THE DIABETES
Communicator
Summer 2021

EDITORIAL

Caring for Hospitalized Patients with Diabetes

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This issue of *The Diabetes Communicator* focuses on the care we provide our patients when hospitalization is necessary. Hospitalization presents extra challenges for the individual living with diabetes, including those newly diagnosed. The achievement of glycemic control may be a challenge due to a myriad of medical and structural factors. The COVID-19 pandemic has added another layer of complexity to care delivery, and in-hospital management is no exception. Preventing transmission of disease is top of mind as we explore new ways to improve and deliver patient care. This issue will delve into several key areas relevant to patients with diabetes and the evidence to support our changing care landscape.

The technology of continuous blood glucose monitoring has the potential to transform our care as Paul Atkins and David Thompson highlight its advantages over point-of-care blood glucose testing. Zafreen Nazarali discusses the subsequent change driven by the COVID-19 pandemic towards virtual care and how it can be optimally delivered to individuals living with diabetes.

In the article on the management of COVID-19, Joseph Leung reviews the risks and pathophysiological considerations, and offers recommendations on the use of hypoglycemic agents when hospitalized with COVID-19.

Jessica Key, an Indigenous Patient Care Clinician, emphasizes that our responsibility as clinicians is to ensure our Indigenous clients experience health equity and culturally safe health care when engaging with us for their diabetes management. She describes how our respectful and sensitive engagement, particularly in our current sociopolitical environment, is critical.

Julie McKeen, Glenda Moore, Leta Philp, Rhonda Roedler and Karmon Helmle share the In-hospital Glycemic Management

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In This Issue

A Diabetes Canada Professional Section Publication

FROM THE CHAIR'S DESK

Self-Care is Health Care

Alice Y.Y. Cheng, MD, FRCPC
Chair, Professional Section National Executive

I remember in the spring of 2020, I said to patients at the end of a phone visit, "See you in person at the next visit." Boy, was I wrong! Sixteen months later, the pandemic continues, although the light at the end of the tunnel grows closer as vaccination rates increase. Looking ahead, though, it is important to remember that even when the pandemic comes under control and we reach the goal of "COVID Zero," the effects on all of us will last much longer. As health-care professionals, you have stepped up to the plate and performed your duties, despite the many other demands on your time and energy. You have continued to provide care for those living with diabetes, and some of you have had to go beyond your comfort zone in redeployments. You have done this with the single-minded focus of performing your duties because you were needed. The prolonged nature of this pandemic has not allowed time to process and decompress, so instead you compartmentalize and carry on. But we all have limits. Limits that ebb and flow and change from week to week—but they still exist. It is okay to recognize those limits and not push yourself beyond them. Although we are often quick to sincerely tell a colleague that it is okay to take a break or decline a new project, we often do not show the same compassion to ourselves. Ironically, the very motivation and drive that allow us to excel are also the cause for the guilt and shame when we do slow down. It is time to reframe this thinking. Let's stop glorifying the perceived "limitless" individual who always says yes and does everything perfectly. Let's normalize open conversations about limits and bandwidth, and recognize that these change over time. Check in on your colleagues. Check in on yourself. This is important now and will continue to be important even after the pandemic is "over," as the residual toll will be long lasting. We all need to do this to sustain the passion to continue the work to improve the lives of people living with diabetes—whether as a health-care professional with direct patient care, a diabetes researcher and/or a professional volunteer participating in Diabetes Canada activities. There are many projects and activities that are ongoing and planned for the Professional Section around knowledge exchange (podcasts, webinars), knowledge leadership (chapter updates, position statements) and health-care professional engagement (chapter/special interest group support). All of these will require the invaluable efforts of professional volunteers and the Diabetes Canada staff, but this can only happen if we are healthy and happy enough to do it. So remember that self-care is health care.

The Diabetes Communicator is published quarterly by Diabetes Canada.

The purpose of the publication is to inform members of the activities of the Professional Section, and publish relevant information and practice-based diabetes education.

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Respectful Relationships: Engaging in a Good Way With Indigenous Clients

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Indigenous people throughout the lands that are now called Canada are disproportionately affected by the burden of disease with chronic health conditions, including diabetes (1). Indigenous people are also likely to experience health disparities and have negative experiences when engaging with health care (2). At first glance, there appears to be a correlation between Indigeneity and being at risk of developing diabetes. However, high rates of diabetes and various health concerns are not simply a result of race, culture or individual choices. There are many reasons why Indigenous people face high rates of diabetes, ranging from limited access to affordable fresh and nutritious foods in remote communities to the physiologic effects of chronic toxic stress arising from intergenerational trauma and systemic injustices on stress hormone responses. The underlying forces of systemic racism and colonization have profound and far-reaching health impacts on all Indigenous people and inform the relationships that health-care workers enter when working with Indigenous clients (3,4). Having a greater understanding of the systemic forces that shape and cause health inequities can help to inform the health care services provided to Indigenous people (2). Making a commitment to active learning, humility and anti-racism can ultimately guide the work towards culturally safe health care and improved health equity for Indigenous people.

The country of Canada is built on the territories of Indigenous peoples. The term Indigenous describes First Nations, Métis, and Inuit people and nations. There are hundreds of distinct languages, cultures, governance systems and societies that have been rich and whole since time immemorial (5). Indigenous nationhood and lives have been severely disrupted through the process of colonization, initiated by the arrival of European settlers and upheld through government policy, capitalist industry and racism. While there is no single Indigenous culture, worldview or experience, there is a shared experience of colonization that has shaped many aspects of the lives of Indigenous people. Intentional discrimination and oppression (e.g. the Indian Act and Residential School System in Canada [6]) and unintentional discrimination and oppression (e.g. unconscious bias and racism) both contribute to health inequities (2). Consider that when an individual or population experiences racial discrimination, it is manifested in realities, such as denial of goods and services, physical harm and psychological stress and trauma. These experiences can then contribute to disruptions in the social determinants of health, such as poor access to primary health-care services, racism and interpersonal violence, or the ongoing impacts of trauma, such as mental health struggles or maladaptive coping strategies.

In Canada, there is a long history of and recently increasing evidence of reports of anti-Indigenous racism in health care. The In Plain Sight report, conducted in British Columbia in 2020, revealed widespread anti-Indigenous racism in all areas of health care, with profound impacts on the health experiences and outcomes of Indigenous people (2). The report also revealed that Indigenous people have less access to primary and preventive care, while also being less likely to be able to receive safe and effective care when they do have access. Thus, Indigenous people, especially those with chronic conditions, may present to hospital only once they have become seriously ill and require more complex care and interventions. The true colonial foundation of Canada is the responsibility of all people who call Canada home.

Indigenous cultural safety is an outcome in health care that arises from intentionally acknowledging and addressing the power imbalances inherent to the health-care system that have major impacts on the health and lives of Indigenous people (7). This outcome is a work in progress and is determined by the Indigenous people receiving care and not by health-care providers or systems. The work towards cultural safety is the responsibility of all health-care providers, leaders and organizations, and it requires ongoing learning, vulnerability, honesty and humility. Cultural humility is a practice of respect that requires self-reflection and challenging unconscious personal and systemic biases (7). Having humility means making space for Indigenous ways of being and knowing, and acknowledging that one is a learner when it comes to someone else's lived experience. Humility also means consistently challenging and evaluating one's knowledge, assumptions and practices. Every person carries unconscious biases that are informed by the world and the society in which they live. Sometimes, these biases are based on harmful stereotypes, and not acknowledging that these are informing one's actions can lead to unintentional propagation of these stereotypes. Unlearning unconscious biases is a process.

There is no single Indigenous way of knowing or approach to health. There is no prescription to working with Indigenous people. Each Indigenous person is an individual with their own unique and nuanced life and experience. However, there are values and approaches that can help Indigenous and non-Indigenous people work together in a good way. Values of respect, relationship and reciprocity can guide the practice of health-care providers (8). Respect the individual and their lived experience. Respect that they carry strength, knowledge and expertise. Consider whether language used or questions asked are respectful of someone's life and background; consider

what assumptions are behind the questions asked, or not asked. Build relationships and honour the responsibilities that relationships to one another carry. Responsibilities include learning about colonialism and taking individual actions towards anti-racism in life and in practice. One responsibility of non-Indigenous people is to learn and understand whose traditional territory you live and work in (9). Being in a relationship can also look like meeting someone where they are at in their journey in a genuine and caring way, whether that aligns with a health-care provider's priorities or not. The value of reciprocity includes honouring the gifts and generosity of others. Consider what the people you are working with are offering, whether that is sharing their knowledge, story or trust. In positions of power as health-care professionals, it is important to recognize that everyone brings something to a relationship. When it comes to supporting an Indigenous person at risk of developing diabetes or who is currently living with diabetes, respect for a person and who they are, where they are coming from, and the colonial context in which they live is essential. Entering into a relationship where the provider holds that respect and is open to learning about the person as an individual, what is meaningful to them, what resources they have access to and how they define living a good life can contribute to a meaningful and safe health-care relationship. Honouring that person and the gifts, perspectives and strength that they bring into that relationship is incredibly powerful.

At the heart of cultural humility and the values of respect, relationship and reciprocity is a genuine pursuit to see and work with someone. Cultural safety and anti-racism are commitments to actively recognizing and undoing the implicit biases, harms and inequities in the systems that we live and work in. Indigenous people have been subjected to centuries of oppression and genocide, and continue to deal with barriers and harm perpetrated by even well-meaning people in society. Each non-Indigenous person has the power and responsibility to seek out education and information about anti-colonialism and anti-racism action, to challenge the structures and systems that they have access to, and to enter into a relationship with Indigenous people with genuine humility and respect.

References

1. Diabetes Canada Clinical Practice Guidelines Expert Committee; Crowshoe L, Dannenbaum D, Green M, Henderson R, Hayward MN, Toth E. Type 2 Diabetes and Indigenous Peoples. *Can J Diabetes*. 2018;42(Suppl 1):S296-306.
2. Turpel-Lafond ME. In Plain Sight: Addressing Indigenous-specific Racism and Discrimination in B.C. *Health Care*. November 2020.
3. Dupuis-Rossi R. The Violence of Colonization and the Importance of Decolonizing Therapeutic Relationship: The Role of Helper in Centring Indigenous Wisdom. *Int J Indig Health*. 2021;16:108-117.
4. Browne AJ, Smye VL, Varcoe C. The Relevance of Postcolonial Theoretical Perspectievs to Research in Aboriginal Health. *Can J Nurs Res*. 2005;37:16-37.
5. Government of Canada. Crown-Indigenous Relations and Northern Affairs Canada. Indigenous peoples and communities. Available at: https://www.rcaanc-cirnac.gc.ca/eng/1100100013785/ 1529102490303. Accessed June 18, 2021.
6. Truth and Reconciliation Commission of Canada. Honouring the Truth, Reconciling for the Future: Summary of the Final Report of the Truth and Reconciliation Commission of Canada. 2015. Available at: https://publications.gc.ca/collections/collection_2015/trc/IR4-7-2015-eng.pdf. Accessed June 18, 2021.
7. First Nations Health Authority. #itstartswithme: FNHA's Policy Statement on Cultural Safety and Humility. Available at: https://www.fnha.ca/Documents/FNHA-Policy-Statement-Cultural-Safety-and-Humility.pdf. Accessed Apr. 7, 2021.
8. Kimmerer RW. Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants. Minneapolis: Milkweed Editions, 2013.
9. Native Land. Available at: https://native-land.ca/. Accessed Apr. 7, 2021.

