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EDITORIAL

Celebrating, Learning, and Collaborating at the 2022 Calgary Conference

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Judy Bornais


Susie Jin

We are thrilled to be able to share the Winter 2023 issue of the *Diabetes Communicator*, with the focus on capturing some of the amazing sessions that occurred at the 2022 Diabetes Canada Annual Professional Conference that was held November 9 to 12 in Calgary, Alberta. Attending the conference and seeing so many friends and colleagues back in person, learning, networking, and sharing was a delight. We hope you will enjoy this recap of some of the sessions from the conference and look forward to seeing all of you at Vascular 2023 in Montreal, Quebec, from October 25 to 29, 2023.

The first article in this issue is by Dr. George L. Bakris, who provides an overview of how far we have come in the last few years in the tools that we have to slow diabetic kidney disease (DKD) and reduce the risk of heart failure hospitalization. Dr. Bakris reviews the management of DKD, including the three pillars of therapy—renin-angiotensin system blockers, sodium-glucose cotransporter-2 inhibitors, and nonsteroidal mineralocorticoid receptor antagonists—that health-care professionals should use to maximally slow DKD progression and reduce cardiovascular events and risk.

Dr. Ereny Bassilious and Joanne Gibson shared the McMaster experience of early initiation of continuous glucose monitoring at diagnosis in the pediatric population through which their team has observed results consistent with the literature: improved quality of life, confidence in management, and increased time in range (TIR).

Drs. Virginie Blanchette and Janet Lynne Kuhnke, whose passion and life's commitment to reducing amputations

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A Diabetes Canada Publication

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was evident during their presentation at the conference, summarized their session, "Diabetic Foot Screening and Care Pathways Are a Necessity in Canada." Drs. Blanchette and Kuhnke demonstrated how to do a diabetic foot screening using the Inlow 60-second tool.

Our fourth article is a synopsis of the session "Diabetic and Bariatric Surgery," reminding us of the importance of nutrition, screening, and treatment for individuals with obesity and type 2 diabetes (T2D) undergoing bariatric surgery.

In the article "How Diabetes Technology Has Changed Our Practice," Alanna Chambers and Drs. Jeremy Gilbert and Ilana J. Halperin provide useful tips on how clinicians can use real-time continuous glucose monitoring to explore sugar patterns in people with diabetes to reduce glycemic variability, increase TIR, and individualize a person's diabetes management.

Lisa Maks, Dr. Sue D. Pederson, and Lori Berard's article provides us with data and insights into the use of dual glucose-dependent insulinotropic polypeptide/glucagon-like peptide-1 receptor agonism in people with T2D in helping with glucose management and significant weight reduction. Dr. Charles H. Samuels reminds us of the importance of sleep, circadian factors, and recovery in the management of a person's weight, glycemic parameters, blood pressure, and chronic inflammation—a good reminder for all of us to get enough good quality sleep at the right time to achieve optimal health and performance.

Kim Young's article covers the "Diabetes and Nutrition" session from the conference, which includes information on where to start with nutrition care, intuitive eating, intermittent fasting, and low-carbohydrate/ketogenic diets.

Our final article, by our own editorial board member Susie Jin, brings to life the newest Diabetes Canada Clinical Practice Guideline on the remission of T2D. Who should be considered for remission and how remission fits into the overall management of T2D are discussed. As health-care practitioners, we are reminded that we must have safe and open conversations with eligible people with T2D, support those with capacity for remission, and utilize the "User's Guide" and its resources to help facilitate these conversations.

We look forward to furthering our conversations about the conference, the latest guidelines, and supporting each other via community.diabetes.ca. If you haven't logged on for a while, we hope you will return soon. In the meantime, enjoy the learning in this issue, and we can't wait to celebrate, learn, and collaborate with you at Vascular 2023!

FROM THE CHAIR'S DESK

Celebrating Membership

Lynn Baughan RN, BScN, MN, CDE
Chair, Professional Section National Executive

Welcome to the first issue of the year! It's an exciting one, focussing on the Diabetes Canada/CSEM Professional Conference that took place in Calgary in November of last year. The conference was a huge success with over 100 speakers, 150 poster presentations, 28 exhibitors, and 1,721 delegates (both in-person and virtual).

The conference, which was a hybrid, offering both live and recorded sessions, was a great opportunity to meet with colleagues, both new and old, and to attend exciting sessions and symposia on a variety of topics, some of which are highlighted in this issue—bariatric surgery, continuous glucose monitoring in

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children, kidney disease, foot care, nutrition, sleep and metabolic disease, foot care, remission of type 2 diabetes, and diabetes technology. There is truly something of interest for everyone.

One of the most exciting sessions at conference is always the Diabetes Canada Clinical Practice Guidelines session, which highlighted updates to the hypoglycemia and mental health chapters, as well as a position statement on do-it-yourself automated insulin delivery, an especially hot topic right now. A new chapter on remission of type 2 diabetes was also unveiled, a topic that Susie Jin (one of the chapter authors) discusses in this issue. The remission chapter, along with an accompanying user's guide, can be accessed on the *Canadian Journal of Diabetes* website (https://www.canadianjournalofdiabetes.com/).

Another favourite part of the conference is the awards presentation and the opportunity to honour our hardworking colleagues. I'd like to offer my thanks and heartfelt congratulations to the 2022 recipients, all of whom did amazing work for their diabetes communities, institutions, and clinics by helping to improve the lives of people living with diabetes. In this issue, we highlight Dr. Bruce Perkins, recipient of the Gerald S. Wong Service Award, and Leigh Caplan, recipient of the Educator of the Year Award. We are so inspired by the outstanding work you do and I thank you for your contributions to the care of people living with diabetes.

I hope you all enjoy this issue!

2022 Diabetes Educator of the Year

Leigh Caplan RN, MA, CDE

An exceptional diabetes nurse educator in the Sunnybrook Academic Family Health Team in Toronto, Ontario, Leigh Caplan has worked in the area of diabetes education for over 27 years. She was the clinical lead on the expansion of the diabetes program at Sunnybrook Hospital and is responsible for inter-professional diabetes education.

Leigh is a faculty member with the Health Leadership & Learning Network at York University, where she instructs in the Lifestyle and Wellness Health Coach Certificate and Motivational Interviewing Certificate. She is a tutor for the University of Toronto Medical School's Integrated Clinical Experience: Health in Community Years 1 and 2. She has also been a tutor and facilitator of the Michener Institute for Applied Health Sciences' Diabetes Educator Graduate Certificate course.

Leigh is very well known and highly respected for her teaching excellence and has received numerous awards, including the University of Toronto Family and Community Medicine Interprofessional Teaching Award (2011); the Banting and Best Diabetes Centre University of Toronto Diabetes Educator of the Year Award (2012); the Excellence in Scholarship in Faculty Development, Family & Community Medicine, University of Toronto (2017); and the MD Program Teaching Award of Excellence for the 2020–2021 academic year, Family and Community Medicine, University of Toronto (2021).

Leigh has been an active member on many projects, which have included the Toronto Central Local Health Integration Network (TC LHIN) Diabetes Physician Engagement project; the Health Quality Ontario: Type 2 Diabetes Standards Advisory Committee; the TC LHIN Regional Diabetes Steering Committee; and the Toronto Diabetes Care Connect New Hires Program Planning Committee. She is also a member of the QUEST Committee for quality education and safety, the Central Toronto LHIN Self-Management Group and the Government of Ontario Diabetes Strategy Self-Management Working Group, and she is the Sunnybrook Academic FHT Education Committee co-chair of QI for foot assessments.

Leigh's unparalleled dedication and passion for education make her much deserving of the title of Diabetes Educator of the Year, and we congratulate her on this award.

Perspective on an Approach to Maximize Slowing of Diabetic Kidney Disease and Reducing the Risk of Heart Failure Hospitalizations

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It should be appreciated that over the next 20 years, the number of people with diabetes mellitus is estimated to rise by 51%, reaching 700 million, or 10.9% of the global population, by 2045 (1). Additionally, the number of people who require dialysis due to diabetes will more than double in 2030 compared with 2010 (2). Hence, diabetes comorbidities—and, importantly, kidney failure—are a global emotional and economic burden. Diabetic kidney disease (DKD) is one of the most common complications arising from diabetes, affecting approximately 40% of people with diabetes (1,3). DKD typically develops after a diabetes duration of 10 years in individuals with type 1 diabetes but may be present at the time of diagnosis with type 2 diabetes (T2D). It is important to note that DKD is defined as a reduction in function assessed by an estimated glomerular filtration rate (eGFR) of <60 mL/min/1.73 m^2 and/or persistent albuminuria at levels >30 mg/day (4). Both need to be measured as one may miss the diagnosis by only checking eGFR.

Slowing DKD progression is dependent on achieving target or very close to target blood pressure, glucose, and lipids. In 1980, when there was no specific therapy to slow DKD, the annual rate of filtration loss was 10 to 12 mL/min/year (5,6). The advent of three renal outcome trials between the early 1990s and 2001, using maximal tolerated doses of renin-angiotensin system (RAS) blockers, documented a kidney function loss to about 4 to 6 mL/min/year. This resulted in a significant slowing in kidney disease progression over prior conventional treatment (4).

Since the early 2000s, there have been many attempts to find other pharmaceutical agents that will further slow the epidemic of DKD beyond the benefits of maximally tolerated doses of RAS blockers (7); all efforts have failed for a variety of reasons (7).

