

# THE DIABETES Communicator

Spring 2021

## EDITORIAL

### Diabetes Care Across the Lifespan

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This spring 2021 issue of *The Diabetes Communicator* will bring you a breadth of knowledge and practice tips for caring for individuals with diabetes across the lifespan and during pregnancy. Dr. Roger Chafe reviews recent research involving transition of care from pediatric to adult care, reminding us that we all have a role to play in this process. Furthermore, Dr. Jessica C. Kichler discusses factoring in the psychosocial aspects of diabetes care into practice. Also, Dr. Jason M. Kong highlights recent research and guidelines around caring for diabetes during pregnancy and provides an update on the latest on oral antihyperglycemic use in pregnancy.

Care of the elderly person with diabetes is becoming increasingly important as our population ages and those living with diabetes are now living longer. How do we ensure seniors

living with diabetes live the last decades of life to the fullest? Experts in the field, Dr. Linda S. Gottfredson and Kathy Stroh from the United States, bring us an article that addresses caring for our seniors with declining cognitive function. Dr. Sarah L. Sy reviews current evidence on prescribing medications and reducing the treatment burden for the older adult.

How do you include spirituality into your diabetes clinic visits? Piraveena Piremathasan reminds us how spirituality can be an important factor in the management of diabetes, and gives us some practical tips on how to better understand our patients' spiritual needs. Have you ever wondered what meters are out there to help our clients with visual impairment? Our tech article highlights some of the meters on the market to help those with visual impairment. Also, Melanie Snider provides an interview highlighting the perspectives of a home care dietitian and, finally, Susie Jin provides us with a behind-the-scenes look into what it took to create the patient-directed resource: "Stay Safe When You Have Diabetes and Are Sick or at Risk of Dehydration."

Our editorial committee is always looking for potential articles for future issues. If you have any ideas for upcoming issues, or would like to write for us, we would love to hear from you. Please contact Tracy Barnes [tracy.barnes@diabetes.ca](mailto:tracy.barnes@diabetes.ca) for more information. Enjoy the issue!

### In This Issue

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# Advocacy Works

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



The warm weather is upon us again and, by the time you read this, I hope that many of you have also received your COVID-19 vaccination. We can see the light at the end of the tunnel! During this difficult time, we have all done the best we can to continue

to provide high-quality care to people living with diabetes. Diabetes Canada staff members have also continued to work tirelessly to advocate for people living with diabetes and to provide education and support to us. Here are some of the achievements to share with the Professional Section and individuals living with diabetes.

On March 5, 2021, the Ontario government announced that those with diabetes would be included in the priority populations in Phase 2 of the COVID-19 vaccine roll-out plan. This was welcome news for Ontarians and the Diabetes Canada advocacy team. Shortly after, Manitoba and Alberta announced people living with diabetes will have priority access to COVID-19 vaccination. This is great news for adults living with type 1 and type 2 diabetes, who are at greater risk of serious complications if they do contract COVID-19. If you receive any questions about COVID-19 and diabetes, you can direct them to the COVID-19 area on the Diabetes Canada website.

On March 10, 2021, the Diabetes 360° strategy took a very important step forward to becoming reality when Bill

C-237 passed the second reading in the House of Commons and moved forward to the Standing Committee on Health. The strategy is a national framework created by and for the diabetes community. The expectation is that with this strategy:

- 90% of Canadians will live in an environment that reduces their risk of diabetes
- 90% of Canadians will be aware of their diabetes status
- 90% of Canadians with diabetes will be engaged in preventing complications
- 90% of all Canadians will achieve improved health outcomes

There is still much work to be done to ensure that Diabetes 360° becomes a reality and we, as health care providers, have important roles to play to advocate. To learn more, please visit: [www.diabetesstrategynow.ca/about](http://www.diabetesstrategynow.ca/about) or watch the webinar at <https://youtu.be/Gccr7zRpeQc>.