Call for Manuscripts

The *Canadian Journal of Diabetes* (CJD) is planning a special issue on "Social Determinants of Health and Diabetes," with a focus on inequalities.

The recent COVID-19 pandemic has provided a stark reminder that health threats are not experienced in the same way across or within communities, in Canada, as well as globally. Indigenous, racialized, LGBTQ2S+ and low-income communities bear a disproportionate burden of diabetes due to the complex interaction of multiple social determinants of health, many of which are rooted in colonial processes and structures that altered our socioeconomic, political and cultural systems.

The manuscripts we seek may go beyond describing the relationships between diabetes and diabetes outcomes, with the existence of disparities to include broader conceptual and implementation insights and challenges to changing diabetes care and policy. We encourage papers that use critical race theory and intersectionality as a conceptual, methodological, analytical and praxis-oriented framework to examine the ways multiple, heightened forms of inequality create obstacles to diabetes care, while also challenging existing social systems to advance the cause of social justice in diabetes outcomes.

If you are interested in submitting a manuscript, please contact Jill Toffoli at Jill.Toffoli@diabetes.ca with your topic by August 31, 2021. Due date for manuscript submissions is November 15, 2021.

ASK THE EXPERT

Diabetes and Enteral Feeding

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Diabetes Management in Nutrition Support

In-hospital diabetes management of patients receiving nutrition support presents a special set of considerations. Given the 10% prevalence of diabetes in the Canadian population, the proportion of patients in hospital with diabetes can be significant (1). Patients with diabetes in an acute care setting who require nutrition support should have increased attention given to their antihyperglycemic agent and insulin needs due to a predisposition to further complications and a doubled all-cause mortality (1).

Nutrition support in the form of enteral or parenteral nutrition can be used for a variety of reasons to optimize nutritional status. Most commonly, in hospital, reasons for enteral nutrition include mechanical ventilation, stroke and dysphagia. Parenteral nutrition may be used in instances of inability to use or access the gastrointestinal tract. In some circumstances, nutrition support will be used supplemental to oral intake to improve patient nutrition status. Intensive insulin therapy to manage hyperglycemia in critically ill patients can help to reduce mortality, as well as reduce secondary complications, such as urinary tract infections, delayed wound healing or bloodstream infections (2,3). Optimization of glycemic control in acute care settings is linked to improved outcomes (4,5).

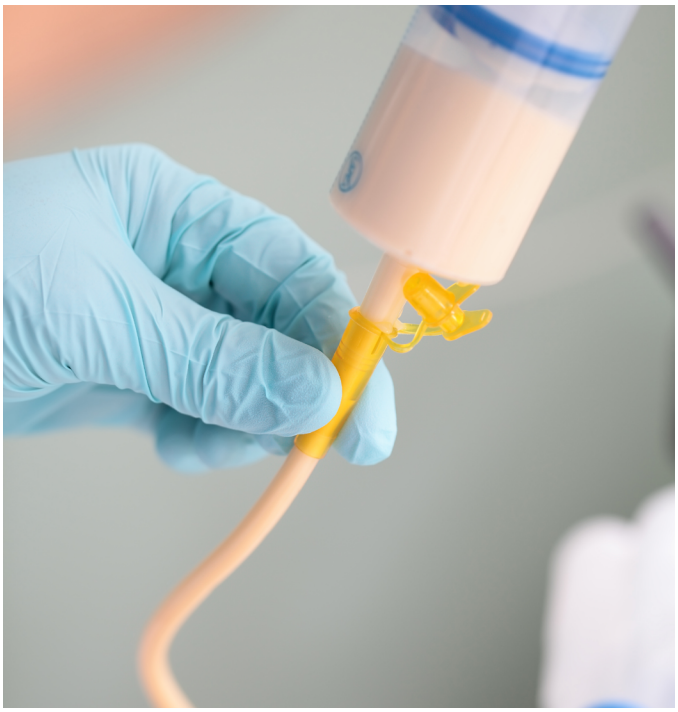
Enteral Formulas

There are various diabetes-specific enteral feeding formulas with lower carbohydrate and higher protein and fat content. A specific diabetic formula may not be required for optimization of glycemic control but can be helpful in those with elevated insulin requirements or intractable hyperglycemia. Diabetes-specific formulas are found to result in a lower peak blood glucose concentration and a lower postprandial rise in glucose (2).

When enteral nutrition is provided continuously over 24 hours, intravenous insulin infusion is the method of choice; however, this may not be the best method of practice. Basal insulin given every 24 hours, or every 12 hours at 30%-40% of the total daily dose (TDD), with regular insulin given every 4-6 hours, can achieve optimal glycemic control as outlined in the Diabetes Canada 2018 clinical practice guidelines (6).

Parenteral Nutrition Support

Parenteral nutrition support (peripheral parenteral nutrition [PPN] and total parenteral nutrition [TPN]) have a significant impact on blood glucose of any patient, particularly those with diabetes. Infusion of solutions containing dextrose results in quick delivery of carbohydrate to the bloodstream. While some centres are able to infuse insulin simultaneously, or even mixed with TPN, others manage blood glucose in a more traditional basal/bolus method. It is recommended that dosing of insulin be based on the patient's current TDD, with consideration of the composition of the parenteral solution and the patient's weight (7). Blood glucose monitoring should be continued QID or every 4-6 hours with insulin adjustments based on blood glucose patterns (3).



Total nutrient admixture (TNA or 3-in-1 TPN) offers the combination of dextrose, amino acids and lipids in a single solution; anecdotally, this generally aides with glycemic control given that the infusion of fat is more evenly mixed with the dextrose.

Timing of Feeds

Most acute care settings focus on continuous nutrition support (24 hours) while the patient is requiring inpatient hospitalization. As the patient progresses toward discharge, other factors may contribute to a desire to change the timing of tube feeds. These factors may include time away from an infusion pump for rehabilitation, preference to lay completely flat at night (contraindicated in enteral feeding), tolerance of feed rate, financial planning of cost of tube feeding and supplies or a desire to mimic usual meal patterns. Tube feeds

are very flexible, with the most common schedules being nocturnal feeds (disconnecting from the pump during the day) or bolus feeds (also called syringe feeds), where the person administers the feed in a larger quantity throughout the day (i.e. at mealtimes). Infusion schedules of parenteral nutrition can also be altered to fit the individual's lifestyle.

Optimization of a basal insulin for nocturnal feeds with glucose monitoring throughout the day while nothing by mouth (NPO) is feasible for most individuals. Bolus feeding allows for a traditional basal/bolus administration of insulin with a basal insulin and rapid-acting insulin prior to tube feed bolus.

Avoidance of Hypoglycemia

With mindfulness to the comorbidities of the individual, it is important to plan for treatment of hypoglycemia, particularly if the individual is compromised in a way that limits their sensation of hypoglycemia or their ability to treat hypoglycemia. In patients who are exclusively tube fed and otherwise NPO, alternative methods of glucose administration should be considered (i.e. crushed glucose tabs, sugar mixed in water via nasogastric/gastrostomy tube), and glucagon should be available to the individual. Parenteral nutrition should be rate-reduced over 1-2 hours prior to stopping infusion to avoid hypoglycemia when infusion of dextrose is stopped.

Optimization of nutrition status outweighs risk of increased hyperglycemia given the variety of medications and insulin regimens available for management of diabetes. Diabetes follow up should continue regardless of route of nutrition administration. In summary, nutrition support does not preclude the need for diabetes management, and both should be optimized to best support patient outcomes and recovery.

References

1. Diabetes Canada. Diabetes in Canada. Available at: https://diabetes.ca/DiabetesCanadaWebsite/media/Advocacy-and-Policy/Backgrounder/2020_Backgrounder_Canada_English_FINAL.pdf. Accessed June 18, 2021.
2. Elia M, Ceriello A, Laube H, Sinclair AJ, Engfer M, Stratton RJ. Enteral nutritional support and use of diabetes-specific formulas for patients with diabetes: A systematic review and meta-analysis. *Diabetes Care*. 2005;28:2267-2279.
3. Clain J, Ramar K, Surani SR. Glucose control in critical care. *World J Diabetes*. 2015; 6:1082-1091.
4. NICE-SUGAR Study Investigators; Finfer S, Chittock DR, Su SY-S, et al. Intensive versus conventional glucose control in critically ill patients. *N Engl J Med*. 2009:360:1283-1297.
5. Mabrey ME, Barton AB, Corsino L, et al. Managing hyperglycemia and diabetes in patients receiving enteral feedings: A health system approach. *Hosp Pract (1995)*. 2015;43:74-78.
6. Malcolm J, Halperin I, Miller DB, et al. Diabetes Canada 2018 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada: In-Hospital Management of Diabetes. *Can J Diabetes*. 2018;42(Suppl 1):S115-S123.
7. Gosmanov AR, Umpierrez GE. Management of hyperglycemia during enteral and parenteral nutrition therapy. *Curr Diab Rep*. 2013;13:155-162.

Improving Diabetes Care in Alberta Hospitals: Diabetes Experts Supporting Non-Diabetes Experts in Implementing Basal Bolus Insulin Therapy

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The Diabetes, Obesity, and Nutrition Strategic Clinical Network (DON SCN), one of 16 strategic clinical networks in Alberta, has made optimization of inpatient diabetes management a priority. The In-hospital Glycemic Management Initiative was driven by a patient survey highlighting areas for improvement in diabetes care and local data showing that hyperglycemia in hospital was common, with over a third of blood glucose results being above the recommended target range (1). Hyperglycemia in hospital is associated with poor outcomes, including delayed wound healing, surgical site infections, hospital-acquired infections and increased length of stay (2). The use of basal bolus insulin therapy (BBIT) in individuals requiring subcutaneous insulin reduces hyperglycemia and improves outcomes (3,4). BBIT has long been the preferred

insulin regimen recommended in the Diabetes Canada 2018 clinical practice guidelines (5).

Translating best practice into reality at the bedside is challenging and complex, requiring an effective knowledge translation strategy to support implementation and sustain practice change. The implementation of BBIT was one of the initial priorities of the DON SCN In-hospital Glycemic Management Initiative (6). A small but motivated team of multidisciplinary diabetes experts, working under the leadership of the DON SCN (expert team), collaborated with implementation teams of knowledge users at acute care sites (implementation teams) to transform diabetes care in Alberta hospitals.