Advances in the understanding of DKD pathophysiology and identification of new targets beyond the RAS have opened new treatment possibilities. Sodium-glucose cotransporter-2 inhibitors (SGLT2i) emerged as early as 2016 as a novel class of glucose-lowering medications that can both slow the progression of DKD and reduce cardiovascular (CV) events, notably heart failure hospitalizations, in people with type 2 diabetes (and existing CV disease or CV risk factors) (8,9). Additionally, over the past 2 decades, the deleterious effects of aldosterone in the pathophysiology of cardiorenal disease have been increasingly recognized, and blockade of the mineralocorticoid receptor (MR) has arisen as a therapeutic approach (10–12). Steroidal MR antagonists (MRAs) have demonstrated protective effects in nondiabetic and diabetic chronic kidney disease (CKD) animal models, reduced proteinuria or albuminuria and slowed CKD progression in small clinical studies, albeit with markedly increased risk of hyperkalemia and renal dysfunction (13). More notably, within the past decade, a novel class of agents called nonsteroidal MRAs (NS-MRAs) has emerged (14,15). These agents are very distinct pharmacologically from their steroidal counterparts and not considered to be in the same class. Additionally, strong data from two well-designed large clinical trials and an individual patient-level pooled analysis of these trials emerged between 2020 and 2021 demonstrating a clear benefit of NS-MRAs in slowing DKD progression, as well as reducing heart failure hospitalizations (16,17). Finerenone is one of five members in the class, is the only agent extensively studied, and has been shown to slow DKD and reduce CV events. Other agents within the class may have similar action (14).

Multiple treatment strategies used in combination are required to slow DKD and reduce CV events, and these include glycemic management, blood pressure management, and management of dyslipidemia, together with lifestyle changes. Angiotensin-converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs) are the basis of therapy in people with DKD since they reduce blood pressure, intraglomerular hypertension, and albuminuria (4). While they also reduce aldosterone initially, there is a well-described aldosterone escape that is associated with an accelerated decline in eGFR in both individuals with T2D and individuals with type 1 diabetes nephropathy, and is frequent in people treated with short-acting ARBs, such as losartan and valsartan (18).

After 20 years, it is interesting that the first agents shown to slow kidney disease progression in DKD were originally developed to lower glucose. While they do a good job of this if one has normal kidney function, they do a superb job slowing the progression of nephropathy and reducing heart failure independent of any glucose lowering in people with advanced kidney disease. SGLT2i are truly cardiorenal risk-reducing agents that also happen to lower glucose if kidney function is normal. This is documented in numerous outcome trials (8). Thus, until 2020, we had two pillars of therapy to slow nephropathy progression; when used together, they were better than either alone.

In 2020, it was demonstrated that finerenone slowed DKD progression and reduced heart failure risk even in people with reasonably well-managed glucose and blood pressure (16). Moreover, it did this with a far better safety profile than spironolactone and without dramatic drops in blood pressure. While steroidal MRAs like spironolactone and eplerenone have documented clinical benefits in people with hypertension, heart failure, and left ventricular dysfunction, they are not more widely used because of their associated complications in people with CKD, such as antiandrogenic side effects, hyperkalemia, and worsening of kidney function. These complications were not a limiting factor for the use of finerenone as shown in both the phase II ARTS program and the outcome trials, FIDELIO and FIGARO (16,17,19,20). In people with T2D and DKD, finerenone reduced albuminuria and N-terminal pro-B-type natriuretic peptide, with a lower risk of hyperkalemia compared to steroidal MRAs. Moreover, this treatment reduced heart failure hospitalizations, and did so in people with microalbuminuria and eGFR values up into the 80s (17). Recently, finerenone was approved by Health Canada to reduce the risk of kidney function decline, kidney failure, CV death, nonfatal heart attacks, and hospitalizations for heart failure in people with T2D. It is the only NS-MRA of the NS-MRAs available for this indication. This is not true for the steroidal MRAs.

The finerenone program included two phases and three trials that had complementary protocols. These were independent, event-driven, randomized, double-blind placebo-controlled trials with similar designs and reciprocal primary and key secondary outcomes (i.e. the primary endpoint in one trial corresponds with the key secondary endpoint in the other). FIDELIO-DKD investigated the efficacy and safety of finerenone in delaying CKD progression in advanced CKD, whereas FIGARO-DKD evaluated the efficacy and safety of finerenone in reducing CV morbidity and mortality in earlier stages of CKD. In addition, the finerenone program included a prespecified individual patient-level analysis of both trials, FIDELITY (21). The primary outcomes were defined as CV endpoints and renal endpoints, including doubling of serum creatinine and time to end-stage kidney disease. In this analysis, both were highly significant, supporting the use of this agent with an SGLT2i and RAS blocker to further slow DKD progression and reduce CV risk.

In conclusion, based on our current knowledge, we now have three pillars to support the halting of DKD progression: maximally tolerated doses of RAS inhibitors, SGLT2i, and the NS-MRA, finerenone (22). All of these agents are of proven benefit and are strongly recommended to be used in heart failure where four pillars of therapy are used because of their individual beneficial effects. Moreover, a recent network meta-analysis strongly supported the use of all three agents for the best cardiorenal outcomes (23). So, using this paradigm, health-care professionals are encouraged to use these three pillars of therapy in all qualifying individuals, to maximally slow DKD progression and reduce CV events and risk.

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Dr. Gerald S. Wong Service Award

Bruce Perkins MD, FRCPC

Dr. Bruce Perkins has been a wonderful long-time volunteer for Diabetes Canada and an outstanding advocate for the diabetes community. His clinical work and internationally renowned research have led to advances in diabetes care and major improvements in the management of the disease, subsequently improving the lives of people living with, and affected by, diabetes.

He is the Director, Leadership Sinai Centre for Diabetes in Toronto and a Professor of Medicine, Division of Endocrinology and Metabolism, and Institute of Health Policy, Management and Evaluation, at the University of Toronto. He obtained his MD and Internal Medicine training at the University of Toronto, his endocrinology subspecialty training at Harvard University, his Masters of Public Health in Epidemiology at the Harvard School of Public Health, and a research fellowship in epidemiology at the Joslin Diabetes Center.

Dedicated to the study of type 1 diabetes, his current research is focussed on a number of topics, including the diagnosis and prediction of diabetic neuropathy, the most common diabetes complication; diabetic kidney disease prediction and identification of novel causative factors and interventions; and novel glycemic interventions for type 1 diabetes, including non-insulin therapies and additional contributions to existing models of the artificial pancreas. Recently, he has also focused on ways to preserve insulin production at the diagnosis of type 1 diabetes and has contributed to research on stem-cell derived islet cells in humans.

He has served as a Steering Committee member of the Diabetes Canada clinical practice guidelines (CPG), as well as Chair, Microvascular Complications. He leads the CIHR/SPOR-funded Diabetes Action Canada Clinical Trials Goal Group, and he was the recipient of the Diabetes Canada (formerly Canadian Diabetes Association) – Canadian Institutes of Health Research 2015 Young Scientist Award.

We thank Dr. Perkins for his amazing work with the diabetes community, and congratulate him on this award.

Continuous Glucose Monitoring at Diagnosis in Pediatrics: The McMaster Experience

Ereny Bassilious MD, FRCPC, MHPE; Joanne Gibson RD, CDE
McMaster Children's Hospital, Hamilton, Ont.

There is an abundance of evidence for real time continuous glucose monitoring (rtCGM) and flash glucose monitoring (FGM) as a key tool in the management of type 1 diabetes (T1D). Evidence supports many benefits to rtCGM and FGM, including a reduction in glycated hemoglobin (A1C), increase of time in range (TIR), and reduction in hypoglycemic events in people with T1D. Both children with diabetes and their parents report improved quality of life (QoL) (1,2). Recent literature supports early initiation of rtCGM in the T1D pediatric population with evidence of sustained rtCGM wear time, decreased time in hypoglycemia, and sustained long-term improvement in A1C (3,4).

At our large tertiary academic children's centre, our T1D team has adopted early rtCGM and FGM initiation shortly after diagnosis. This initiative was triggered by a recognition of the many benefits of this technology and the increasing availability of funding for rtCGM and FGM devices in Ontario.

All families of newly diagnosed children with T1D at McMaster Children's Hospital in Hamilton, Ontario, attend a series of education appointments with our multidisciplinary team. Integration of rtCGM and FGM education into our existing education pathway further enhances the families' understanding of diabetes and its management.

Table 1: Patient education pathway

Day	Who you will see	Existing education pathway	Enhanced CGM curriculum
1	Doctor Nurse	Insulin administration Glucometer Low BG	Introduce rtCGM or FGM Provide starter kit Funding paperwork
2 or 3	Dietitian	Meal planning Carb counting	
2 or 3	Child life worker/ social worker	Assessment/support Financial issues	
2 or 3	Nurse	Review High BG management Glucagon	Visit increased to 2 hours Benefits/barriers Alarms Data sharing Insertion
Two to three weeks	Doctor Dietitian	School plan Review ICR Dose adjustment	rtCGM/FGM reports rtCGM/FGM to inform dose adjustment
Four weeks	Nurse	Review Sick days Mini-dose glucagon	rtCGM use in illness management
Six weeks	Doctor Dietitian	Review/adjust Advanced carb counting ISF Exercise	rtCGM /FGM to evaluate effect of activity on BG and effectiveness of activity plan rtCGM/FGM in dose adjustment Trend arrows with rtCGM

BG, blood glucose; *CGM,* continuous glucose monitoring; *FGM,* flash glucose monitoring; *ICR,* insulin-to-carbohydrate ratio; *ISF,* insulin sensitivity factor; *rtCGM,* real-time continuous glucose monitoring.