On March 15, 2021, Health Canada approved updates to the blood donor eligibility and, finally, people living with type 1 diabetes are allowed to donate blood. This was achieved through the dedicated advocacy work from Diabetes Canada, Canadian Blood Services and Edward Robertson. Now, people living with type 1 diabetes can participate in one of the truly life-saving activities that society can offer. People with either type 1 or type 2 diabetes taking insulin will be accepted for blood donation if they have not experienced an acute hyperglycemia or hypoglycemic event requiring third party assistance in the prior three months.

All of these milestones are important to recognize and applaud, but the work must continue to advocate for other

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# Psychosocial Aspects of Diabetes: Integrating Patient-Reported Outcomes into Practice

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Psychosocial aspects of both type 1 and type 2 diabetes (e.g. emotional, behavioural, social, familial and environmental factors) are recognized in the literature as having a significant impact on individuals' self-management behaviours and subsequent glycemic levels (1). The 2018 Diabetes Canada clinical practice guidelines (CPG) state that, for adults with diabetes, all diabetes education and support interventions should be individualized based on the individual's psychosocial needs to achieve these self-management goals and to minimize long-term physical health complications (2). For children with diabetes, the 2018 CPG also suggest screening for psychological disorders associated with diabetes to improve self-management outcomes (3). Although assessing and addressing psychosocial functioning within the context of how these factors impact physical health outcomes in diabetes care is valid, we need to expand the definition of what constitutes successful diabetes outcomes to also include psychosocial outcomes as a complement to clinical outcomes (e.g. glycemic levels). This demonstrates to people with diabetes (PWD) that their diabetes team members value their psychosocial well-being associated with diabetes separately from its potential impact on physical health alone.

Psychosocial screening in PWD commonly assesses diabetes-related distress, depression, anxiety, disordered eating, health literacy and numeracy, self-care efficacy, cognitive functioning, chronic pain and diabetes self-management barriers (1). This type of screening can provide information to the diabetes team in order to: (a) tailor diabetes education and support interventions to improve self-management and glycemic goals, and (b) understand the PWD's particular psychosocial adaptation to diabetes in a more holistic manner. This allows the diabetes team to build more of a collaborative model of care (i.e. chronic care model) in which the diabetes team and the PWD work together as equals, each bringing their own expertise (medical management skills and the lived experience, respectively) to the diabetes clinic visit (4). This, in turn, allows for guided discovery and shared decision making regarding the best treatment goals for each PWD (4).

## Use of Psychosocial Patient-Reported Outcomes in Clinical Care

Screening for psychosocial functioning in PWD can occur in many ways, including verbal inquiries, asking open-ended questions on written clinic forms, and/or the use of standardized and validated tools. These more formal psychosocial screeners can be characterized as a type of

patient-reported outcome (PRO), which is defined as a self-report measure of how a PWD is functioning within the context of their diabetes (5). It is recommended that these psychosocial assessments be completed throughout the lifespan, as well as at initial diagnosis, onset of new medical complications and/or other changes in one's life circumstance (6). The use of PROs in routine diabetes visits allows for these screenings to be integrated into care; therefore, encouraging more ongoing dialogue between the PWD and the medical team. The goal of these psychosocial PROs is not just screening alone, but to increase both parties' engagement in improving the diabetes outcomes that are relevant and meaningful to the PWD. Before beginning this process, there are many aspects to the successful implementation and uptake of these PROs into practice that need to be considered, including how to:

- Determine which measures to select
- Choose what population to target and the frequency of administration
- Integrate the measures into diabetes clinic flow
- Find the most effective way to train staff
- Engage a PWD in productive dialogue after they have been screened
- Assess the success of the PRO practices by examining clinic-wide data

Using quality-improvement methodology, Corathers et al (5) provide further detail about a six-step process for adding PRO measures to a diabetes clinic. The 2018 position statement from the American Diabetes Association on the psychosocial care for PWD also summarizes the commonly used evidence-based screeners for many of the previously mentioned PRO psychosocial constructs (1). There is also guidance for the diabetes team about when to provide outpatient referral for PWD for additional psychosocial support (1). Therefore, both resources can be instrumental when establishing and/or refining the utilization of PROs into diabetes clinical practice.