Several knowledge translation science elements were used during the implementation process to support uptake and sustainability of the practice change. Guidelines for successful implementation, together with a repository of tools and educational resources, are populated on the www.bbit.ca and www.kttoolkit.ca websites.

One of the most impactful tools was a Train-the-Trainer Day (TTD), presented by the expert team. TTD was typically hosted in person at each acute care site but was offered virtually for smaller sites where travel was a barrier.

Optimally, sites established their entire multidisciplinary implementation team and ensured that each member understood their role in the process prior to scheduling the TTD.

Local implementation team members, including doctors, nurses, pharmacists and any other relevant team members identified by the site, would become the champions for practice change; site administrative champions ensured dedicated time and resources for the TTD and provided leadership support for the greater initiative.

The TTD was a full-day event, divided into four sections.

Context

The first section was an overview of the larger, multifaceted In-hospital Glycemic Management Initiative, highlighting its integrated components, including a provincial glycemic management policy with protocols for both hyperglycemia and hypoglycemia management, a simplified provincial insulin formulary to support safe administration of insulin, provincial resources around the diabetic diet and guidelines for safe management of insulin pump therapy in hospital, perioperative management of diabetes, and management of diabetic ketoacidosis (see infographic).

Site leadership and/or engaged local champions co-introduced the initiative, with special attention to why the initiative was important within the local context, together with the assurance of support and sponsorship. Primary collaborators were introduced.

Site-specific baseline data, collected before the TTD, were presented so that the local implementation team could see firsthand the care gap at their site. Data gathered earlier in the initiative from other sites were shared as evidence that a knowledge translation–based BBIT implementation approach was worthwhile, effective and reproducible.

Imparting Expertise

One of the goals of the TTD was to transfer knowledge and expertise from the expert team to the implementation team around why and how to use BBIT and provide a brief overview of the literature and guidelines supporting its use. It was essential for the implementation team members to understand that BBIT was safe, effective and superior to outdated, unsafe and unproven insulin protocols, including sliding scale insulin alone. These site champions were then expected to serve as local content experts, providing peer-to-peer education (physician to physician, nurse to nurse, pharmacist to pharmacist) when possible.

Familiarization With the Tools

The BBIT order set was then introduced, together with its supporting educational resources (www.bbit.ca). Breakout sessions—one with prescribers (e.g. doctors, nurse practitioners and pharmacists) and another with nurses and administrators—allowed practical application of the order set through interactive case-based prescribing and interpretation/application scenarios, respectively.

Barriers and Facilitators

The final and arguably most critical section of the TTD was devoted to identifying local barriers and facilitators to this practice change, a key element for successful knowledge translation. Facilitated breakout sessions, organized by unit or specialty, sought to identify the site's anticipated local barriers and facilitators. Time was dedicated to exploring possible barriers as a larger group and reviewing barriers identified earlier in the initiative. Breakout groups were often surprised by the shared barriers identified. The expert team shared tools co-developed to address and overcome previously identified barriers; all tools were made available to sites to use/modify as needed.

New barriers were coded using validated frameworks and mapped to evidence-informed behaviour change strategies, and additional tools were co-developed and added to an openly available repository (www.kttoolkit.ca). Regular communication and ongoing assessment of new barriers was coordinated through the expert team nurse. Additionally, a community of practice (online monthly or quarterly meetings) was facilitated by the expert team bringing together implementation teams to support each other.

Feedback from the TTDs was consistently positive. In total, 299 evaluations were completed over 10 TTDs between 2015 and 2020. On a scale of 1 to 5, participants were satisfied with the TTD (4.5/5), felt the content was useful (4.4/5), felt that their knowledge of what was required to implement BBIT had increased (2.4/5 pre-TTD to 4.4/5 post-TTD) and had

confidence in their site's ability to implement BBIT (4.0/5). After each TTD, the content and structure of the day was modified based on participant feedback.

Hospitals throughout Alberta have been extremely successful in implementing BBIT and sustaining this practice change. Key to this initiative's success has been the application of knowledge translation strategies that emphasize a collaborative and supportive relationship between experts and knowledge users. Through various strategies, including the TTD, the DON SCN diabetes expert team was able to transfer knowledge and expertise and to share strategies, tools and educational resources with implementation teams, empowering these champions to become local experts and influencers. Through this collaboration, the initiative successfully imparted the ability to implement and maintain this evidence-based practice change.

References

1. O'Connell P, McKeen JA, Helmle KE, Moore G, Rogers E. A patient survey of diabetes patients in hospital: Implications for quality improvement strategies [abstract]. *Can J Diabetes*.2015;39:541.
2. Smiley D, Umpierrez GE. Management of hyperglycemia in hospitalized patients. *Ann N Y Acad Sci*. 2010;1212:1-11.
3. Umpierrez GE, Smiley D, Jacobs S, et al. Randomized study of basal-bolus insulin therapy in the inpatient management of patients with type 2 diabetes undergoing general surgery (RABBIT 2 surgery). *Diabetes Care*. 2011;34:256-61.
4. Umpierrez GE, Smiley D, Zisman A, et al. Randomized study of basal-bolus insulin therapy in the inpatient management of patients with type 2 diabetes (RABBIT 2 trial). *Diabetes Care*. 2007;30:2181-6.
5. Diabetes Canada Clinical Practice Guidelines Expert Committee. Diabetes Canada 2018 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada. Can J Diabetes. 2018;42(Suppl 1):S1-S325.
6. Helmle KE, Chacko S, Chan T, et al. Knowledge translation to optimize adult inpatient glycemic management with basal bolus insulin therapy and improve patient outcomes. *Can J Diabetes*. 2018;42:505-513.e1.

The Current State of Inpatient Continuous Glucose Monitoring

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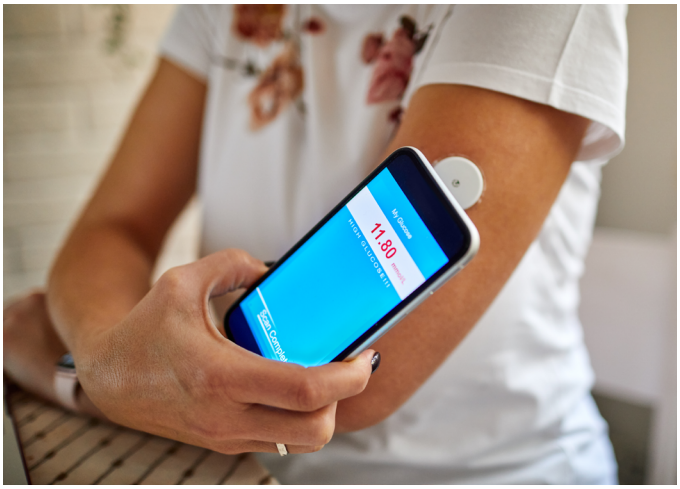
Bedside point-of-care capillary blood glucose (POC-BG) measurements are the current standard of care for inpatient glucose monitoring in Canada (1). This is commonly performed three to four times per day in hospitalized patients in order to guide diabetes treatment. However, when more frequent monitoring is deemed necessary, the increased burden placed on both patients and nursing staff represents a significant limitation of POC-BG testing. Indeed, with the onset of the global coronavirus disease 2019 (COVID-19) pandemic and the need to reduce nursing-patient encounters to preserve personal protective equipment (PPE) and prevent disease transmission, the limitations imposed by the intermittent nature of POC-BG testing could not have become more evident.

Continuous glucose monitoring (CGM) is an emerging technology that has seen rapid improvements in accuracy and commercial availability in recent years and has the potential to significantly improve and transform inpatient diabetes care in Canada. CGM systems use subcutaneously placed sensors that measure glucose in the interstitial space every 5 to 15 minutes and transmit this data to a remote receiver device. The receiver device displays glucose data and provides insight into glucose trends by displaying both the direction and the rate of change of glucose. Calibration



with capillary glucose is no longer required for the newest generation of CGM devices, representing a significant step forward in convenience and ease of use. In the outpatient setting, CGM has already demonstrated significant benefit when compared with intermittent capillary glucose testing. It has been shown to reduce glycated hemoglobin in outpatients with both type 1 and type 2 diabetes, while at the same time reducing hypoglycemia (1). CGM has also seen

high levels of acceptance in the outpatient setting among individuals with insulin-treated diabetes (2).

CGM thus has the potential to improve glycemic control and prevent hypoglycemia in the inpatient setting. With its ability to remotely monitor glucose, CGM also has the potential to reduce nursing and patient burden as well as the number of nursing-patient contacts and associated use of limited PPE. Currently, however, the literature around CGM use in the inpatient setting remains limited. Numerous small studies have shown that inpatient CGM is accurate and feasible and reduces the need for frequent POC-BG testing, and several studies have suggested an improvement in hypoglycemia but not in glycemic control (3). Large, well-powered randomized trials are still needed to determine whether CGM can improve inpatient glycemic control and other meaningful clinical outcomes such as mortality and hospital length of stay.

In the critical care setting, numerous small randomized trials examining CGM versus POC-BG testing have been performed. While they have confirmed acceptable accuracy and feasibility of CGM in this setting, in general, these studies have been too underpowered to detect important differences in clinical outcomes (3). In the largest prospective randomized trial to date, involving 124 critically ill participants, a significant reduction in hypoglycemia, but no difference in overall glycemic control, was observed (4). A recent study of CGM use in 11 patients with COVID-19 infection and critical illness demonstrated an estimated 60% reduction in the frequency of POC-BG testing and an associated reduction in PPE use (5).

In noncritically ill inpatients, data have been primarily observational and have confirmed accuracy, as well as improved detection and prevention of hypoglycemia (3). A recent randomized trial comprising 72 participants examined the use of CGM with a glucose telemetry system (GTS), in which CGM data were transmitted to nursing personnel with alerts for hypoglycemia, and found a significant reduction in hypoglycemic events when compared with POC-BG monitoring (6). In nine noncritically ill COVID-19–infected patients, Reutrakul and colleagues reported acceptable CGM accuracy and feasibility, as well as a reduction in POC-BG frequency and PPE use (7).

Regulatory bodies have temporarily allowed the use of CGM in hospitalized patients during the pandemic, although they have issued caution. In March 2020, given the potential for remote glucose monitoring to reduce health-care worker exposure and preserve PPE during the COVID-19 pandemic, the U.S. Food and Drug Administration issued a statement of temporary nonobjection to use of CGM systems in the hospital setting (8). In April 2020, Health Canada subsequently approved both the Dexcom G6 CGM and the FreeStyle Libre Flash Glucose Monitoring System for temporary use related to COVID-19 in the inpatient setting but cautioned that treatment decisions should not be based on sensor readings alone (9). The manufacturers of these approved devices also currently recommend against using sensor data to make treatment decisions, given the lack of extensive safety or efficacy data in the hospital setting (2).