Table 1 outlines the new patient education pathway at McMaster Children's Hospital and how the rtCGM and FGM curriculum has been embedded.

With implementation of this rtCGM/FGM curriculum, we have noted a robust uptake of rtCGM and FGM in our T1D population. Feedback from children with T1D and their families consistently echo benefits highlighted in the literature (5), including improved QoL, confidence in management, and increased TIR. Through continuous quality improvement initiatives, our clinic plans to refine our education curriculum to respond to the evolving needs of children with T1D and their families.

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Diabetic Foot Screening and Care Pathways Are a Necessity in Canada

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Up to 34% of Canadians with diabetes will develop a diabetic foot ulcer (DFU) in their lifetime (1). The rate of diabetes-related amputation is rising and related care is fragmented (2,3). The impacts of amputation deeply affect the lives of individuals and their families, and lead to increased use of health-related services (3).

How to Act Against Amputation

It is feasible to help individuals and their families to develop self-management skills, knowledge, and behaviours using targeted education and support. An interdisciplinary health-care team that communicates and works with clients, performs regular foot screening, provides education about foot care and footwear, and promotes prevention by using defined trajectories can reduce the number of clients receiving an amputation by about 80%. Building a specialized and integrated care team helps to ensure a defined pathway for people with diabetes (1,3).

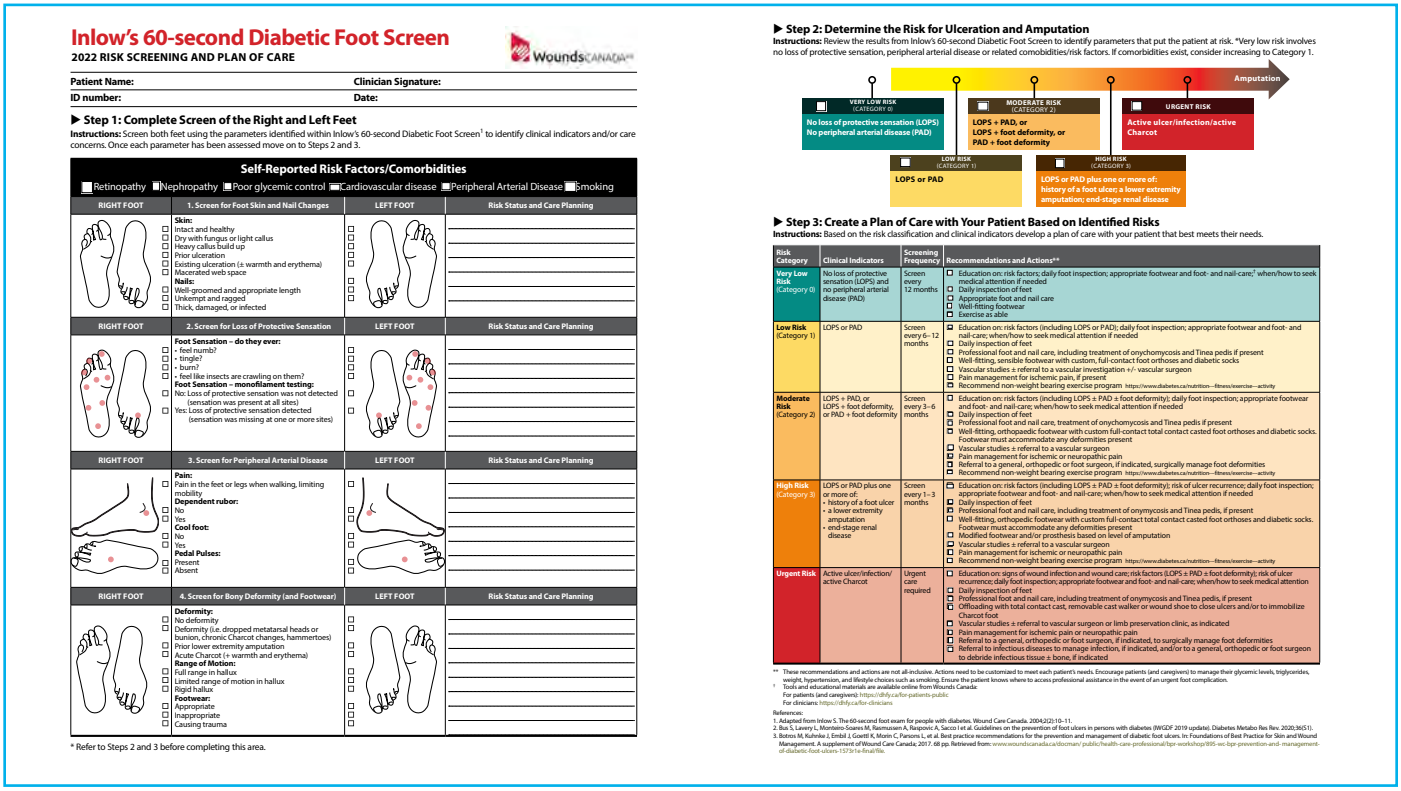
Foot Screening in Practice

Use of diabetic foot screening tools in all care settings creates a common communication between individuals and interdisciplinary teams across health sectors (3,4). In Canada, it is estimated less than half of people with diabetes have their feet and limbs appropriately screened (4). Foot screening is recommended by leading health organizations, such as the International Working Group on Diabetic Foot, Wounds Canada, Diabetes Canada, and the Registered Nurses' Association of Ontario.

Inlow's 60-second Diabetic Foot Screen (2022) is a tool available in French and English (Figure 1) (5). Validated for inter-/intra-reliability and predictive value in the previous version, the updated version's validation is ongoing. For an individual with diabetes, the screening result provides them a level of risk and suggests what educational activity they could benefit from. The activities include education on footwear and socks, daily foot care, skin moisturizing, and inspection (3,5).

The health professional follows three steps when using Inlow's tool (5):

- Step 1: Complete the evaluation of both feet by assessing 1) the skin of the foot and nail condition, 2) loss of protective sensation using a monofilament (follow manufacturer's instructions), 3) suspected peripheral arterial disease,



Inlow's 60-second Diabetic Foot Screen
2022 RISK SCREENING AND PLAN OF CARE

Patient Name: Clinician Signature:
ID number: Date:

▶ Step 1: Complete Screen of the Right and Left Feet
Instructions: Screen both feet using the parameters identified within Inlow's 60-second Diabetic Foot Screen[1] to identify clinical indicators and/or care concerns. Once each parameter has been assessed move on to Steps 2 and 3.

Self-Reported Risk Factors/Comorbidities
☐ Retinopathy ☐ Nephropathy ☐ Poor glycemic control ☐ Cardiovascular disease ☐ Peripheral Arterial Disease ☐ Smoking

RIGHT FOOT	1. Screen for Foot Skin and Nail Changes	LEFT FOOT	Risk Status and Care Planning
	Skin: ☐ Intact and healthy ☐ Dry with fungus or light callus ☐ Heavy callus build up ☐ Prior ulceration ☐ Existing ulceration (± warmth and erythema) ☐ Macerated web space **Nails:** ☐ Well-groomed and appropriate length ☐ Unkempt and ragged ☐ Thick, damaged, or infected		
RIGHT FOOT	**2. Screen for Loss of Protective Sensation**	**LEFT FOOT**	**Risk Status and Care Planning**
	Foot Sensation – do they ever: ☐ • feel numb? ☐ • tingle? ☐ • burn? ☐ • feel like insects are crawling on them? **Foot Sensation – monofilament testing:** ☐ No: Loss of protective sensation was not detected (sensation was present at all sites) ☐ Yes: Loss of protective sensation detected (sensation was missing at one or more sites)		
RIGHT FOOT	**3. Screen for Peripheral Arterial Disease**	**LEFT FOOT**	**Risk Status and Care Planning**
	Pain: ☐ Pain in the feet or legs when walking, limiting mobility **Dependent rubor:** ☐ No ☐ Yes **Cool foot:** ☐ No ☐ Yes **Pedal Pulses:** ☐ Present ☐ Absent		
RIGHT FOOT	**4. Screen for Bony Deformity (and Footwear)**	**LEFT FOOT**	**Risk Status and Care Planning**
	Deformity: ☐ No deformity ☐ Deformity (i.e. dropped metatarsal heads or bunion, chronic Charcot changes, hammertoes) ☐ Prior lower extremity amputation ☐ Acute Charcot (+ warmth and erythema) **Range of Motion:** ☐ Full range in hallux ☐ Limited range of motion in hallux ☐ Rigid hallux **Footwear:** ☐ Appropriate ☐ Inappropriate ☐ Causing trauma		

* Refer to Steps 2 and 3 before completing this area.

▶ Step 2: Determine the Risk for Ulceration and Amputation
Instructions: Review the results from Inlow's 60-second Diabetic Foot Screen to identify parameters that put the patient at risk. *Very low risk involves no loss of protective sensation, peripheral arterial disease or related comobidities/risk factors. If comorbidities exist, consider increasing to Category 1.