## Clinical Recommendations

Diabetes team members may come across a PWD during a routine diabetes clinic visit who, on the surface, appears disengaged, unmotivated or otherwise ineffective at their diabetes self-management. It may be that this PWD is struggling due to feeling threatened by diabetes complications and, thereby, feeling anxious; feeling a sense of loss of their former health status, and experiencing sadness; or feeling diabetes tasks are an intrusion on their life and, therefore,

feeling angry. It may also be that this PWD has developed negative health beliefs about their diabetes (e.g. loss of control of their life, low confidence in their ability to complete tasks effectively, internalization that diabetes is a personal failure), or it may be that this PWD does not have enough social support from family, friends or the online diabetes community to help buffer the burden of diabetes. So, diabetes team members must identify these psychosocial factors by asking the right questions at the right time and let the biggest experts of all – the PWD – tell us about their personal lived experience with diabetes. The answers revealed may not be what was originally assumed, but they will ultimately allow diabetes team members to support the PWD more effectively as they navigate and adapt to diabetes.

We, the community of diabetes team members, have a responsibility to screen PWD not just for potential physical health complications, but also for the potential negative impact of diabetes on emotional well-being as it affects the whole person (3). Even though there are many different standardized PRO screeners that may be beneficial to use in a diabetes clinic, the routine monitoring of diabetes distress is recommended as a good place to start (1). Assessing for diabetes distress has the potential to yield a lot of underlying information about both psychosocial and self-management issues in a wide variety of patients. Furthermore, once a PRO screener (like diabetes distress) is given, clinicians must honour the time and energy that the PWD spent filling out the screener by acknowledging it was completed and directly following up on the scores with them (5). For example, the clinician may want to open the conversation by saying, “Thank you for completing the survey today. In reviewing your answers, it looks like you endorsed that you feel diabetes is

controlling your life in many ways. I would like to learn more about what that is like for you. What can you tell me about that?” Opening up these meaningful clinical conversations can create a space for frank and supportive interactions between the PWD and the clinician, which, in turn, may make the clinical visit more useful as they develop a shared treatment plan going forward.

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## FROM THE CHAIR'S DESK...CONTINUED FROM PAGE 2

changes to improve the lives of people living with diabetes. Health-care providers play a critical role in advocacy. We are uniquely positioned to lend our voices and energy as we can speak to the science and data but, at the same time, speak to the human side that we learn from individuals living with diabetes. As we commemorate the 100<sup>th</sup> anniversary of the discovery of insulin, we must be mindful of the work that remains. Diabetes Canada's new campaign – “We Can't Wait 100 Years to End Diabetes” aims to raise awareness and funds to support the work and, in particular, the research that will ultimately lead to a cure. In the meantime, we have excellent evidence-based tools to reduce microvascular and macrovascular complications of diabetes, but the implementation of the tools needs to be improved. In a recent Lancet Commission on diabetes, it was estimated that

if appropriate treatments were available and risk factors were improved in 70 per cent of diagnosed individuals with type 2 diabetes, it was estimated that 800,000 premature deaths could be prevented in 3 years (1). To achieve this, there are global, national and community-based initiatives. There are also steps we should take as individual clinicians to examine our own barriers and address them. I challenge each of you to reflect on the role you play to achieve the common goals of preventing the onset and consequences of diabetes, helping those affected by diabetes, and working to find a cure.

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# Staying Safe: Conversations With the Dissemination and Implementation Team

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Many people have asked me what it's like to volunteer on the Dissemination and Implementation Committee. I am happy to share some of the conversations and thought processes that went into developing the patient-directed resource, "Stay Safe When You Have Diabetes and Are Sick or at Risk of Dehydration": <http://guidelines.diabetes.ca/docs/patient-resources/stay-safe-when-you-have-diabetes-and-sick-or-at-risk-of-dehydration.pdf>. The goal was to create a simple resource that encapsulated very complex information to support the educator to provide individualized information.