CGM is a rapidly evolving technology with great potential to revolutionize inpatient diabetes care, but the current body of literature remains limited and many questions around clinical benefit and appropriate implementation remain unanswered. Large randomized studies are still needed in order to achieve the statistical power sufficient to examine the impact of inpatient CGM on meaningful clinical outcomes. Protocols that link CGM data to insulin dose adjustments will need to be developed and tested, and CGM data will need to be integrated with electronic medical record programs. Finally, cost-benefit analyses will be needed to justify widespread implementation and drive change in health-care policy.

References

1. Malcolm J, Halperin I, Miller DB, et al. Diabetes Canada 2018 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada: In-Hospital Management of Diabetes. *Can J Diabetes*. 2018;42(Suppl 1):S115-S123.
2. Korytkowski M, Antinori-Lent K, Drincic A, et al. A pragmatic approach to inpatient diabetes management during the COVID-19 pandemic. *J Clin Endocrinol Metab*. 2020;105:dgaa342.
3. Davis GM, Galindo RJ, Migdal AL, Umpierrez GE. Diabetes technology in the inpatient setting for management of hyperglycemia. *Endocrinol Metab Clin North Am*. 2020;49:79-93.
4. Holzinger U, Warszawska J, Kitzberger R, et al. Real-time continuous glucose monitoring in critically ill patients: A prospective randomized trial. *Diabetes Care*. 2010;33:467-472.
5. Agarwal S, Mathew J, Davis GM, et al. Continuous glucose monitoring in the intensive care unit during the COVID-19 pandemic. *Diabetes Care*. 2021;44:847-849.
6. Singh LG, Satyarengga M, Marcano I, et al. Reducing inpatient hypoglycemia in the general wards using real-time continuous glucose monitoring: The glucose telemetry system, a randomized clinical trial. *Diabetes Care*. 2020;43:2736-2743.
7. Reutrakul S, Genco M, Salinas H, et al. Feasibility of inpatient continuous glucose monitoring during the COVID-19 pandemic: Early experience. *Diabetes Care*. 2020;43:e137-e138.
8. U.S. Food & Drug Administration. Enforcement policy for non-invasive remote monitoring devices used to support patient monitoring during the coronavirus disease 2019 (COVID-19) public health emergency (revised). Available at: https://www.fda.gov/media/137286/download. Accessed June 19, 2021.
9. Health Canada, Government of Canada. Authorized medical devices for uses related to COVID-19: List of medical devices for expanded use. Available at: https://www.canada.ca/en/health-canada/services/drugs-health-products/covid19-industry/medical-devices/authorized/expanded-use.html. Accessed Apr. 3, 2021.

Upload This and Download That: The Challenges of Virtual Care

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Whether we like it or not, the current COVID-19 pandemic has driven our health-care system to conform to one that is largely virtually based, be it through video appointments or phone calls. Needless to say, there are a variety of challenges that not only face the health-care practitioner that is attempting to provide the best care possible but also greatly impact patients as they try to navigate the great digital world.

The world of diabetes has greatly been reformed to include the use of technology to improve care, from Bluetooth glucose meters to glucose sensors to insulin pumps. All of these devices are intended to better diabetes care—but do they improve care? What happens when patients are not able to use these devices to enhance their virtual health-care visits? A host of issues may impede the use of technology. For example, older mobile phones may not have Bluetooth technology or the necessary system requirements to download an application; perhaps there is no access to the internet to upload results; or the patient is unable to navigate the system to download the appropriate application. Whichever scenario is relevant, the outcome is the same—a lack of the digital link between the patient and the health-care provider.

The absence of this link can then snowball into a less fruitful encounter between patient and provider that, undoubtedly, is frustrating for both parties. Furthermore, from the patient perspective, the digital disconnect may then lend itself to a lack of confidence in the patient's ability to advocate for themselves and their own health care. This leads to gaps in communication and potentially gaps in thorough assessments and adequate treatment. Therein lies a loss of connection between provider and patient. This connection is crucial to building a therapeutic relationship that fosters patient-centered care in a way that is meaningful to the patient.

There is no one, easy solution addressing the challenges of virtual care. The bottom line is that diabetes virtual care can be tremendously difficult to navigate for patients. As providers, we need to assess each patient individually with respect to their capacity of engagement with the digital world. If they are fully able and willing, then we work with that. If, on the other hand, challenges with engagement ensue, then we have to be adaptable to the situation while still providing the best care possible by whatever means we can. While striving for excellence in care, we must ensure that there is no loss of connection or rapport between provider and patient, despite the challenges of the virtual world.

New Resources for Health-Care Providers and Patients

Return-to-care letter template

Research shows Canadians' access to the health-care system has changed over the course of the pandemic and many patients have not sought care when they probably should have. For people living with diabetes, delayed or deferred care can contribute to a higher risk of short- and long-term complications which, in time, may lead to poorer outcomes.

Diabetes Canada has created a letter that you can send to your patients to help facilitate a reconnection and encourage a return to regular diabetes appointments. Routine check-ins will help decrease the likelihood of adverse health impacts to your patients. You can customize the template or send it as is. The letter is available in English, French, Simplified Chinese and Punjabi.

Diabetes visits

During the pandemic, many health-care providers have adopted a hybrid model of care, offering certain types of visits in-person at the clinic and others virtually, by phone, video chat or secure messaging. Virtual diabetes care may be a new and different experience for your patients. To help your patients prepare for their virtual diabetes visit, check out these resources:

Tips for a virtual diabetes visit

English | French | Simplified Chinese | Punjabi

Optimizing Inpatient Care and Outpatient Follow Up for Vascular Surgery Patients With Diabetes

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The patient population with peripheral vascular disease and its associated complications represents a high-risk group. An estimated 15% of patients with diabetes will develop a foot ulcer in their lifetime as a result of ischemic peripheral arterial disease or diabetic neuropathy (1). Where diabetic foot ulcers are present, the 5- to 10-year mortality rate approaches 50% for patients who were hospitalized and there is a two-fold higher risk of death compared with diabetes at baseline (2-4). Other cardiovascular events and wound-related events are cited as major causes of death in this population (2,5).

Additionally, there is increased utilization of the health-care system in the treatment of these conditions. Hospital-based treatment is a major driver of health-care expenditures and is estimated to account for 77% of the total cost of treating diabetic foot ulcers, which is more costly than other diabetes-related admissions (1,6). In British Columbia, this cost is disproportionately higher in patients aged 60 to 79 years. Factors for this include duration of diabetes, level of intervention, hospital length of stay (LOS) and high incidence of readmission or use of emergency department resources (7,8).

Lower extremity vascular complications of diabetes are generally associated with other advanced microvascular complications, such as nephropathy, and result in high rates of morbidity (2,9). The optimization of diabetes management and a multidisciplinary treatment approach in the inpatient setting with follow up in the community affords the opportunity to address continuity of care with respect to glycemic parameters and cardiovascular risk factor modification, along with minimizing perioperative complications, such as secondary infection and wound healing (10).

Our endocrinology group previously implemented an automatic inpatient referral system for all patients on the cardiovascular surgery ward for management of all cases of diabetes and hyperglycemia. Preliminary data suggested that hospital LOS was reduced to the same duration as patients without diabetes undergoing similar surgical interventions. Long-term outcomes, however, had not been formally assessed as part of this intervention.

Project Aim

The primary aim of the project is to reduce LOS of vascular surgery patients with diabetes or hyperglycemia by 20%; reduce perioperative complications related to diabetes; and improve time in range (TIR) for glycemic parameters by 30% in hospital.

The secondary aim is to ensure continuity of care for diabetes management in the outpatient setting.

Description of Intervention/Methods

This is a quality improvement initiative in an inpatient setting at Vancouver General Hospital located in Vancouver, British Columbia, Canada.

The target population is patients with hyperglycemia admitted under the Vascular Surgery service for typical interventions, including amputation, percutaneous transluminal angioplasty, open bypass and wound debridement.

Automatic referral to the endocrinology service can be initiated through team clinicians, including nursing staff and physicians. Patients will be identified as having diabetes or newly identified hyperglycemia using the following criteria: prior documentation of type 1 or type 2 diabetes, glycated hemoglobin (A1C) ≥6.5%, random glucose ≥11.1 mmol/L or evidence of a diabetes medication on their outpatient medication profile.

Patients will be followed by the inpatient Endocrinology service and provided standard care through nutritional and

medication interventions at the discretion of the overseeing clinician. Optimal inpatient glycemic targets or TIR are defined as blood glucose values between 5.0 and 8.0 mmol/L per Diabetes Canada's 2018 clinical practice guidelines (11). LOS data and National Surgical Quality Improvement Program (NSQIP) data to assess perioperative complications will be obtained through respective hospital databases based on International Classification of Diseases ninth and tenth revision (ICD-9 and ICD-10, respectively) codes.

At time of discharge, patients will be referred to the outpatient Diabetes Education Centre for ongoing care through a multidisciplinary team. First follow up is targeted for 1-3 months after hospital discharge, with ongoing follow up for a minimum of one year. Additional outcomes related to quality of life (EuroQol-5D-5L Health Survey), diabetes medications, A1C and NSQIP data will be analyzed as part of the follow-up care plan.

Preliminary Data

In the 12-month period preceding the project start, there were 651 admissions to the Vascular Surgery service, of which 181 (27.8%) were documented to have diabetes; however, patients with diabetes represented 35.4% of patient days in hospital. Average LOS was 4.12 days longer for patients with diabetes (11.63 versus 15.75 days).

Canadian Institute for Health Information (CIHI) data suggest that the majority of patients admitted to hospital for vascular intervention (amputation, peripheral vascular disease, foot infection, lower limb ulcer) are between ages 60 and 79 years. With cost of stay for all patients undergoing vascular intervention averaging $9,150 (range $6,027 to $11,632) in British Columbia, the cost of additional days in hospital related to a diabetes diagnosis is estimated to be $3,241. Average direct cost to treat a diabetic foot ulcer for both medical and surgical interventions is approximately $9,141, illustrating the significant cost burden of this complication.

Baseline data between January and March 2020 documented 21 patients admitted who would meet the criteria for referral. Of these, only one patient was referred for subspecialty diabetes care.

TIR for glucose levels for individual patients varied between 6.5% and 92.1%. Pooled glucose data showed that 8.7% of readings were below 5.0 mmol/L and 51.0% were above 8.0 mmol/L.

Currently, the project has been suspended due to a SARS-CoV-2 outbreak of the target ward but will resume pending lifting of outbreak precautions and will enter the active phase of automatic referral and endocrinology intervention.

Discussion

Patients with diabetes who are undergoing vascular surgery represent a high-risk population with increased risk of mortality and high cost to the health-care system related to level of intervention and increased hospital LOS. Among hospitalized patients, both hypoglycemia and hyperglycemia are associated with increased mortality (12). Early intervention with targeted glycemic management in hospital can improve patient outcomes and reduce LOS (8). Ongoing study is needed to determine best practices in managing this patient population.