Amputation

VERY LOW RISK (CATEGORY 0)	MODERATE RISK (CATEGORY 2)	URGENT RISK
☐ No loss of protective sensation (LOPS) No peripheral arterial disease (PAD)	☐ LOPS + PAD, or LOPS + foot deformity, or PAD + foot deformity	☐ Active ulcer/infection/active Charcot

LOW RISK (CATEGORY 1)	HIGH RISK (CATEGORY 3)
☐ LOPS or PAD	☐ LOPS or PAD plus one or more of: history of a foot ulcer; a lower extremity amputation; end-stage renal disease

▶ Step 3: Create a Plan of Care with Your Patient Based on Identified Risks
Instructions: Based on the risk classification and clinical indicators develop a plan of care with your patient that best meets their needs.

Risk Category	Clinical Indicators	Screening Frequency	Recommendations and Actions**
Very Low Risk (Category 0)	No loss of protective sensation (LOPS) and no peripheral arterial disease (PAD)	Screen every 12 months	☐ Education on: risk factors; daily foot inspection; appropriate footwear and foot- and nail-care;† when/how to seek medical attention if needed ☐ Daily inspection of feet ☐ Appropriate foot and nail care ☐ Well-fitting footwear ☐ Exercise as able
Low Risk (Category 1)	LOPS or PAD	Screen every 6–12 months	☐ Education on: risk factors (including LOPS or PAD); daily foot inspection; appropriate footwear and foot- and nail-care; when/how to seek medical attention if needed ☐ Daily inspection of feet ☐ Professional foot and nail care, including treatment of onychomycosis and Tinea pedis if present ☐ Well-fitting, sensible footwear with custom, full-contact foot orthoses and diabetic socks ☐ Vascular studies ± referral to a vascular investigation +/- vascular surgeon ☐ Pain management for ischemic pain, if present ☐ Recommend non-weight bearing exercise program https://www.diabetes.ca/nutrition---fitness/exercise---activity
Moderate Risk (Category 2)	LOPS + PAD, or LOPS + foot deformity, or PAD + foot deformity	Screen every 3–6 months	☐ Education on: risk factors (including LOPS ± PAD ± foot deformity); daily foot inspection; appropriate footwear and foot- and nail-care; when/how to seek medical attention if needed ☐ Daily inspection of feet ☐ Professional foot and nail care, treatment of onychomycosis and Tinea pedis if present ☐ Well-fitting, orthopaedic footwear with custom full-contact total contact casted foot orthoses and diabetic socks. Footwear must accommodate any deformities present ☐ Vascular studies ± referral to a vascular surgeon ☐ Pain management for ischemic or neuropathic pain ☐ Referral to a general, orthopedic or foot surgeon, if indicated, surgically manage foot deformities ☐ Recommend non-weight bearing exercise program https://www.diabetes.ca/nutrition---fitness/exercise---activity
High Risk (Category 3)	LOPS or PAD plus one or more of: • history of a foot ulcer • a lower extremity amputation • end-stage renal disease	Screen every 1–3 months	☐ Education on: risk factors (including LOPS ± PAD ± foot deformity); risk of ulcer recurrence; daily foot inspection; appropriate footwear and foot- and nail-care; when/how to seek medical attention if needed ☐ Daily inspection of feet ☐ Professional foot and nail care, including treatment of onymycosis and Tinea pedis, if present ☐ Well-fitting, orthopedic footwear with custom full-contact total contact casted foot orthoses and diabetic socks. Footwear must accommodate any deformities present ☐ Modified footwear and/or prosthesis based on level of amputation ☐ Vascular studies ± referral to a vascular surgeon ☐ Pain management for ischemic or neuropathic pain ☐ Recommend non-weight bearing exercise program https://www.diabetes.ca/nutrition---fitness/exercise---activity
Urgent Risk	Active ulcer/infection/ active Charcot	Urgent care required	☐ Education on: signs of wound infection and wound care; risk factors (LOPS ± PAD ± foot deformity); risk of ulcer recurrence; daily foot inspection; appropriate footwear and foot- and nail-care; when/how to seek medical attention ☐ Daily inspection of feet ☐ Professional foot and nail care, including treatment of onymycosis and Tinea pedis, if present ☐ Offloading with total contact cast, removable cast walker or wound shoe to close ulcers and/or to immobilize Charcot foot ☐ Vascular studies ± referral to vascular surgeon or limb preservation clinic, as indicated ☐ Pain management for ischemic pain or neuropathic pain ☐ Referral to a general, orthopedic or foot surgeon, if indicated, to surgically manage foot deformities ☐ Referral to infectious diseases to manage infection, if indicated, and/or to a general, orthopedic or foot surgeon to debride infectious tissue ± bone, if indicated

** These recommendations and actions are not all-inclusive. Actions need to be customized to meet each patient's needs. Encourage patients (and caregivers) to manage their glycemic levels, triglycerides, weight, hypertension, and lifestyle choices such as smoking. Ensure the patient knows where to access professional assistance in the event of an urgent foot complication.
† Tools and educational materials are available online from Wounds Canada:
For patients (and caregivers): https://dhfy.ca/for-patients-public
For clinicians: https://dhfy.ca/for-clinicians

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Figure 1: Inlow's 60-second Diabetic Foot Screen tool used with the permission of Wounds Canada.

and 4) foot deformities. The health-care provider asks the individual to self-report risk factors and comorbidities, such as retinopathy, nephropathy, and smoking.

- Step 2: Based on the individual's self-reported information and assessment, the health-care professional determines the individual's risk of DFU based on the risk categories of very low, low, moderate, high, and urgent. This is informed by the previous observations.
- Step 3: Once the level of risk is identified, the recommendations and action plan can be determined. Adapt the care plan to respect the individual's needs, values, and cultural preferences, experience with trauma, and ability to participate. Engage relevant caregivers, as needed, to support the individual.

Wounds Canada recently released the Foot Health Pathway for People Living with Diabetes (2), which integrates foot screening. The pathway takes a risk-based approach consistent with population health principles as outlined by the Institute for Healthcare Improvement. This strongly supports a person-centred and preventative approach and upstream principles. This potentially prevents individuals with diabetes from needing complex health and social services in the downstream services (2).

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Diabetes and Bariatric Surgery

Anne McLaughlin MEd., RD, CDE

A review of the 2022 Diabetes Canada/Canadian Society of Endocrinology and Metabolism annual professional conference session, "Diabetes and Bariatric Surgery," which included three different speakers and their perspectives on bariatric surgery and key components to help ensure success. The session ended with a person who shared their perspective post bariatric surgery, reminding health-care practitioners to take a person-first approach to care.

Stephanie Cameron RD

Stephanie Cameron, RD, began this session by emphasizing that nutrition is a key component of an individual's success and safety after bariatric surgery. People living with obesity are already at higher risk for inadequate nutrition status and malnutrition, and bariatric surgery places those individuals at even higher nutrition risk. Preoperative bariatric surgery preparation and postoperative follow-up is required.

An interdisciplinary presurgery assessment ensures that bariatric surgery is safe and appropriate for the individual. This includes medical, nutrition, psychosocial, and functional assessments.

Ms. Cameron highlighted the chapter in the Obesity Canada Clinical Practice Guidelines (CPG) for Adults entitled "Bariatric Surgery: Selection and Preoperative Work-up": "Overall, there is no compelling evidence mandating weight loss prior to bariatric surgery for the long-term efficacy of weight management, but rather only for the technical simplicity of the surgery" (1).

A typical diet progression after surgery begins with full fluids from zero to two weeks postoperatively, transitioning to soft solids at two to three weeks and then returning to solids after three weeks (2). Postsurgery eating behaviours are also crucial to minimizing postoperative complications. Eating recommendations include choosing small portions; regular meals/snacks; eating slowly and chewing food well; separating liquids and solids; sipping fluids slowly throughout the day; avoiding use of straws; avoiding carbonated beverages and alcohol; and limiting chewy, sticky, stringy textures. Micronutrient deficiencies can develop after bariatric surgery for several reasons, such as poor oral intake, malabsorption

from the surgery itself, and increased excretion or losses. Because of this, lifelong vitamin and mineral supplementation is required, and biochemical nutrient data must be monitored regularly (3). Additionally, one of the realities of bariatric surgery is the risk of postoperative complications. The complications can include diarrhea, constipation, vomiting or regurgitation, acid reflux, and dumping syndrome (2).

In conclusion, bariatric surgery can be a life-changing treatment option for people living with obesity, especially those with type 2 diabetes (T2D). If a person decides to pursue bariatric surgery as a treatment option, it is important that they are well informed of both the risks and the lifelong changes required to ensure success and safety after the surgery.

Jo Telfer PhD

Jo Telfer, PhD, opened her presentation with an important message: "Obesity is a complex chronic disease in which abnormal or excess body fat (adiposity) impairs health" (4). It is important that health-care professionals and individuals affected with adiposity understand the complexity of obesity and the many factors that influence it. Many people experience blame and shame, weight bias, and feelings of failure related to dieting. She encourages individual self-compassion and provides support and resources. Dr. Telfer also noted the importance of changing one's relationship with food. As part of her work, she works with individuals to explore their relationship with food by looking at many factors affecting food intake. In her presentation, Dr. Telfer highlighted a mindful eating exercise. Other factors include hunger and fullness, stress management, coping strategies, sleep, and physical activity. An important question she asks people considering bariatric surgery is, "Am I willing and able to live the lifestyle to keep the weight off for the rest of my life?" Dr. Telfer highlighted that bariatric surgery is a tool, but skills are required for long-term success.

