions and linked resources – are provided on the [DON SCN web site](#).

Many of these resources have been shared with other provinces and health jurisdictions. They include:

- clinical guidelines, pathways and safe practice notices
- glycemic management policies (adult and pediatric)
- implementation toolkits and resources
- learning resources and FAQs for healthcare providers (webinars and videos)

Blood Glucose Targets



- National Guidelines recommend blood glucose targets of 5-10 mmol/L for most patients with diabetes in hospital.
- Blood glucose targets of 5-12 mmol/L are recommended for the frail elderly, including those with dementia, those with limited life expectancy, and those at risk for severe hypoglycemia (e.g., hypoglycemia unawareness).
- For more information, see the Diabetes Canada [Clinical Practice Guidelines for In-Hospital Management of Diabetes](#).

- order sets and clinical knowledge topics for use in Epic® clinical information systems
- [publications](#)

For information about these resources, contact the DON SCN at don.scn@ahs.ca



Project Descriptions and Achievements to Date

1. Provincial Glycemic Management Policies (Adult and Pediatric)

The Glycemic Management Policy suites includes an overarching glycemic management policy with procedures and algorithms for the treatment of hyperglycemia and hypoglycemia for adult and pediatric patients.

The adult policy suite became effective September 2017. Minor revisions, including direction on the use of home glucose monitoring devices, were completed in July 2021. The pediatric policy suite, which mirrors the adult documents, came into effect in September 2021.

These policy suites outline expectations and recommended strategies for glycemic management of 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 settings.

The hyperglycemia and hypoglycemia procedures primarily focus on early recognition and treatment. The DON SCN collaborated with Alberta Precision Laboratories point-of-care testing (POCT) to have alerts on all blood glucose meters in Alberta hospitals changed to align with the procedures.

There are now alerts when an adult patient's blood glucose is less than 4.0 or greater than 18.0 mmol/L, instead of alerts only activating at critically low or high laboratory values of 2.5 and 25.1 mmol/L, respectively.

[See full policy suite \(adult and pediatric\)](#)

2. Continuous Glucose Monitoring Devices (CGMD) Resources

Individuals living with diabetes have access to many options to monitor their glucose (sugar) levels at home. CGMD are a growing technology, and many patients are using them to monitor and manage their glucose levels at home.

Although not approved for hospital use in Alberta, hospitals facilities are seeing more community-based glucose monitoring devices that patients bring to hospital with them. To support patients in the continued self-management of their diabetes when they are in hospital, while balancing the safety concerns with using home devices in hospital, a number of resources have been developed for healthcare providers and patients. These include:

- [AHS Safer Practice Notice](#)
- Health Care Professional FAQ (available on the AHS internal site, search Insulin Safety or Diabetes Management)
- Patient resources, such as [Checking your blood glucose \(sugar\) level while you're in the hospital](#) (MyHealth.Alberta.ca)

3. Basal Bolus Insulin Therapy (BBIT)

One of the initial priorities was to implement basal bolus insulin therapy (BBIT), a method of ordering subcutaneous insulin injections that mimics the normal physiologic secretion of insulin, aiming to safely achieve target blood glucose (BG) levels.

Diabetes Canada has recommended BBIT as the preferred method for ordering subcutaneous insulin in hospital for more than 16 years. The approach is proactive and tailored to patients' individual needs.

Over the past four years, the DON SCN has supported multidisciplinary teams in hospitals across Alberta to implement BBIT. The implementation strategy was based on learnings from an attempted implementation in Calgary in 2012 and insights from other hospitals/jurisdictions across Canada.

The strategy included site-based champions including nurses, prescribers (including nurse practitioners) and pharmacists that provided peer-to-peer education and addressed concerns that arose. They were supported by their local administrative champions. As well, teams were encouraged to assess individual site, unit or program barriers and facilitators to the practice change and address each barrier.

The strategy also involved data pre- and post-implementation that was shared back with the whole team. Most hospitals in Alberta have now implemented BBIT and retired sliding scale insulin (SSI) ordering practices.

For more information, see the [BBIT website](#), which includes learning resources, order sets, clinical guidelines and implementation tools on www.kttoolkit.ca.