References

1. Stockl K, Vanderplas A, Tafesse E, Chang E. Costs of lower-extremity ulcers among patients with diabetes. *Diabetes Care*. 2004;27:2129-2134.
2. Ghanassia E, Villon L, Dieudonné JFTD, Boegner C, Avignon A, Sultan A. Long-term outcome and disability of diabetic patients hospitalized for diabetic foot ulcers: A 6.5-year follow-up study. *Diabetes Care*. 2008;31:1288-1292.
3. Walsh JW, Hoffstad OJ, Sullivan MO, Margolis DJ. Association of diabetic foot ulcer and death in a population-based cohort from the United Kingdom. *Diabet Med*. 2016;33:1493-1498.
4. Saluja S, Anderson SG, Hambleton I, et al. Foot ulceration and its association with mortality in diabetes mellitus: A meta-analysis. *Diabet Med*. 2020;37:211-218.
5. Brownrigg JRW, Griffin M, Hughes CO, et al. Influence of foot ulceration on cause-specific mortality in patients with diabetes mellitus. *J Vasc Surg*. 2014;60:982-986.e3.
6. Syed MH, Salata K, Hussain MA, et al. The economic burden of inpatient diabetic foot ulcers in Toronto, Canada. *Vascular*. 2020;28:520-529.
7. Malone M, Lau NS, White J, et al. The effect of diabetes mellitus on costs and length of stay in patients with peripheral arterial disease undergoing vascular surgery. *Eur J Vasc Endovasc Surg*. 2014;48:447-51.
8. Cakir M, Altunbas H, Karayalcin U. Hyperglycemia: An independent marker of in-hospital mortality in patients with undiagnosed diabetes. *J Clin Endocrinol Metab*. 2003;88:1402; author reply 1402.
9. Boulton AJ, Vileikyte L, Ragnarson-Tennvall G, Apelqvist J. The global burden of diabetic foot disease. *Lancet*. 2005;366:1719-1724.
10. Edmonds ME, Blundell MP, Morris ME, Thomas EM, Cotton LT, Watkins PJ. Improved survival of diabetic foot ulcer: The role of a specialized foot clinic. *Q J Med*. 1986;60:763-771.
11. Diabetes Canada Clinical Practice Guidelines Expert Committee. Diabetes Canada 2018 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada. *Can J Diabetes*. 2018;42(Suppl 1):S1-S325.
12. Umpierrez G, Korytkowski M. Diabetic emergencies – ketoacidosis, hyperglycaemic hyperosmolar state and hypoglycaemia. *Nat Rev Endocrinol*. 2016;12:222-232.

Management of COVID-19 in Patients Living With Diabetes

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Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a coronavirus that can cause COVID-19, a respiratory disease that can range in severity from a mild respiratory illness to severe pneumonia, multiorgan failure and death (1,2). COVID-19 and diabetes share similar clinical features, such as inflammation, tissue damage and hypercoagulability (3). As such, the clinical course of one condition may impact the management of the other. This article reviews the risks, pathophysiology and management implications of COVID-19 among individuals living with diabetes.

Risks of COVID-19 in Patients with Diabetes

Similar to other recently emerged respiratory illnesses, such as severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), diabetes increases the infectious risk, morbidity and mortality associated with COVID-19 (1). For example, a recent study showed that diabetes increases the odds of severe COVID-19 by 2.2 times and mortality by 2.5 times (4). Several diabetes comorbidities also independently increase these risks, including obesity, chronic kidney disease, cardiovascular disease and hypertension. While the risks of type 1 and type 2 diabetes are similar, early reports suggest that the risks of gestational diabetes are lower. Confirmatory studies are needed (3).

Pathophysiological Interaction Between COVID-19 and Diabetes

As the COVID-19 virus enters cells, an inflammatory cascade is triggered, releasing cytokines, promoting hypercoagulability and damaging vascular endothelial cells, all accentuated by diabetes. The resulting cardiovascular and thromboembolic events are common causes of morbidity and death (5). COVID-19 infection itself can also impact blood sugars by increasing insulin resistance and exerting a direct toxic effect on pancreatic beta cells, which can cause hyperosmolar hyperglycemic state (HHS), diabetic ketoacidosis (DKA) and/or new-onset type 1 diabetes (2). Those who are already on immunosuppressive medications (e.g. solid organ transplant recipients) are at a particularly high risk for DKA (6).

COVID-19 Treatments and Diabetes

Several potential COVID-19 treatments have been proposed and investigated, including lopinavir-ritonavir, hydroxychloroquine and azithromycin. Dexamethasone has shown favourable outcomes through well-designed studies

(e.g. RECOVERY trial). A 10-day course of dexamethasone 6 mg daily resulted in lower mortality rates in COVID-19 patients on mechanical ventilation or oxygen. Length of hospitalization, mechanical ventilation rates and renal replacement rates were also reduced (7).

While glucocorticoids can improve outcomes, they can exacerbate COVID-19 dysglycemia and precipitate DKA and HHS. For patients already on insulin, basal requirements may need to be increased by 20% initially, with ongoing uptitration as needed. For those not already on insulin, initiation of a daily basal analogue or twice-daily neutral protamine Hagedorn (NPH) insulin (and possibly a sliding scale) may be required. Once dexamethasone is discontinued, close glucose monitoring is needed to direct insulin dose reductions. Those who return to normoglycemia after dexamethasone has been stopped are still at high risk for diabetes in the future and require long-term follow up (e.g. annual screening glycated hemoglobin [A1C] from their general practitioner) (8).

Management of Diabetes in COVID-19

COVID-19 can precipitate and/or unmask previously undetected diabetes. As such, all patients admitted to hospital with COVID-19 should be screened for diabetes with an A1C (9). Those with high blood sugars should be treated, as high blood sugars can cause a more severe inflammatory response (2).

Current recommendations for the use of diabetes medications in different COVID-19 clinical settings is summarized in Table 1 (5). Metformin has been shown to decrease inflammation and may be continued in most

Table 1: Recommended use of diabetes medications according to severity of COVID-19 illness.

= may be used = use with caution = not recommended.

Diabetes Medication	Uninfected: At risk for disease	Ambulatory: Mild disease	Hospitalized: Moderate disease	Critical care: Severe disease
Metformin				
Sulfonylurea				
α-glucosidase inhibitor				
Thiazolidinedione				
GLP1-RA				
DPP4 inhibitor				
SGLT2 inhibitor				
Insulin				

DPP-4, dipeptidyl peptidase-4; *GLP1-RA*, glucagon-like peptide-1 receptor agonist; *SGLT2*, sodium-glucose cotransporter-2.

hospitalized patients. Sulfonylureas should be used with caution because they may provoke hypoglycemia (2). Thiazolidinediones are known to increase insulin sensitivity, decrease inflammation and reduce the risk of recurrent stroke. However, they are also associated with weight gain, edema and aggravation of heart failure. Because of this, they should be discontinued in hospitalized COVID-19 patients (5,10).

Glucagon-like peptide-1 receptor agonists (GLP1-RAs) are known to have beneficial effects on glucose homeostasis, cardiovascular outcomes and inflammatory processes and may prevent coronavirus entry into cells. As such, GLP1-RAs may be continued in COVID-19 infection, although caution should be exercised in the critical care setting because they take time to uptitrate and can provoke nausea and vomiting (5,10). Dipeptidyl peptidase-4 (DPP-4) inhibitors are considered safe in COVID-19 patients at this time (6). Even though there are known cardiovascular benefits of sodium-glucose cotransporter-2 (SGLT2) inhibitors, they can also cause volume depletion, acute renal impairment and DKA. Thus, the current recommendation is to discontinue these medications upon admission to hospital (5,10).

The blood glucose target for hospitalized patients is 8-10 mmol/L and insulin therapy is often required (e.g. basal insulin or basal-bolus regimens). For critical care patients, insulin infusion is preferred, especially since insulin requirements can be very high (e.g. often upwards of 100 units per day). Further study is needed to determine the effects of different diabetes medications in COVID-19, and several trials (e.g. on SGLT2 inhibitors) are ongoing (2,5).

Adjunctive Treatments

Multiple international organizations support continuing medications to treat conditions associated with diabetes, including antihypertensives (such as angiotensin-converting enzyme inhibitors and angiotensin receptor blockers) and statins. Patients with diabetes should also be reviewed regularly through teleconference appointments (5). Diet and exercise should be discussed, as lifestyle measures may have changed with local quarantine regulations. Lastly, patients with diabetes should be prioritized for receiving the COVID-19 vaccine, as major COVID-19 vaccine trials did not show significant adverse reactions in these patients (11).

Conclusions

COVID-19 has specific pathophysiological and management considerations in patients living with diabetes. Special attention is required to appropriately diagnose, monitor and manage diabetes during the COVID-19 pandemic. Further evidence is emerging and vigilance is needed as we learn more about the interplay between COVID-19 and diabetes (5,10).

References

1. Hussain A, Bhowmik B, do Vale Moreira NC. COVID-19 and diabetes: Knowledge in progress. *Diabetes Res Clin Pract*. 2020;162:108142.
2. Papadokostaki E, Tentolouris N, Liberopoulos E. COVID-19 and diabetes: What does the clinician need to know? *Prim Care Diabetes.* 2020;14:558-563.
3. Feldman EL, Savelieff MG, Hayek SS, Pennathur S, Kretzler M, Pop-Busui R. COVID-19 and diabetes: A collision and collusion of two diseases. *Diabetes*. 2020;69:2549-2565.
4. Varikasuvu SR, Dutt N, Thangappazham B, Varshney S. Diabetes and COVID-19: A pooled analysis related to disease severity and mortality. *Prim Care Diabetes.* 2021;15:24-27.
5. Lim S, Bae JH, Kwon H-S, Nauck MA. COVID-19 and diabetes mellitus: From pathophysiology to clinical management. *Nat Rev Endocrinol*. 2021;17:11-30.
6. Bornstein SR, Rubino F, Khunti K, et al. Practical recommendations for the management of diabetes in patients with COVID-19. *Lancet Diabetes Endocrinol*. 2020;8:546-550.
7. RECOVERY Collaborative Group; Horby P, Lim WS, Emberson JR, et al. Dexamethasone in hospitalized patients with Covid-19. *N Engl J Med*. 2021;384:693-704.
8. Rayman G, Lumb AN, Kennon B, et al. Dexamethasone therapy in COVID-19 patients: Implications and guidance for the management of blood glucose in people with and without diabetes. *Diabet Med*. 2021;38:e14378.
9. Sathish T, Cao Y, Kapoor N. Newly diagnosed diabetes in COVID-19 patients. *Prim Care Diabetes*. 2021;15:194.
10. Cuschieri S, Grech S. COVID-19 and diabetes: The why, the what and the how. *J Diabetes Complications*. 2020;34:107637.
11. Powers AC, Aronoff DM, Eckel RH. COVID-19 vaccine prioritisation for type 1 and type 2 diabetes. *Lancet Diabetes Endocrinol*. 2021;9:140-141.