Dr. Telfer works as part of an interdisciplinary team that deploys many types of screening tools, including for depression, attention deficit hyperactivity disorder, anxiety, sleep apnea, and alcohol use. Dr. Telfer encouraged educators working in this area to educate themselves, review the Canadian Adult Obesity Clinical Practice Guidelines—The Role of Mental Health in Obesity Management chapter (5), and learn about screening tools used in their practice.

In her closing message, Dr. Telfer encouraged educators to educate themselves about obesity, listen to the person's story, and use Obesity Canada's 5A's of Obesity Management in practice. Most importantly, she stressed the importance of creating a compassionate, nonjudgmental, and stigma-free environment when working with people with obesity.

Aristithes Doumouras MD, MPH, FRCSC

In his opening slide, Aristithes Doumouras, MD, MPH, FRCSC, emphasized that treating obesity is a vital management strategy for diabetes, and metabolic targets should be treated concurrently. Dr. Doumouras reiterated that surgery is a tool, just like pharmacotherapy, psychological strategies/therapies, and lifestyle interventions. In practice, we must use them all.

Dr. Doumouras provided a detailed overview of the different surgical options—sleeve gastrectomy, gastric bypass, and duodenal switch—and reviewed outcomes and limitations for each surgery. For more information, refer to the Obesity Canada CPG chapter, Bariatric Surgery: Surgical Options and Outcomes (6).

As part of a bariatric surgery assessment, there are many important considerations, including body mass index (BMI), comorbidities (gastroesophageal reflux disease, inflammatory bowel disease), individual choice and behaviours, previous surgery, and medication use. Dr. Doumouras noted that "there were no absolute indication based on BMI," but BMI is considered in terms of surgery choice. As part of the preoperative workup, Dr. Doumouras provided a summary of selection tools, risk assessment, preoperative investigations, and medical considerations to be used with clients (see CPG chapter, Bariatric Surgery: Surgical Options and Outcomes (6).

In a recent study, Dr. Doumouras et al examined the association between bariatric surgery and all-cause mortality (6). This was a cohort study that included 6,910 individuals with type 2 diabetes and severe obesity. One study finding was that all-cause mortality was 2.4 per cent (%) in the bariatric surgery group and 5.2% in the nonsurgery group. Additionally, a 68% decrease in cardiovascular mortality, a 34% decrease in composite cardiac events, and a 42% decrease in nonfatal renal events was associated when the bariatric surgery group was compared with a nonsurgical control group after 4.6 years of follow-up (7).

Dr. Doumouras reviewed Obesity Canada CPG recommendations stating that bariatric surgery can be considered for people with BMI >40 kg/m^2 or BMI >35 kg/m^2 with at least one adiposity-related disease to induce significantly better long-term weight loss compared with medical management alone; and to induce control and remission of type 2 diabetes, in combination with best medical management, over best medical management alone (6).

Dr. Doumouras concluded by suggesting obesity treatment should be a foundation of type 2 diabetes treatment and can be done concurrently with other types of management. He noted that bariatric surgery remains the gold standard for obesity treatment and the best treatment for diabetes in individuals living with obesity. He noted that bariatric surgery is an important option for obesity treatment, including for those living with diabetes and obesity.

Kari Duarte, Person With Lived Experience

Kari Duarte shared her life-changing personal journey with bariatric surgery. Despite undergoing two separate bariatric surgical procedures, Kari did not have easy access to bariatric surgery and her story emphasizes the toll it can take on a person when there are barriers limiting access to care. Kari

spoke of how much better she feels after successful bariatric surgery and observed that although there is a daily routine of supplements and, in her case, complications, "these are things I can control, not things controlling me." She emphasized that successful bariatric surgery requires the correct mindset and support, and encouraged the audience to adopt a person-first approach: "listen to the person's story, how they got there, and why they want to change".

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How Diabetes Technology Has Changed Our Practice

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A review of the 2022 Diabetes Canada/Canadian Society of Endocrinology and Metabolism annual professional conference symposium, "Eureka Moments: How Real-time Continuous Blood Glucose Monitoring (rtCGM) Has Changed Our Practice."

Diabetes technology advancements have unquestionably transformed our health-care practices. For people living with diabetes (PwD), glucose sensors provide invaluable information for in-the-moment diabetes management decisions, while improving outcomes and relieving burden. For clinicians, we have practical glucose metrics that provide tremendous insight. As we have adapted to embrace these new tools, learning has been immense. After much reflection, we narrowed down our most impactful "Eureka" revelations to share.

1. The sooner real-time continuous glucose monitoring (rtCGM) is started after diagnosis, the better.

Recent evidence has shown significantly lower glycated hemoglobin (A1C) values in people with type 1 diabetes (T1D) who start rtCGM within the first year of diagnosis. This A1C benefit was sustained for seven years of follow-up. PwD who started rtCGM three years after diagnosis did see some benefit, but did not reach the lower A1C values of those who started within year one (1).

Consider the proactive discussion points in Textbox 1 to support PwD and encourage success during rtCGM initiation.

2. Time in range (TIR) is important, but, without more insight about glycemic variability and daily management, we risk being blind to some of the other things that may be going on.

Our health-care team now has an abundance of glucose data combined with new metrics that can facilitate understanding and meaningful conversations. We unanimously agree that no single glucose metric in isolation can accurately portray

Textbox 1: Discussion points when people with diabetes start continuous glucose monitoring

1. Don't do anything different for at least one week!
2. Understand the acceptable difference between capillary blood glucose and continuous glucose monitoring values.
3. Customize high and low alerts—how? why?
4. Understand what the trend arrows are telling you.
5. Recognize what the data is telling you.
6. Establish realistic expectations.

the complete picture of an individual's glucose profile. While TIR offers a snapshot, glycemic variability presents insights about hypoglycemia risk and daily management. A coefficient of variation (CV) of less than 36% indicates that glucose levels are "stable" with a reduced risk of hypoglycemia (2). When the CV is over 36%, always ask the PwD about hypoglycemia and use exploratory questions to reveal other sources of variability (Figure 1).

Optimizing post-prandial glucose can be key in minimizing glycemic variability. A recent study in people with type 2 diabetes (T2D) demonstrated how postprandial glucose increasingly influences TIR, as TIR increases toward the goal of 70 per cent (%), and beyond (3). We see similar examples with automated insulin delivery in T1D; overnight glucose consistently comes into range, and daytime glucose, influenced heavily by postprandial glucose, often becomes the focus for further improvements (4). Strategies to improve postprandial variability include discussing carbohydrate quality and quantity, pre-meal bolusing, and the mealtime dose itself. It is critical to respect PwD's autonomy with food choices and use shared decision-making for mealtime strategies to minimize potential diabetes distress related to eating.

3. Simple teaching on trend arrows, alerts, and alarms can be really helpful in individualizing diabetes management.

There are simple and effective ways to include education on rtCGM features, which can be incredibly meaningful in self-management. Individualizing alert settings can help PwD develop trust. The "Triple A" rules emphasize that alerts are Actionable, Avoid alert fatigue, and Adjustable (6). To help PwD find their "just right" settings, ask them at what number they usually take action. Encourage setting the low alert slightly above the level they typically treat a low. Suggest setting the high alert slightly below the level they generally correct with insulin between meals. Tighter alerts could create alert fatigue, while wider alerts may result in missed opportunities to prevent hypo- or hyperglycemia. Additionally, use of predictive low-glucose alarms have shown to reduce the frequency, duration, and severity of hypoglycemic and rebound hyperglycemic events (7).

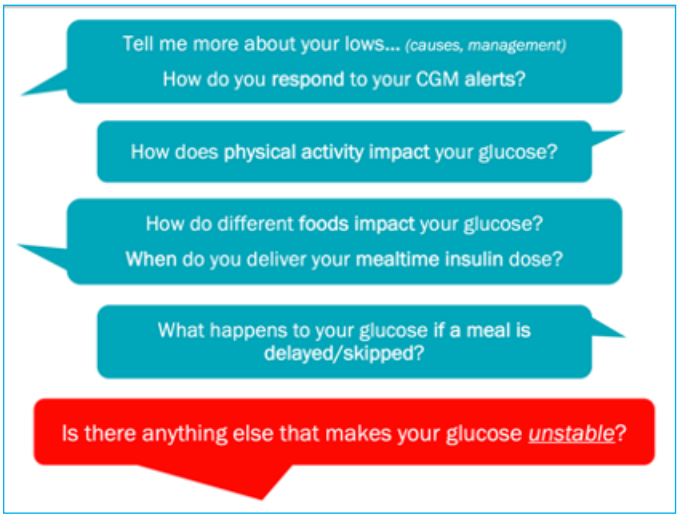

Figure 1: Exploring glycemic variability.

Trend arrows provide meaning and context behind single glucose values. Understanding what these arrows mean can guide people to act differently. The simple 2-4-6 rule for expected glucose changes based on trend arrows (Table 1) provides a practical way to help PwD adjust management decisions (6,8). A little more or less insulin based on trend arrows can be a quick way to boost TIR.