Some of the key questions that we had to ask ourselves were:

- What must educators consider when individualizing this resource for their patient?
- Who would benefit from the various points within this tool? For example, is my patient:
  - At risk of hypoglycemia
  - At risk of diabetic ketoacidosis (DKA)
- When should I hold medications?
  - Is the patient adequately able to rehydrate to mitigate the risk of dehydration?
    - » If yes, then the person is no longer at risk of dehydration, and medications that increase the risk of acute kidney injury (AKI) do not need to be temporarily stopped (until the person can no longer adequately rehydrate), i.e. continue to assess hydration status.
- When should I advise my patient to seek medical attention?
  - This requires an individualized approach and could depend on factors such as:
    - » Patient cognition and ability to self-care
    - » Patient access to their diabetes health-care team
    - » Does the person live alone? Or does the person have

an engaged support team (e.g. spouse or parent) capable of taking appropriate action?

- » Relative endogenous insulin capacity (e.g. people who use basal/bolus insulin to manage their diabetes would be at higher risk for DKA)
- » Distance that the person lives to the nearest emergency department

## What are we trying to prevent?

### Hyperglycemia

During illness, our bodies release counter-regulatory stress hormones, which can cause hyperglycemia in people with diabetes. For this reason, many will experience higher-than-normal blood sugars when they are sick, despite maintaining a consistent level of food (carbohydrate) intake and medication (including insulin doses). For this reason:

- We do not want to "temporarily hold" sulfonylureas too early (see discussion on hypoglycemia below)
- We do not stop insulin administration. Rather, people using insulin to manage their diabetes should check their blood glucose more frequently and may need to adjust their insulin doses, particularly if they are on bolus insulin. Insulin doses may need to be increased due to the counter-regulatory hormone response and particularly if ketones are present, or insulin doses may need to be decreased if the person is eating less carbohydrates or is vomiting and cannot adequately replace carbohydrates.

### Hypoglycemia

- Not everyone is at risk of hypoglycemia. Only people who take medications that can cause lows (e.g. insulin and

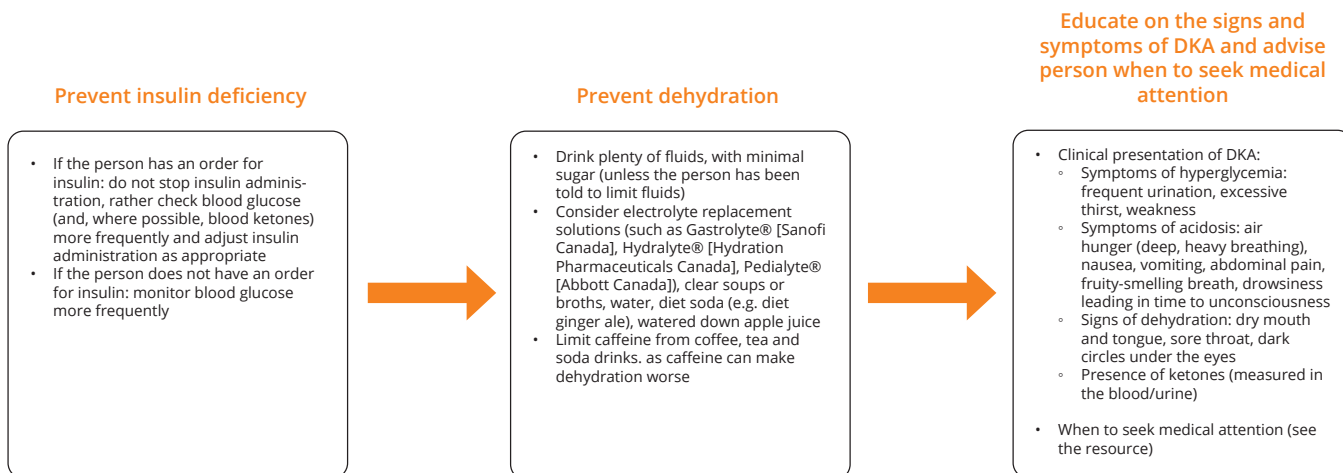
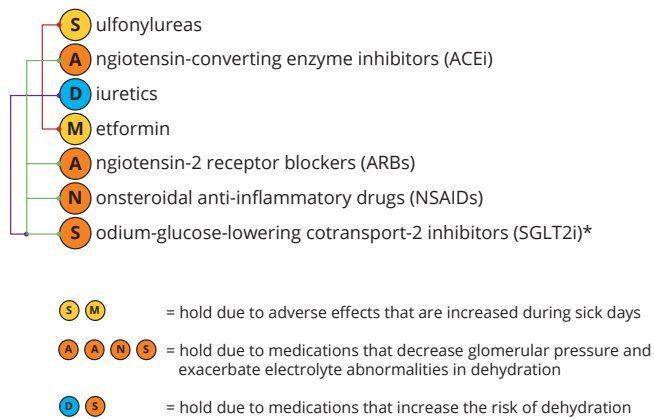