News You Can Use: The Risk of Diabetic Ketoacidosis Associated With Sodium-Glucose Cotransporter-2 Inhibitors

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There have been many case reports of euglycemic diabetic ketoacidosis (DKA) related to the use of a sodium-glucose cotransporter-2 (SGLT2) inhibitor. The presentation of euglycemic DKA is similar to that of DKA without SGLT2 inhibitor exposure, except that the blood glucose (BG) levels on presentation may not be as elevated as expected (1). In most cases, there is usually a known precipitant as a contributing factor, such as insulin dose reduction or omission, bariatric surgery or other surgery, alcohol, exercise, or low carbohydrate or reduced food intake (1). Endocrinology clinical practice guidelines recommend stopping treatment with SGLT2 inhibitors at least 24 hours before elective surgery, invasive procedures, and anticipated severe, stressful physical activity and/or metabolically challenging activities, such as marathon running (2). Case studies suggest the timing of stopping and starting SGLT2 inhibitors needs to be further investigated.

In one case, a patient with type 2 diabetes on empagliflozin for three weeks admitted to hospital for breast abscess drainage was diagnosed with DKA (3). Empagliflozin was stopped at admission and intravenous (IV) insulin was started; after 12 hours, BG had stabilized at 6.3 mmol/L (3). She was scheduled for surgery so had nothing by mouth. Nineteen hours later, while BG was consistently less than 9.1 mmol/L, she was again diagnosed with DKA (3). Her urine glucose remained consistently high, suggesting a continued effect of empagliflozin as the etiology of euglycemic DKA (3). On day nine, BG was in the 6.1 to 10 mmol/L range, while urine glucose was persistently high (3). On the day of discharge, urine glucose had decreased but not normalized, despite 14 days past last empagliflozin dose (3).

In another case, a woman was admitted to hospital for cerebral revascularization and her empagliflozin was discontinued; she had surgery 18 hours later (4). She developed acidosis 24 hours postoperatively, and because of near normal BG, testing for DKA had not been performed (4). A diagnosis of euglycemic DKA was made; repeated urinalysis showed persistent glucose four days after the last dose of empagliflozin (4).

An Australian case series published in 2018 showed some of the deficiencies associated with a euglycemic DKA diagnosis in patients on an SGLT2 (3). Most patients did not recognize DKA (3). Treating physicians did not initially recognize the DKA in many cases due to euglycemia, causing delay in treatment (3). The multiple triggers in the 13 cases were missed insulin in five cases, undiagnosed type 1 diabetes in two cases, infection in five cases, surgery in three cases and decreased carbohydrate intake in five cases (3). The case series led to the following recommendations:

- temporary cessation of SGLT2 inhibitors during acute illness and surgery;
- caution early on regarding euglycemia associated with DKA;
- holding the SGLT2 inhibitor for a period of time after resolution of illness and postsurgery;
- ensuring adequate hydration and insulin administration; and
- delivering an appropriate amount of carbohydrate to avoid ketosis.

Since hospitalized patients are more prone to developing risk factors for DKA—whether related to surgery, infection, volume depletion or decreased oral intake—inpatient providers should remain vigilant for potential evidence of the development of euglycemic DKA. It is important to be able to identify patients presenting with DKA due to SGLT2 inhibitor therapy and to promptly initiate treatment to prevent sequelae. Early recognition and treatment can prevent morbidity, mortality and prolonged hospital stay.

We also need to ensure that everyone taking an SGLT2 is aware of all potential precipitating factors for euglycemic DKA, besides a risk of dehydration. Case reports suggest that the pharmacologic effects of SGLT2 inhibitors persist beyond five half-lives of elimination with glucosuria and ketonemia lasting up to nine to 14 days after discontinuation (4). Therefore, the optimal timing of discontinuation of SGLT2 inhibitor treatment is unknown, but temporary discontinuation for a period longer than 24 hours before potential precipitating events and for a longer period after SGLT2 inhibitor-associated DKA would be suggested by consideration of the half-life of elimination alone (4).

The incidence of SGLT2 inhibitor-related DKA does not appear to exceed the low levels occurring in the general diabetes population (2). The glycemic, cardiovascular and renal benefits of SGLT2 inhibitors outweigh the risks of euglycemic DKA (2).

References

1. Goguen J, Gilbert J. Diabetes Canada 2018 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada: Hyperglycemic Emergencies in Adults. *Can J Diabetes*. 2018;42(Suppl 1):S109-S14.
2. Handelsman Y, Henry RR, Bloomgarden ZT, et al. American Association of Clinical Endocrinologists and American College of Endocrinology Position Statement on the Association of SGLT-2 Inhibitors and Diabetic Ketoacidosis. *Endocr Pract*. 2016;22:753-762.
3. Yehya A, Sadhu A. Sodium-glucose cotransporter 2 inhibitor-associated prolonged euglycemic diabetic ketoacidosis in type 2 diabetes: A case report and literature review. *Clin Diabetes*. 2020;38:112-116.
4. Wang KM, Isom RT. SGLT2 inhibitor–induced euglycemic diabetic ketoacidosis: A case report. *Kidney Med*. 2020;2:218-221.

Care of the Hospitalized Patient With Diabetic Foot Ulcers

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Diabetes mellitus is prevalent in Canada. Prediabetes or diabetes currently affects more than 11 million people (29%) and, by 2030, the prevalence is expected to be above 13 million (32%) (1). In addition, 15% to 25% of Canadians with diabetes may develop diabetic foot ulcers (DFUs) (1,2). The cause of a DFU is multifactorial; risk factors include peripheral arterial disease, neuropathy, foot abnormalities and previous ulcer or amputation (2). Even after wound closure, up to 59% of DFUs will recur (3). Studies demonstrate that decreased or delayed healing of DFUs is related to the presence of comorbidities and number and location of ulcers (4,5). Comorbidities associated with diabetes include peripheral arterial disease (3), renal disease, hypertension, heart disease, chronic obstructive pulmonary disease, mood disorder and arthritis (4). Complications secondary to diabetes include premature death and decreased lifespan of five to 15 years (1).

Diabetes cost is a burden on Canada's health-care system, with an estimated annual direct cost of almost $4 billion; this amount is expected to reach almost $5 billion by 2030 (1). The estimated annual cost of DFU-related institutional care in Canada is $21,371 (6). Furthermore, a newly diagnosed DFU has a three-year cost of $52,360 (6). This cost includes an admission/emergency department visit, medication, wound/dressing care, home care nursing services, long-term care and time lost for caregiver (6). The high cost in the first three years demonstrates the need for preventative care. Realistically, the actual cost is likely much higher as costing does not usually account for indirect costs, such as the impact on quality of life, inability to work, frequent appointments, social isolation, embarrassment, depression, anxiety, pain and decreased mobility (2).

Amputations are more common in people with diabetes than in the general population (7). In a three-year period, 207 Canadian hospitals performed more than 5,000 lower leg amputations, 81% of which were due to complications from diabetes (8). People with diabetes also have a higher hospitalization rate for cardiovascular disease, end-stage renal disease and nontraumatic amputation than the general public (1). Moreover, patients who present with multiple DFUs and peripheral vascular disease have a statistically significant association with death or amputation at 52 weeks (5). Additionally, those who have a significant amputation and peripheral arterial disease have an increased mortality rate of 50% within two years of amputation (2). The high prevalence and cost of DFU management make it essential that people with diabetes receive evidence-informed comprehensive care while hospitalized. It is also necessary to develop a coordinated transition of care from hospital to community to prevent additional complications and rehospitalizations.

Care of the Hospitalized Patient with DFUs

An interprofessional team and an evidence-informed approach to wound care can reduce costs and prevent DFU recurrences (9). Management of diabetes requires an interprofessional team to manage underlying comorbidities (2), provide glucose monitoring, target glycemic control, optimize nutritional status and provide education and discharge planning (2,10). Patients with diabetes and a DFU also require evaluation of vascular status, treatment of infection, evaluation for the need for surgical intervention, adequate offloading and appropriate wound management (2,7).

Wound management includes a comprehensive bilateral foot assessment, neuropathy testing, sharp debridement, treating infections and selecting dressing products to control exudate and promote a moist wound (2,3,7). Interprofessional specialists may include any or all of the following: endocrinologist, surgeon (orthopedic, general or foot and ankle), vascular specialist, infectious disease specialist, podiatrist/chiropodist, nurse, orthotist/prosthetist and pedorthist.

Once the etiology of the wound is diagnosed, the patient's vascular status is determined to be adequate for wound healing and wound management is initiated, it is time to focus on offloading. Initiation of appropriate offloading and access to a continuum of care is imperative to wound healing success and prevention of recurrence. The most effective method for offloading adequately perfused plantar neuropathic wounds continues to be a nonremovable knee-high offloading device, such as total contact casting (11) or nonremovable walker (12). The rigid casting ensures reduced plantar pressure by increasing contact surface area while also decreasing both gross foot and leg edema and local wound edema. If a nonremovable option is not indicated, the use of removable knee-high cast walkers can also be effective to minimize midfoot and forefoot pressures and move toward wound healing (12). If neither of these options is indicated or available, a rigid postoperative sandal may be used for basic offloading. It is vital for patients and staff to understand that the amount of time walking and standing must be minimized for optimal healing. Furthermore, it is ill-advised to allow patients to take any steps without an appropriate device on their feet (12).

Transition of Care Hospital to Community

Once discharged, the patient with a DFU will require ongoing follow up with primary care and referrals to various health-care professionals (2). An interprofessional team is essential in the community to deliver integrated comprehensive care to people with DFUs (2). To ensure a smooth transition from hospital to community, discharge planning needs to be a coordinated effort between discharge planning and the patient, their family and an interprofessional team made up of providers in the hospital and community. Once discharge planning is underway, communication via written and digital technology needs to be exchanged to ensure all providers know the hospital's treatment and any community follow up is arranged (2,10). Oral and written information should also be provided to patients and their caregivers (10). Comprehensive care includes monitoring glycemic control, adjusting medications, providing diabetes education and providing ongoing and preventative wound care, including offloading (2).

A smooth transition from hospital to community is essential to ensure ongoing management of patients with DFUs. Due to the high rate of recurrence and the systemic and personal costs of having a DFU, it is incumbent on institutions and governments to act and enable best practices to occur. There are robust Canadian and international guidelines that identify the need to structure ongoing interprofessional care to meet the needs of patients rather than only responding to acute problems when they occur (2,3,7,12).