4. If it isn't automated, it might not happen.

Automation has been a "game-changer" for PwD. rtCGM data are automatically pushed to smartphones and insulin pumps with the ability to customize alerts. This can help PwD proactively prevent hypo- and hyperglycemia, improve A1C and TIR, and even address fear of hypoglycemia. Adding more technology with automated insulin delivery (AID) takes it a step further. The ability to auto-adjust basal delivery, auto-suspend and deliver auto-correction boluses helps minimize hypo- and hyperglycemia. We have watched AID consistently optimize the overnight glucose profile. Even youth who did not change bolus behaviours have shown improvements in TIR (5). Traditional prerequisites for pump therapy may not be necessary with AID. We have seen numerous examples of success with AID technology across individuals with diverse levels of education, age groups, and baseline glycemic metrics.

5. It's important to be patient and trust the system.

Learning to trust technology can take time and patience. Lack of trust often leads to behaviours that can further contribute to glycemic variability. Seeing glucose values higher or lower than expected may result in overcorrecting hyperglycemia or overtreating hypoglycemia. Being patient with insulin action time and hypoglycemia recovery time are important educational points. With AID, trust becomes even

Arrows	Meaning	Approximate glucose change in 30 min
↑↑	**Rapidly rising**	**+ 6** mmol/L
↑	**Rising**	**+ 4** mmol/L
↗	**Slowly rising**	**+ 2** mmol/L
→	**Steady**	**No significant change**
↘	**Slowly falling**	**- 2** mmol/L
↓	**Falling**	**- 4** mmol/L
↓↓	**Rapidly falling**	**- 6** mmol/L

Figure 2: Utilizing continuous glucose monitoring trend arrows (2-4-6 Rule). Adapted, with rounding, from Pettus J, Edelman SV. *J Diabetes Sci Technol*. 2017;11:138-47; and Al-Gadi I, Menon S, Lyons SK, DeSalvo DJ. *Diabetes Spectr*. 2021;34:139-48.

more important, as the system works in the background to minimize glucose fluctuations. During AID education, we emphasize to the PwD that trusting more, hence interfering less, has the potential to further improve TIR, variability, and burden.

6. Diabetes technology is not just for engineers.

Finally, as health-care professionals, we need to be cautious of our own biases and assumptions regarding technology use. PwD from all socioeconomic backgrounds and with varying levels of health and technology literacy can benefit from CGM. Health-care providers often perceive more barriers to technology use than PwD, which can lead to inequitable access (9,10). Data from the T1D Exchange registry illustrated that although ethnic groups of lower socioeconomic status had higher A1C values, they improved dramatically when started on CGM (11). The high quality of evidence for rtCGM is reflected in Diabetes Canada's 2021 update on glucose monitoring recommendations, which states that rtCGM should be used in people with T1D of all ages, and may be used in persons with T2D using basal-bolus insulin therapy (2). Evidence continues to emerge showing benefits of rtCGM in adults with T2D using less intensive regimens (12).

We look forward to watching how technology will continue to evolve in the coming years, with hope for ongoing improvements to access for all PwD who may benefit from its use. As clinicians, we must challenge ourselves to continue advancing our skills and embrace new tools as they become available. Ultimately, the use of technology has revealed its potential to help us be more effective and efficient at what we do, while improving the lives of PwD who use it.

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Straight to the Source: Early Glucose Management and Weight Reduction With Dual GIP/GLP-1 Receptor Agonism in People With Type 2 Diabetes

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A review of the 2022 Diabetes Canada/Canadian Society of Endocrinology and Metabolism annual professional conference breakfast session, "Straight to the Source: Early Glucose Control and Weight Reduction With Dual GIP/GLP-1 Receptor Agonism in People With T2D and/or Obesity."

Weight reduction shortly after diagnosis of type 2 diabetes (T2D) has been shown to slow the progression of the disease. In an exploratory analysis of the Diabetes Prevention Program, a clinical trial in prevention of T2D, every 1 kg of weight loss achieved by intensive lifestyle intervention in people with impaired glucose tolerance and body mass index >24 kg/m^2 was associated with a reduction in the risk of developing T2D by 16% (1). In the Diabetes Remission Clinical Trial (DiRECT), 86% of people recently diagnosed with T2D with sustained weight loss of at least 15% of their body weight achieved diabetes remission at 12 months (2).

In a recent systematic literature review on weight loss in adults with T2D and overweight or obesity, each kilogram or percent of weight lost was correlated to a mean glycated hemoglobin (A1C) reduction of 0.1% (3).

Experience and research have shown that underlying metabolic abnormalities leading to T2D are typically present decades before diagnosis. Upstream interventions focusing on weight management earlier in the natural history of T2D can disrupt the underlying pathophysiology or reverse or slow down the disease course (2,4–8).

However, it is important to recognize that obesity is not simply a product of lifestyle choices. It is not always possible to achieve significant weight loss with lifestyle interventions alone, and maintenance of weight loss once achieved is very challenging. Weight regain is common with lifestyle interventions. An additional and important consideration is that obesity treatments lead to less weight loss in people with T2D than in people without T2D (2,4,9).

Surgical interventions may be an option to induce remission of T2D for some people with obesity. Bariatric surgery can also be considered for people with class 1 obesity and severe, uncontrolled obesity-related disease, such as poorly managed T2D, despite optimal medical management (10). Continued advancements in pharmacotherapy for the management of T2D and obesity are producing excellent results in both A1C and weight reduction.

Tirzepatide is a dual glucose-dependent insulinotropic polypeptide (GIP)/glucagon-like peptide-1 (GLP-1) receptor agonist that binds both GIP and GLP-1 receptors and has a mean half-life of approximately five days, enabling once-weekly dosing. While GIP and GLP-1 can have some similar and synergistic effects on the central nervous system and pancreatic beta cells, some impacts differ. For instance, GIP increases glucagon under some circumstances, while GLP-1 has the opposite effect. GIP also improves insulin sensitivity in skeletal muscle and adipose tissue, while GLP-1 improves insulin sensitivity in the liver (11). The mechanisms of action and how they interplay are still under investigation, however tirzepatide has shown some promising results.

The SURPASS clinical trial program investigated the effect of tirzepatide—5, 10, or 15 mg—administered once weekly for the treatment of T2D either as monotherapy or in combination with various background therapies used in both arms (metformin, sodium-glucose cotransporter-2 inhibitor [SGLT2i], ≥1 and ≤3 oral antihyperglycemic agents [metformin, SGLT2, or sulfonylurea], or insulin glargine with or without metformin) and compared with placebo, semaglutide 1 mg, insulin degludec, or insulin glargine. No matter the background therapy, A1C reduction was impressive in the tirzepatide arms, between –1.87% to –2.59% versus 0.04% to –1.86% in the different comparator arms. Weight reduction achieved was –6.2 to –12.9 kg versus –2.7 to –6.2 kg. Body weight loss of greater than 15% was achieved by 23% to 43% of individuals receiving tirzepatide 15 mg (12–16).

Over the full duration of the trials (40 to 52 weeks), gastrointestinal disorders (nausea, vomiting, and diarrhea) were the most commonly reported adverse events with tirzepatide, similar to what is seen with the GLP-1 receptor agonist class. Cholelithiasis occurred slightly more frequently versus placebo (0.55% in tirzepatide arm vs 0.29% in all comparators vs 0% in placebo arms); no cases of medullary thyroid cancer were reported in the registration clinical trials; pancreatitis was reported in 0.2% in the tirzepatide-treated arm versus 0.1% in the comparator-treated arm; and there was an increase in heart rate of 2 to 4 beats/minute (with cardiovascular outcomes trials ongoing) (12–16). Rapid improvement in glucose management has been associated with a temporary worsening of diabetic retinopathy. Tirzepatide has not been studied in people with nonproliferative diabetic retinopathy requiring acute therapy, proliferative diabetic retinopathy, or diabetic macular edema, and should be used with caution in these individuals, with appropriate monitoring.

The dual GIP/GLP-1 receptor agonist tirzepatide (Mounjaro®) is now indicated in Canada (but not yet commercially available) for once-weekly administration as an adjunct to diet and exercise to improve glycemic management for the treatment of adults with T2D, either 1) as a monotherapy when metformin is inappropriate due to contraindication or intolerance, or 2) in combination with metformin; metformin and a sulfonylurea; metformin and an SGLT2i; or basal insulin with or without metformin. It is not, or may not be appropriate, for individuals with the following health issues: history of retinopathy (with details as above), diabetic maculopathy, family history of medullary thyroid carcinoma, prior pancreatitis, or type 1 diabetes (17).

As with any therapy, dual GIP/GLP-1 receptor agonists may not be appropriate for all individuals, but it is exciting that we will soon have another tool in the arsenal to manage the growing epidemic of T2D (3).

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Sleep, Circadian Rhythms, and Metabolic Disease: What You Need to Know

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Sleep health is now considered by the World Health Organization to be critical for optimal human health. Restricting the amount of sleep ("amount"), sleeping at the wrong time of the day ("timing"), and poor-quality sleep ("quality") are the three key components of the sleep state that must be managed to provide optimal recovery on a daily basis. It is important for clinicians working in metabolic and/or cardiovascular disease to acknowledge the importance of sleep, circadian factors, and recovery in the management of a person's weight, glycemic parameters, blood pressure, and chronic inflammation.