Figure 1: Mitigating precipitating factors of diabetic ketoacidosis (DKA) to be considered only for people who are at risk of DKA.





**Figure 2:** SADMANS medication and the rationale for why to temporarily hold during "sick" episodes.

sulfonylureas) are at risk of hypoglycemia if their blood sugars started close to target during the "sick" episodes and the person is:

- Eating less (possibly due to nausea/not feeling well)
- Vomiting and cannot adequately replace carbohydrate intake
- Sick-day management: only hold sulfonylureas if:
  - The person's blood sugar is close to target (i.e. the person is not experiencing hyperglycemia)
  - The person cannot adequately replace carbohydrate intake (see suggestions on the resource "If you cannot eat your usual foods, try any of the following foods, each containing about 15g of carbohydrates.")

## DKA

The risk of DKA is increased in people who have a larger gap in blood glucose level and blood insulin level. Therefore, who is at risk of DKA? People with lowered (or no) endogenous insulin production (i.e. people with type 1 diabetes [no endogenous insulin production] and people with type 2 diabetes on SGLT2 inhibitor therapy [lowered endogenous insulin production]).

How do we minimize the risk of DKA? We need to mitigate the precipitating factors of DKA (prevent insulin deficiency, where possible, and prevent dehydration) and provide education (Figure 1).

## AKI

Everyone, including people with or without diabetes, is at increased risk of acute AKI when they are on medications that affect glomerular pressure and when they cannot adequately prevent dehydration. The SADMANS acronym (Figure 2) helps us to remember which medications are affiliated with an increased risk of AKI (except for the first "S", sulfonylureas, which is part of the acronym, but reminds us of mitigating the risk of hypoglycemia; and the "M", metformin, which is part of the acronym due to higher risk of lactic acidosis that is associated with dehydration and kidney impairment).

### Practice Tip #1: Vaccinations Help Keep People Safe!

Ensure all childhood vaccines and provincially publicly-funded immunizations are up-to-date.

Recommended immunizations include:

- Annual flu vaccine
- Pneumonia vaccine, including:
  - pneumococcal polysaccharide vaccine (23-valent)
  - pneumococcal conjugate (PCV 13) vaccine\*
- Shingles vaccine\*
  - Recombinant two-dose series spaced two to six months apart preferred over live/attenuated one-dose vaccine (but choice may depend on cost and access to vaccine)
- COVID-19 vaccine\*\*

### Practice Tip #2: Keeping People Safe During COVID-19

Remind people that, even after receiving the vaccine, safe COVID-19 practices must be observed until we establish community immunity:

- Stay home as much as possible.
- When not at home or even in the comfort of your own home (if you live with others), or when there is a risk that someone within your household has been exposed to a person with COVID-19:
  - Stay 2 meters apart, wear masks, hand sanitize and choose well-ventilated areas.