References

1. Ghanem S. Diabetes in Canada: Backgrounder. Ottawa: Diabetes Canada; 2020.
2. Health Quality Ontario. Diabetic Foot Ulcers: Care for Patients in All Settings. 2017. Available at: https://www.hqontario.ca/evidence-to-improve-care/quality-standards/view-all-quality-standards/diabetic-foot-ulcers. Accessed Mar. 1, 2021.
3. Lavery LA, Davis KE, Berriman SJ, et al. WHS guidelines update: Diabetic foot ulcer treatment guidelines. *Wound Repair Regen*. 2016;24:112-126.
4. Lu SH, McLaren A-M. Wound healing outcomes in a diabetic foot ulcer outpatient clinic at an acute care hospital: A retrospective study. *J Wound Care*. 2017 Oct;26(Suppl 10):S4-S11.
5. Roth-Albin I, Mai SHC, Ahmed Z, Cheng J, Choong K, Mayer PV. Outcomes following advanced wound care for diabetic foot ulcers: A Canadian study. *Can J Diabetes*. 2017;41:26-32.
6. Hopkins RB, Burke N, Harlock J, Jegathisawaran J, Goeree R. Economic burden of illness associated with diabetic foot ulcers in Canada. *BMC Health Serv Res*. 2015;15:13.
7. Embil JM, Albalawi Z, Bowering K, Trepman E. Diabetes Canada 2018 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada: Foot care. *Can J Diabetes*. 2018;42:S222-S227.
8. Kayssi A, de Mestral C, Forbes TL, Roche-Nagle G. A Canadian population-based description of the indications for lower-extremity amputations and outcomes. *Can J Surg*. 2016;59:99-106.
9. Sheehan DD, Zeigler MH. Developing an outpatient wound care clinic in an acute rehabilitation setting. *Rehabil Nurs*. 2010;35:91-98.
10. Malcolm J, Halperin I, Miller DB, et al. Diabetes Canada 2018 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada: In-Hospital Management of Diabetes. *Can J Diabetes*. 2018;42:S115-S123.
11. Messenger G, Masoetsa R, Hussain I. A narrative review of the benefits and risks of total contact casts in the management of diabetic foot ulcers. *J Am Coll Clin Wound Spec*. 2018;9:19-23.
12. Bus SA, Armstrong DG, Gooday C, et al; International Working Group on the Diabetic Foot (IWGDF). Guidelines on offloading foot ulcers in persons with diabetes (IWGDF 2019 update). *Diabetes Metab Res Rev*. 2020;36(Suppl 1):e3274.

Managing Euglycemia in Pregnancy in a Tertiary Care Setting: Dietary Challenges and Considerations

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Women with pre-existing diabetes can become hospitalized during their pregnancy due to obstetrical issues, such as threatened preterm labor, short cervix and ruptured membranes. Women without pre-existing diabetes who receive an oral glucose tolerance test while admitted to hospital can be diagnosed with gestational diabetes (GDM). For hospitalized women with pre-existing diabetes and newly diagnosed GDM, there are additional challenges to maintain glycemic control, and COVID-19 adds an additional layer of complexity.

In our health-care facility, which is a tertiary care setting, women come from a wide geographical area to receive care. Women may be admitted for a week or many weeks depending on their gestational age and their specific health issue.

Social and environmental challenges that affect glycemic control may fall into the following categories:

- Inpatient menus: Most inpatient menus are on a seven-day repetitive cycle. Prolonged stays can cause increased boredom with the menu. Inpatient meal service is cost driven. Although quality of food is important, often the cost determines what is available on the inpatient meal trays. Many hospitals outsource their food, and freshly prepared inpatient meals are not as common as they once were. Foods that are prepackaged tend to be cheaper to provide. Thus, carbohydrate-heavy items, such as scones, English muffins and bagels, are less expensive per item than fresh fruit, fresh vegetables and protein choices. Women may resort to cafeteria food or outside meal delivery services that have more carbohydrates and larger portions that could lead to dysglycemia.
- Family food provision: In order to address the limitation with inpatient menus, many families will bring in takeout food or homemade meals to share with the patient. This allows women to have home-cooked, culturally familiar food. Home-prepared food provides more variety, especially when the woman has food practices, such as halal or vegetarianism. The rules in place for COVID-19 have limited the ability for families to provide home-cooked food, as they are not allowed to use the family lounge and have meals together. When these restrictions are lifted, it can be challenging attempting to control carbohydrates and glycemic load, as families may bring in carbohydrate-heavy choices, such as rice, noodles or other starchy items. This can alter the eating patterns of inpatients and affect their blood glucose control. Women will often eat at different times from regular inpatient meal service and this may impact insulin administration and point-of-care testing from nursing staff.
- Physical activity: It is recommended that women include at least 150 minutes of aerobic activity per week during pregnancy (1). Physical activity will assist in management of GDM, likely by reducing insulin resistance (2). Women who are admitted for management of medical complications in pregnancy are often on some level of bed rest and therefore unable to achieve the recommended level of activity, leading to higher blood glucose.
- Medication: Corticosteroids may be given to women who are at risk of preterm delivery from 24 to 34 weeks gestational age. Corticosteroid administration to the mother decreases the risk and severity of respiratory distress syndrome, intracranial hemorrhage, necrotizing enterocolitis and morbidity in the fetus (3). Corticosteroids raise blood glucose in the short term and, if the woman is on insulin, it must be adjusted to prevent significant hyperglycemia (2).
- Types of insulin: The type of insulin used by a woman with diabetes will influence sugar control. For example, neutral protamine Hagedorn (NPH) or Humulin N (Eli-Lilly and Company) insulin may cause nocturnal hypoglycemia, especially if the inpatient meal service has prolonged spacing between mealtimes. In our facility, dinner is served between 4:30 pm and 5:00 pm and breakfast is served between 7:30 am and 8:00 am. Without access to evening snacks, low blood sugars may occur. Strategies to prevent this include ordering snacks and setting aside snacks from the meal tray to eat in the evening before bed. A switch to a long-acting basal insulin may be advantageous in this situation to avoid hypoglycemia.
- Self-monitoring of blood glucose: Due to the increased availability of flash glucose monitoring systems (FGMs) and continuous glucose monitoring systems (CGMs), women enter hospital with their choice of self-monitoring method. They may choose to continue using their own devices, but if point-of-care testing (POCT) occurs to verify the woman's test, confusion can arise if there are discrepancies between numbers. In our facility, when there is more than a 20% difference between the sensor monitoring system and

POCT, the POCT value is used (4). The woman is responsible for all supplies of the FGMs/CGMs while in hospital. The ability to procure ongoing supplies for the FGMs may also prove to be an issue for some clients. Some nursing staff may not be familiar with FGMs or CGMs.

- Weight loss: Weight loss can be a common occurrence in the hospitalized woman. The woman is not in her own home with readily accessible food. The inpatient meal service provides a "usual" amount of calories that may or may not meet the actual needs of the woman, especially if the woman is expecting multiples in her pregnancy. Weight loss in pregnancy will likely affect glycemic control.

Seeking solutions to the above issues will assist women in achieving and maintaining euglycemia. Providing nutrition education to the woman, her family and health care staff is necessary. Our experience has found that educating women about the carbohydrate content of their meal choices from the inpatient menu, cafeteria/coffee shops and home-cooked meals assists in controlling blood sugars. Learning to accurately measure carbohydrates is important. Women can learn to use electronic devices to obtain nutritional information from mobile applications and websites. This will assist them to be able to order in food, accept food from home or purchase food from the cafeteria with increased confidence about maintaining blood glucose control.

Hospitals can create guidelines for the use of these glucose monitoring devices (5) and provide training to staff. When staff are educated and hospital policies are created for use of these items, it can assist clients and staff to work together to achieve good blood glucose control. The registered dietitian (RD) can also advocate and collaborate with the institutional food services department to provide foods that have improved nutritional profiles and acceptable taste, and are cost-effective to meet the diverse needs of women. Regular overview of the inpatient menu to assess the usual provided energy, protein, carbohydrates and other nutrients will ensure that nutritional requirements are being met for pregnant women. An RD consult is beneficial to ensure that inpatient needs of high-risk pregnancies are being met.

Glycemic control can be a challenge for women who are admitted for medical reasons during their pregnancy. With education and collaboration, many of these typical hurdles can be surmounted.

References

1. Mottola MF, Davenport MH, Ruchat S-M, et al. No. 367-2019 Canadian Guideline for Physical Activity throughout Pregnancy. *J Obstet Gynaecol Can*. 2018;40:1528-1537.
2. Feig DS, Berger H, Donovan L, et al. Diabetes Canada 2018 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada: Diabetes and Pregnancy . *Can J Diabetes*. 2018;42(Suppl1):S255-S282.
3. Committee Opinion No. 713 Summary: Antenatal Corticosteroid Therapy for Fetal Maturation. *Obstet Gynecol*. 2017;130:493-494.
4. "Flash Glucose Monitor (FGM) – Adult Transcribed Orders – Kardex"; 708025(2020-11). Hamilton Health Sciences, Hamilton, Ont.
5. Glucose Monitor/MD/10-20/V1–"Continuous Glucose Monitor (GDM) Order Set–Adult" & "Flash Glucose Monitor (FGM) Order Set-Adult." Hamilton Health Sciences, Hamilton, Ont.

EDITORIAL...CONTINUED FROM PAGE 1

Initiative, a successful evidence-based practice change strategy that improved diabetes care in Alberta hospitals.

The goal of the project described by Jordanna Kapeluto and David Thompson is the optimization of diabetes in-patient management for vascular surgery patients with diabetes. This project aspires to demonstrate that early intervention can improve patient outcomes and incorporates the implementation of an inpatient referral system to the endocrinology service for all cases of diabetes and hyperglycemia admitted under the vascular surgery service.

Elaine Cooke and Susan Harris explain the importance of early recognition and treatment of euglycemic diabetic ketoacidosis related to the use of sodium-glucose cotransporter-2 inhibitors.

Sherry Morrell, Ruth Thompson and Laura Teague share how to care for a patient with a diabetic foot ulcer, including education on risk factors, causes, comorbidities, complications and the transition of care from hospital back to community.

Glycemic control can be a challenge for pregnant women with diabetes. Gwyneth Xagoraris highlights the dietary challenges, including the necessary education and cross-functional collaboration. The article by Catherine Biden discusses specifics of nutritional management, including enteral and parenteral nutrition for patients with diabetes in an acute care setting.

Lastly, Krishanna Campbell summarizes the key changes of the 2020 Canadian Adult Obesity Clinical Practice Guidelines. Obesity is now classified as a chronic disease.

As this issue is focused on hospital management of diabetes, we want to acknowledge the strain and stress that our hospitals have been under for the past year during the COVID-19 pandemic. Acute care centres are so important for people facing illness, particularly our patients with diabetes who may be cared for in hospital for a variety of medical reasons or emergencies. Given that diabetes confers additional risk for infection, length of stay and challenges with glycemic management, a coordinated, interprofessional team is critical to support these patients in hospital. We are appreciative of the hard work of our hospital colleagues and thank all the clinicians and support staff who have been taking care of patients in hospital this year.