Science of sleep and circadian rhythms

Since the late 1980s, research has focused on the basic science of the relationship between sleep, circadian rhythms, and the physiology of metabolism, energy consumption, and energy utilization in humans. Studies have shown that chronic sleep loss and disruption of circadian rhythms in shift work seem to have behavioural consequences directly associated with increased appetite and weight gain (1–6). It has become clear through clinical observation, epidemiological studies, and the basic sciences that sleep, circadian factors, and metabolism are tightly connected physiologically. This relationship depends on a balance between parasympathetic and sympathetic tone in humans. Specifically, the neuropeptide connecting sleep, circadian rhythms, and metabolism is the orexin system. Orexin is a critical neuropeptide that controls appetite through the hormones leptin and ghrelin. Orexin is also responsible for promotion of wakefulness/alertness in humans, which is under circadian control, and regulates the downstream release of histamine in a circadian pattern or rhythm. Histamine is the most potent wake-promoting neurotransmitter. Histamine antagonism (antihistamines) causes sedation while histamine agonism contributes to alertness and possible insomnia.

Clinical implications of sleep/circadian disruption

Health-care professionals should be aware of the consequences of sleep loss, sleep disruption, and shift work. Remember that sleep health is a function of getting the sleep you need, sleeping at the right circadian time, and ensuring good sleep quality. Sleep apnea is NOT the

Figure 1: Sleep and circadian factors represent the foundation of human recovery. Without adequate recovery, humans cannot achieve optimal health and human performance.

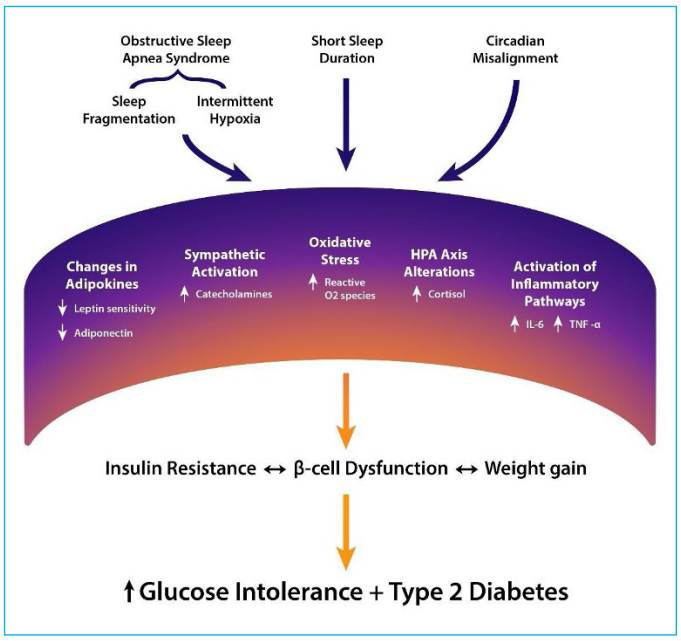

Figure 2: A diagrammatic representation of the impact of sleep/circadian rhythm disruption in humans on metabolic systems that result in metabolic dysregulation, poor weight control, and inflammatory factors that contribute to vascular disease. Adapted from: Shaw JE, Punjabi NM, Wilding JP, et al. Sleep-disordered breathing and type 2 diabetes: a report from the International Diabetes Federation Taskforce on Epidemiology and Prevention. *Diabetes Res Clin Pract*. 2008;81:2-12. *HPA*, hypothalamic-pituitary-adrenal; *IL-6*, interleukin-6; *TNF-α*, tumor necrosis factor alpha.

only sleep disorder! Individuals with a sleep disturbance will not respond optimally to diabetes medications and will be less able to follow dietary recommendations and remain physically active. Sleep disturbances are definitely linked to hypertension, metabolic disease, and heart disease as well as various psychiatric conditions (1–6).

What can you do?

In your clinical practice, ask individuals the following: "How is your sleep?", "Do you get enough sleep?", and "Do you feel rested when you wake up?" These are simple questions that will give you the information that you need to dig further, determine whether to refer for more formal evaluation or implement a strategy to help an individual affected by poor sleep get better sleep for optimal management of their metabolic disease, weight management issues, and general health.

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Diabetes and Nutrition: Different Approaches for Different Folks

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A review of the 2022 Diabetes Canada/Canadian Society of Endocrinology and Metabolism annual professional conference session, "Nutrition and Diabetes."

I had the pleasure of chairing the Diabetes and Nutrition session at the 2022 Diabetes Canada/Canadian Society of Endocrinology and Metabolism Professional Conference. At this session, Jenna Walsh, RD, CDE, and Dr. Michael Mindrum covered a spectrum of topics, from eating disorders and intuitive eating, to intermittent fasting and low-carbohydrate ketogenic diets.

Where to start with nutrition care?

Ms. Walsh reminded us that the messages a person receives shortly after diabetes diagnosis can have a lasting impact on their relationship with food. The language we use is important because diabetes nutrition education can teach behaviours that are recognized as symptoms of eating disorders. Examples include classifying foods as "good" or "bad," and hyperfocusing on counting calories or carbohydrates or on weight loss. To understand how a person is coping and inform our approach to nutrition education, Ms. Walsh recommended starting appointments by asking, "How are you coping with that [diabetes diagnosis]?"

Supporting a positive food relationship

Intuitive eating is an evidence-based strategy that can unpack a history of learned disordered eating and body shame due to dieting (1). Intuitive eating principles support respecting hunger and satiety cues and eating to nourish oneself without shame (Textbox 1). Ms. Walsh explained that it is not a "free-for-all" or a way of ignoring a chronic condition. The process requires time under the care of an aligned health-care team, ideally including a mental health practitioner. To demonstrate the principles of intuitive eating, Ms. Walsh recommended using phrases such as "what patterns are you noticing that

Textbox 1: Ten principles of intuitive eating

1. Reject diet mentality.
2. Make peace with food.
3. Feel your fullness.
4. Discover the satisfaction factor.
5. Exercise—feel the difference.
6. Honour your hunger.
7. Challenge the food police.
8. Respect your body.
9. Cope with your emotions without using food.
10. Honour your health with gentle nutrition.

Table 1: Initial medication adjustments for ketogenic diets (7)

Continue	Metformin (or maximize) GLP-1 receptor antagonist (or initiate)
Discuss	Benefits of DPP-4 inhibitors
Adjust	Insulin, sulfonylureas, diuretics
Stop	SGLT2 inhibitors

DPP-4, dipeptidylpeptidase-4; *GLP-1,* glucagon-like peptide-1; *SGLT2,* sodium-glucose cotransporter-2.

influence your blood sugar?" rather than "avoid foods that spike your sugar."

Intermittent fasting and low-carbohydrate ketogenic diets

Ms. Walsh reviewed different forms of intermittent fasting, and Dr. Mindrum illustrated the effective implementation of a low-carbohydrate ketogenic diet in a multidisciplinary setting (2). Both types of nutrition interventions have the potential to improve metabolic markers and reduce the need for pharmacotherapy (3,4). To mitigate potential harms associated with these interventions, a physical and mental assessment is important to identify conditions such as diabetes distress or binge eating disorder.

Using a case study from his clinic, Dr. Mindrum illustrated a 5As framework (Ask, Assess, Advise, Agree, Assist) for discussing type 2 diabetes remission when implementing a low-carbohydrate ketogenic diet in a multidisciplinary clinic setting. This provided an excellent segue to the newly released Diabetes Canada Clinical Practice Guidelines (CPG) chapter, Remission of Type 2 Diabetes, and its accompanying user's guide (5,6). Dr. Mindrum reviewed medication augmentation (Table 1) and how to include the person affected by diabetes in the decision-making process. Fundamental to the program was the alignment of an individual's readiness, education, medication adjustments, and medical monitoring. Five years after the intervention, Dr. Mindrum's case study subject maintained a 15% body weight reduction and sustained type 2 diabetes remission—a testament to what can be achieved when the right resources are coordinated to support the right person.

Wrapping up

Regardless of the nutrition approach chosen, both speakers demonstrated methods to empower people with diabetes and cautioned against using language that implies failure. Dr. Mindrum reminded us about the differences between behavioural outcomes (e.g. diet, movement) and clinical outcomes (e.g. weight, glycated hemoglobin), and that people cannot control how their body responds to behaviour change.

To focus on what the individual can control, Ms. Walsh suggested wrapping up appointments by asking, "What are you capable of doing today?"

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Remission of Type 2 Diabetes: Are You Ready?

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On November 9, 2022, Diabetes Canada published a brand-new Clinical Practice Guidelines (CPG) chapter on the remission of type 2 diabetes (T2D) and an accompanying user's guide (1,2). Many health-care professionals (HCPs) may have already seen and supported remission of T2D in our practices. However, with the publication of this new guideline, many of us are now asking ourselves, "Am I ready to incorporate remission of T2D as a standard of care management option within my practice?"

The concept of remission of T2D presents diverse ethical and moral considerations. Remission may offer hope and choice and support self-efficacy for people with T2D (PwT2D). However, remission of T2D generally requires a substantial commitment to a prolonged behaviour intervention, and, once in remission, the possibility of relapse exists (with weight regain, and/or an elevation in glycemic parameters with progression of beta-cell loss), necessitating the (re-)start of antihyperglycemic therapy. HCPs are therefore reminded of

the importance of providing safe, positive, and compassionate environments "without discrimination, racism, oppression, and stigma," particularly when discussing movement into, during, and out of remission. HCPs supporting people seeking remission of T2D should have processes for recall and follow-up to ensure timely review and assessment of care plans.