In general, people with uncontrolled diabetes and overweight/obesity will have poorer clinical outcomes. Support patients by encouraging them to achieve and maintain target glucose levels (glycated hemoglobin, time in range, low variability) and healthy weight goals.

Consider chest wall exercises (including diaphragmatic breathing). Note: Amongst people living with asthma, encourage zero tolerance for asthma attacks.

\*May not be part of the publicly-funded program, but should still be considered.

\*\*Currently, if possible, there should be no other vaccine administered 14 days prior to the COVID-19 vaccine and no other vaccine administered 28 days after receiving the COVID-19 vaccine.

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## Use of Diabetes Oral Agents in Pregnancy

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Type 2 diabetes and gestational diabetes have been associated with poor maternal and fetal outcomes. The goal has been to strive for positive maternal and fetal outcomes by achieving euglycemia in pregnancy. The following is an update on the use of glyburide and metformin in pregnant women with type 2 diabetes and those with gestational diabetes. Due to a paucity of literature, other diabetes agents will not be discussed.

Insulin has traditionally been the pharmacotherapy of choice in pregnant women with type 2 diabetes and those with gestational diabetes. The 2018 Diabetes Canada clinical practice guidelines do not advocate oral agents as first-line therapy for type 2 diabetes (3). The guidelines for gestational diabetes suggest that metformin followed by glyburide may be alternative therapies to insulin.

There is a lack of data for glyburide use in type 2 diabetes, but more data regarding glyburide use in gestational diabetes. Glyburide has been most recently studied in a noninferiority, randomized control trial comparing glyburide versus insulin (4). The trial failed to show glyburide noninferiority to insulin (composite of macrosomia, neonatal hypoglycemia and hyperbilirubinemia). The primary outcome occurred in 27.6 per cent (%) of the glyburide group and 23.4% of the insulin group (upper confidence interval [CI] limit 10.5% exceeded the pre-specified noninferiority margin of 7%).

Metformin has also been studied more extensively in gestational diabetes. The historic Metformin in Gestational diabetes (MiG) randomized control trial (5) was an open-label randomized trial of 751 participants comparing metformin versus insulin. The primary outcome (composite of neonatal hypoglycemia, respiratory distress, need for phototherapy, birth trauma, five-minute Apgar score less than seven and prematurity) were similar in both groups (32.0% in the metformin group and 32.2% in the insulin group, relative risk [RR] 0.99; 95% CI 0.80-1.23). Prematurity was seen more often in the metformin group (12.1% versus 7.6%;  $p=0.04$ ). Evaluation of the offspring involved in the trial at seven to nine years has been published (6). At nine years, the offspring exposed to metformin was larger by measures of weight ( $p<0.05$ ), arm and waist circumferences ( $p<0.05$ ), waist to height ratio ( $p<0.05$ ), body mass index and triceps skinfold

( $p=0.05$ ). Similar abdominal fat percentages were seen (visceral adipose tissue, subcutaneous adipose tissue and liver).

A previously published meta-analysis of metformin, glyburide and insulin showed glyburide to be inferior to insulin and metformin (7). Comparing metformin to glyburide, metformin was associated with lower rates of macrosomia (risk ratio 0.33; 95% CI 0.13-0.81), lower mean birth weight (-209 g; 95% CI -314 to -104) and lower rates of large for gestational age (risk ratio 0.44; 95% CI 0.21-0.92). When compared with insulin, glyburide was associated with higher mean birth weight (109 g; 95% CI 35.9-181), higher rates of macrosomia (risk ratio 2.62; 95% CI 1.25-5.08) and higher rates of neonatal hypoglycemia (risk ratio 2.04; 95% CI 1.30-3.20). A more recent review comparing metformin and glyburide favoured metformin (8). Metformin was associated with lower mean birth weight (-191 g; 95% CI -288 to -95), less large for gestational age (odds ratio 0.38; 95% CI 0.18-0.78) and lower maternal weight gain (-2.22 kg; 95% CI -3.88 to -0.56). Evidence suggests that glyburide can readily cross the placental barrier (9). Metformin has also been shown to cross the placental barrier (10).