Obesity Update and the 2020 Canadian Adult Obesity Clinical Practice Guidelines

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The 2020 Canadian Adult Obesity Clinical Practice Guidelines were authored by a broad range of contributors, including individuals living with obesity; members of the Indigenous community; health-care professionals, such as physicians, nurses and dietitians with expertise in this area, and reviewed by external reviewers. The purpose of the guidelines is to provide Canadians (specifically individuals with obesity and associated comorbidities) access to a higher level of care. The target audience of the guidelines is primary health-care workers who work with individuals with obesity.

Since 2007, five key changes have been made to the guidelines, primarily in the classification and characterization of obesity. The previous definition of obesity was centred around body mass index (BMI) and did not focus on the overall health of the individual (1). Currently, obesity is defined as a relapsing chronic disease that is identified by the prevalence of abnormal and/or excessive body fat, which impairs health in the context of being functional, metabolic or even in the form of psychosocial impairment that is complex and progressive in nature (2). This alteration in definition implicitly suggests that treatments should focus on identifying the key drivers leading to obesity by validating each individual, since each person will have a unique experience in not only gaining weight but with living with obesity. This adjustment in focus provides independent and focused treatment paths for each person, rather than applying simplistic stigmas attached to obesity, such as the “eat less, move more” approach. Obesity is now classified as a chronic disease universally and is no longer considered to solely be a risk factor for other health issues (2). The negative effects that weight bias, weight stigma and weight-based discrimination have on individuals living with obesity is a focus in obesity treatment. Weight stigma relates to the stereotypes and assumptions formulated based on misrepresentation of obesity that the public have, which are then used to generate and label those living with obesity, consciously or subconsciously. Weight stigma leads to weight-based discrimination, which is derived from people physically, verbally, professionally and socially treating individuals with obesity atypically. These labels hinder the person’s quality of life, illustrating the need for inclusivity at all sizes. It is necessary for individuals to overcome this negative mindset to be able to be treated successfully. Having a positive feeling about oneself is associated with better weight management success. The guidelines now focus on patient health outcomes and quality of life treatment goals in order to improve the state of comorbidities associated with weight gain (2). The guidelines are no longer weight centred and focused on the numbers seen on the scale but are instead focused on overall health and lifestyle change.

Within the guidelines, there are the "Five As of Obesity Management" (2,3), which analyze the clinical approach of understanding and effectively treating obesity. The five As include the following:

- Ask
- Assess
- Advise
- Agree
- Assist

Obesity is a sensitive subject, especially for those aiming to treat the disease; therefore, asking permission to treat is the first step. Assessing the individual’s journey leading to their obesity and weight management struggles allows clinicians to establish the root cause and understand why the individual is now on a journey to treat the disease, and further provides the individual with goals that they can focus on achieving, through motivation and check-ins on the progression of reaching said goals. For instance, a person may want to attain a better handle on weight management because they want to be able to spend time with their children, from playing sports to running around on a playground and being more involved in their daily activities. These goals can also be more individualistic, focusing on the want to improve how the person feels as a whole, both physically and mentally, thereby improving their overall quality of life both professionally and socially. The guidelines suggest three methods to assess obesity in an individual. The first method involves measuring BMI and waist circumference (2,3). Measuring BMI and waist circumference is a beneficial method to identify individuals with obesity; however, the main focus should not be on the numbers. Clinicians can use this indicator of obesity to identify comorbidities and complications to determine whether an individual has obesity or overweight. Using this method as a first-step identifier is a good way to track trajectory of weight/time per patient and provide population data.

The second method is to use the Edmonton Obesity Staging System to determine the severity of obesity of an individual and to guide clinical decision making (2,3). It ranges from stages 0 to 4, with 0 being patients without any impairments from having overweight to 4 being end-stage disease. These stages are scored in the context of medical, mental and functional effects.

The third method is the 4M's framework for the assessment of obesity, which focuses on analyzing the causes of obesity, as well as the comorbidities of or the contributors to obesity. The 4M's include 1) mental effects, such as self-image, mood and eating disorders; 2) mechanical effects, such as sleep apnea, urinary incontinence and intertrigo; 3) metabolic effects, such as type 2 diabetes, gout, fatty liver disease and polycystic ovary syndrome, among others; and 4) milieu, which pertains to a person's social environment (e.g. the individual's socioeconomic status, education and access to medication) (2,3). The type of medication is subjective to the individual, and determining the combination to be administered is complex due to there being a lack in clinical guidelines for weight-adjusted dose modifications of the drugs available today (4). Currently, drugs with marketing authorization for weight loss include orlistat (2,4), liraglutide (2,4) (also used to manage type 2 diabetes mellitus) and a fixed combination of bupropion and naltrexon (2). Other drugs, such as topiramate, which is an antiepileptic drug used for managing migraine prophylaxis (4), and bupropion paired with fluoxetine, which is used in depression management (4), have side effects of weight loss. It has been seen that some drugs used out of the context of weight loss, such as antiepileptic mood stabilizers, neuroleptics (drugs that depress nerve functions), glucocorticoids (steroid hormones), antidiabetics, antidepressives and beta-blockers (4), also have side effects of weight loss. However, utilizing these medications can lead to misuse and abuse of these drugs when they are not needed for the treatment they are intended for. Therefore, pharmacotherapeutic interventions should be discussed with physicians on a case-by-case basis.

The third "A" of obesity management—advise—pertains to advising the individual on obesity risks and on management strategies utilized with obesity. Two management strategies to be discussed with patients are medical nutrition therapy (MNT) and physical activity (2,3). MNT takes the term "diet" out of focus when discussing food intake because it implies that we are making short-term and temporary changes. The focus should be on making lifestyle changes to support long-term weight management success. Nutrition recommendations for adults of all body sizes should be personalized to fit the individual's personal goals, values and treatment targets, in order to develop MNT that is not only safe and effective but also nutritionally sufficient and culturally relevant for the individual. This form of MNT needs to be supported by behavioural modification strategies for obesity management success. Both subtypes of advising strategies are supported by the three pillars of obesity management that support nutrition and activity, which include psychological intervention, pharmacological therapy and bariatric therapy.

The fourth "A" of obesity management—agree—pertains to the clinician and individual coming to a consensus to generate a personalized action plan that is practical and sustainable, and addresses the drivers of weight gain, establishing realistic expectations and creating appropriate behavioural goals and health outcomes (2,3).

Finally, the fifth "A" of obesity management—assist—relates to helping the person in question identify possible contributors that facilitate poor weight management, including factors that could potentially deter or prevent a person from actively working toward a lifetime change. For example, these factors denoted as drivers and barriers can be environmental, socioeconomical, emotional, physical (for instance, having limited seating options on transportation and work places) and/or medical (certain medications make weight management challenging, preventing weight loss or promoting weight gain) in nature (3). Along with identifying these factors, educating and providing sufficient resources to the individual and supporting family members strengthens the ability for a person to succeed in their weight management goals. Subsequent follow-up appointments are necessary to keep the individual on track and provide support through their weight management journey.

References

1. Lau DCW, Obesity Canada Clinical Practice Guidelines Steering Committee and Expert Panel. Synopsis of the 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children. *CMAJ*. 2007;176:1103-1106.
2. Wharton S, Lau DCW, Vallis M, et al. Obesity in adults: A clinical practice guideline. *CMAJ*. 2020;192:E875-E891.
3. Obesity Canada. 5As of Obesity Management. Available at: https://obesitycanada.ca/resources/5as/. Accessed June 26, 2018.
4. May M, Schindler C, Engeli S. Modern pharmacological treatment of obese patients. *Ther Adv Endocrinol Metab*. 2020;11:2042018819897527.

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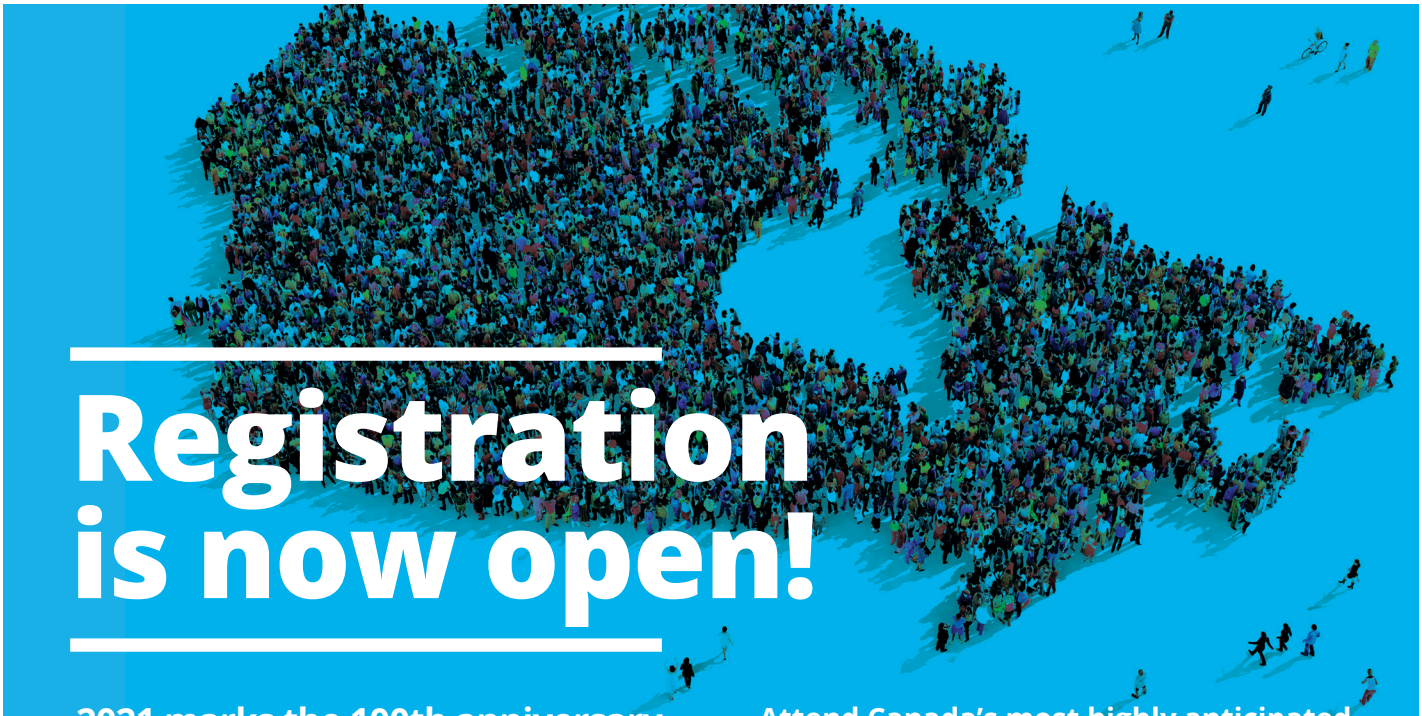

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