Because of the strength of evidence that exists demonstrating that remission is possible for some individuals with T2D (1), HCPs should have conversations with eligible PwT2D to identify those who are interested in remission and, where appropriate, to increase that person's capacity for remission of T2D. On the other hand, there are many aspects to remission of T2D that are currently unknown. For example, it is unknown how remission of T2D compares with staying on diabetes medications, particularly the medications that support weight loss and have proven heart- and kidney-protective benefit in select populations. We also do not fully understand the impact or sense of failure if remission is never realized, despite the effort, or if remission occurs followed by relapse of T2D. To support safe, stigma-free, and weight bias–free conversations about remission of T2D, the "User's Guide," with its several resources, was written alongside the chapter on the remission of T2D. It is hoped that individuals with T2D who are interested and have the capacity for remission will have access and self-management support in their diabetes care.

How do we define remission of T2D?

T2D remission is defined as meeting specified glycated hemoglobin (A1C) thresholds without any antihyperglycemic medications for a minimum of three months. Diabetes Canada sets two remission A1C thresholds: remission to prediabetes (A1C between 6.0% and 6.4%) and remission to normal glucose concentrations (A1C <6.0%) (Figure 1).

What is the strongest evidence for remission of T2D?

Current evidence suggests that T2D remission following weight loss may be possible in a subset of individuals through a variety of interventions, including bariatric surgery (6–11) and low-calorie meal plans (4,5,12–14) under the supervision of a trained dietitian or other HCP. Figure 5 of the "User's Guide" (2) is a low-calorie diet management plan for remission of T2D adapted from the United Kingdom–funded Diabetes Remission Clinical Trial (DiRECT) (4,5). In this trial, sustained weight loss of ≥15 kg of initial body weight was associated with the greatest probability of T2D remission.

For whom should we consider remission of T2D?

With respect to bariatric surgery, a higher rate of remission of T2D was observed in people based on two criteria: a body mass index (BMI) ≥35 kg/m^2 and a shorter duration of diabetes (3). In comparison, the study population of the low-calorie diet approach comprised nonpregnant adults with T2D of less than six years' duration with a BMI 27 to 45 kg/m^2 and an A1C less than 12%, who were not on insulin therapy, with an estimated glomerular filtration rate of ≥30 mL/min/1.732 m^2 (4,5). Similarly, the study population of U-TURN, whose intervention combined a structured exercise program with a calorie-restricted diet, engaged nonpregnant adults with a BMI >25 kg/m^2, T2D duration <10 years, A1C <9%, and not using insulin (13).

A1C	Targets
<6.0	Selected adults with type 2 diabetes with potential for remission to normoglycemia
≤6.5*	Adults with type 2 diabetes to reduce the risk of chronic kidney disease and retinopathy if at low risk of hypoglycemia†
≤7.0	**MOST ADULTS WITH TYPE 1 OR TYPE 2 DIABETES**
7.1 ↓ 8.5	**7.1-8.0%:** Functionally dependent‡ **7.1-8.5%:** • Recurrent severe hypoglycemia and/or hypoglycemia unawareness • Limited life expectancy • Frail elderly and/or with dementia‡
	Avoid higher A1C to minimize risk of symptomatic hyperglycemia and acute and chronic complications

End of life: A1C measurement not recommended. Avoid symptomatic hyperglycemia and any hypoglycemia.
*Target 6.0 to <6.5 for adults with type 2 diabetes with potential for remission to prediabetes
†Based on class of antihyperglycemic medication(s) utilized and person's characteristics
‡See Diabetes in Older People chapter

Figure 1: Glycated hemoglobin (A1C) targets expanded to include the option of type 2 diabetes remission.

Theoretically, it could be argued that all adults with T2D who meet the following criteria should be engaged in conversation about remission of T2D: individuals with early T2D and overweight or obesity; with inclination and circumstances to engage in weight loss with the goal of de-escalation and/or elimination of antihyperglycemic agents; and without significant eating or mental health disorders, atherosclerotic cardiovascular disease, heart failure, and/or chronic kidney disease.

Where does remission of T2D fit into the overall management of T2D?

The management of T2D remains consistent with the Diabetes Canada guidelines. A diabetes management plan should be personalized based on the person's desires, needs, and capacity, and should be reassessed in an individualized, timely manner. At any point in a person's management journey, whether at diagnosis or during aptly timed reassessment, the stepwise approach to management would be as follows:

- to determine if cardiorenal protective agents are indicated, and to start/dose-adjust said agents to cardiorenal protective doses, where accessible and as tolerated; and
- to determine the person's individualized A1C target (Figure 1), and then to set in place a management plan, which may or may not include remission.

Note that "aptly timed reassessment" is embedded within the context of providing evidence-based care in the management of diabetes. However, particularly when supporting people throughout a journey that may or may not involve remission of T2D, HCPs are encouraged to ensure that their practice has robust processes for recall and follow-up to ensure timely review and assessment of care plans.

For many HCPs, remission may be a new option in conversations when supporting people in the management of T2D. Let's continue the conversation and learn from each other. Please post questions and comments in community.diabetes.ca. All comments and suggestions are welcome. The CPG Dissemination and Implementation Committee hopes to hear your needs and what would help to support you in the care you provide.

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DIABETES CANADA

Vice Chair & New CPG Steering Committee Members

Call for Applications

Based on values that respect the individuality of people living with diabetes and their clinical and social context, the guidelines are governed by a multidisciplinary Steering Committee that is committed to the representation of diverse perspectives.

As our new guidelines revision process continues to evolve, and we update our guidelines as important data emerges, our CPG Steering Committee is also growing and evolving to ensure a balanced, dynamic and diverse membership. As such, we are currently looking to add new members to the committee – a Vice Chair and general members – to help in the revision and dissemination and implementation of the Diabetes Canada guidelines.

The role of a general committee member includes:

- Helping to select and prioritize topics for guideline development and revision
- Reviewing and commenting on all new/updated chapters and position statements
- Reviewing, discussing and approving all recommendations (100% consensus is required for all recommendations)
- Attending regular monthly meetings

The role of Vice Chair includes:

- Co-leading the CPG Steering Committee monthly meetings; helping to set the tone and direction of the committee
- Helping to oversee the development and revision processes of all ongoing updates, chapters and position statements
- Helping to oversee the work of all CPG sub-committees and topic working groups
- Helping to oversee all ongoing dissemination and implementation processes

Previous guidelines experience would be an asset for the Vice Chair role. Also, a conflict of interest form will need to be completed in order to be considered for the role, with the expectation that the successful candidate will work to reduce his/her financial interactions with industry. Please note, there is an honorarium for the Vice Chair role that is provided annually by Diabetes Canada.

The quality and integrity of the committee is maintained through the outstanding nature of its members, and care will be taken to ensure a diverse representation of gender, gender identity, sexual orientation, discipline, ethnicity, expertise, geographical location, culture and social class.

If you are interested in volunteering as either Vice Chair or as a general member of the CPG Steering Committee, please contact Tracy Barnes at tracy.barnes@diabetes.ca.

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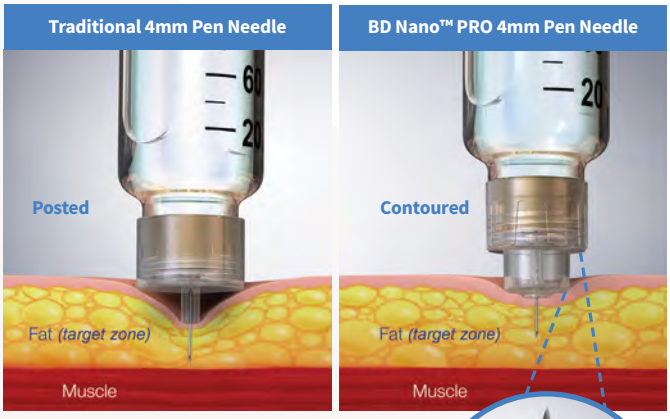

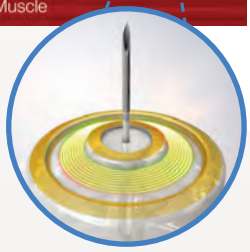

76% of patients surveyed were applying excess pressure when injecting[2]

Why does a contoured-base design matter?

- BD Nano™ PRO 4mm Pen Needles reduce the risk of injecting into muscle by up to **2–8x** vs. other 4mm pen needles[3†]
- Injecting insulin into muscle is associated with **variable blood glucose levels**[4]

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* As of February 2023.
† 1,188 injections using 20 µL of iodinated contrast delivered via BD Nano™ PRO 4mm Pen Needles vs. three 4mm posted-hub pen needles in swine across a range of injection forces. Flat-based pen needles were not studied. Measurements were obtained via fluoroscopic imaging. BD Nano™ PRO Pen Needles more closely achieved the 4mm target injection depth with less variability *(p = 0.006)*.

References: **1.** Berard L, et al. FIT Forum for Injection Technique in Canada. Recommendations for Best Practice in Injection Technique. 4th Ed. **2.** Bari B, et al. *Diabetes Ther.* 2020;11:2595-2609. **3.** Rini C, et al. *J Diabetes Sci Technol*. 2019;13(3):533-545. **4.** Hirsch L, et al. *Diabetes Technol Ther*. 2014;16(12):867-873. **5.** BD Compatibility Confirmation. September 28, 2021.

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