4. Guidelines for the Safe Management of Insulin Pump Therapy (IPT) in Hospitals

Many patients with type 1 diabetes use IPT to manage their diabetes. Insulin pumps use only rapid acting insulin, so if they are disconnected or turned off, patients require insulin within two hours to prevent hyperglycemia and/or Diabetic Ketoacidosis (DKA).

These [guidelines](#) largely focus on supporting patients to continue to use their IPT device in hospital when safe and appropriate, as well as ensuring patient safety if the pump is stopped for any reason.

A website (www.ipumpit.ca) was later developed to support patients and clinicians in the safe management of IPT in hospital.

5. Perioperative Management for Patients with Diabetes Mellitus

Supported by Clinical Knowledge and Content Management (CKCM), the DON SCN and the Surgery SCN led the development of guidelines for the management of patients with diabetes that are having surgery.

These guidelines will be implemented with the support of a PRIHS 6 grant focused on the implementation of [Perioperative Glycemic Management Pathway](#).

6. Other Priority Initiatives

- i. **Standardized Nursing Education** - The DON SCN supported Clinical Nurse Educators from across the province in co-developing standardizing nursing education for diabetes management in hospital. This included topics such as the coordination of glucose monitoring with meal delivery and medication administration.

An interactive Diabetes Learning Module is available on the AHS staff learning platform. For information, contact don.scn@ahs.ca.

- ii. **Provincial Pharmacy Insulin Formulary** - The Institute for Safe Medication Practices (ISMP) Canada notes that insulin is consistently one of the top 3 causes of medication errors in hospitals. This initiative focuses on reducing these errors through provincial medication safety practice changes.

More information is available for staff on the AHS internal site (search Diabetes or Insulin) or by contacting don.scn@ahs.ca.

To address these concerns provincial medication safety implemented:

- A simplified insulin formulary
 - Patient-specific delivery of insulin (One Pen, One Patient)
- iii. **Nutrition and Food Services Diabetes Menu** - the DON SCN collaborated with Nutrition and Food services to improve the diabetes menus and provide carbohydrate content of the meal tray menu items for patients with diabetes. This work involved:
 - Diabetes meal tray menu revised
 - Patient handouts for carbohydrate content of diabetes meal trays
 - Meal tray tickets include carbohydrate content for menu items
 - iv. **Clinical Knowledge Topic Development** - Supported by Clinical Knowledge and Content Management (CKCM), the DON SCN has prioritized several Clinical Knowledge Topics related to diabetes management. Clinical Knowledge Topics are best

practice/evidence-informed clinical guidance for defined diseases/conditions, specific patient populations or segments of a clinical pathway.

Currently, Clinical Knowledge Topics are available for:

Basal Bolus Insulin Therapy

- [Basal Bolus Insulin Therapy, Adult – Inpatient \(BBIT\)](#)
- [Basal Bolus Insulin Therapy \(BBIT\) Order Set](#)

Insulin Pump Therapy

- [Insulin Pump Therapy, Pediatric and Adult – Acute Care](#)

Diabetes Ketoacidosis (DKA)

- [DKA, Adult – Emergency Department \(DKA, Diabetes, Hyperglycemia, HHS\)](#)
- [DKA, Adult – Inpatient](#)
- [DKA, Pediatric - Emergency & Inpatient](#)

Diabetes in Pregnancy (In-Hospital Order Sets)

- [Diabetes in Pregnancy Type 1](#)
- [Diabetes in Pregnancy Type 2 and Gestational Diabetes Mellitus \(GDM\)](#)

Perioperative Management of Patients with Diabetes Mellitus

- [Perioperative Management of Patients with Diabetes Mellitus, Adult - Acute Care \(ahsnet.ca\)](#)

7. Future Priorities

- **Patient Transitions in Care (from and back to community care)** – This work aligns with the [Home to Hospital to Home \(H2H2H\) initiative](#), led by the Primary Health Care Integration Network, to support the safe transition of patients with diabetes.
- **Patient Education to Support Self-Management** – This work focuses on supporting patients to self-manage their diabetes in hospital, where appropriate.