An evaluation of metformin use in conjunction with insulin in type 2 diabetes early in pregnancy has been recently published. The Metformin in Women With Type 2 Diabetes in Pregnancy (MiTY) multicentre trial sought to evaluate metformin as an add on to insulin with respect to neonatal morbidity and mortality (11). The trial randomly assigned 502 women with type 2 diabetes between six weeks and 22 weeks/six days gestation (253 metformin and 249 placebo). The primary outcome was a composite of pregnancy loss (miscarriage, termination, stillbirth or neonatal death up to 28 days), preterm birth (<37 weeks gestation), birth injury, moderate or severe respiratory distress syndrome, neonatal hypoglycemia and neonatal admission to the intensive care unit of greater than 24 hours. The primary composite outcome was similar in both groups (RR 1.02; 95% CI 0.83-1.26).

Regarding secondary outcomes, women in the metformin group had improved markers of glycemic control, some improvement in maternal outcomes and overall smaller infants. More specifically, the metformin group had a lower

glycated hemoglobin (A1C) by 34 weeks gestation (5.90% vs 6.10%;  $p=0.015$ ), a lower mean glucose (6.05 mmol/L versus 6.27 mmol/L; 95% CI -0.4-0.0), required less insulin (1.1 units/kg/day vs 1.5 units/kg/day; 95% CI -0.5 to -0.2), gained less weight (7.2 kg versus 9.0 kg; 95% CI -2.7 to -0.9) and had lower rates of caesarean section (53% versus 63%;  $p=0.031$ ). Metformin-exposed infants had a lower mean birth weight (3,156 g versus 3,375 g;  $p=0.002$ ), less macrosomia (RR 0.58; 95% CI 0.43-0.99) and less mean fat mass (13.2 versus 14.6;  $p=0.017$ ). A higher rate of small for gestational age was seen in the metformin group (RR 1.96; 95% CI 1.10-3.64).

Data on the use of diabetes oral agents in pregnancy continues to grow. If oral agents are to be used in pregnancy, metformin should be favoured over glyburide since metformin has shown to improve maternal and fetal outcomes compared with the latter. There is now reassuring randomized controlled trial data on the use of metformin earlier in pregnancy. However, some questions still remain regarding metformin. As metformin can cross the placental barrier, there is a theoretical concern of fetal effects (10). It is associated with higher rates of small-for-gestational-age infants (11). In utero exposure of metformin has also been associated with higher anthropometric measurements in childhood (6). The long-term effects of in utero metformin exposure have yet to be further elucidated. There is accumulating evidence for the use of metformin in pregnancy. Hopefully, future studies will address the questions that still remain.

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# 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 have 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 creates 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 Tracy Barnes at [tracy.barnes@diabetes.ca](mailto:tracy.barnes@diabetes.ca) with your topic by **June 16, 2021**. Due date for manuscript submissions is **November 15, 2021**.



# Safe-Guarding Cognitive Access to Diabetes Self-Management as Abilities Decline With Age

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People’s minds, bodies, conditions and circumstances change with age. Two predictable changes make diabetes self-management (DSM) increasingly difficult over the life course. People’s cognitive abilities slowly decline with advancing age, while their chronic conditions demand more complex management and decision-making. The result is a slow-growing cognitive mismatch that makes it more difficult to manage one’s diabetes. If not recognized, the mismatch can eventually put effective DSM out of a person’s cognitive reach.

International surveys of adult literacy have examined person-job skills mismatch. They help us by detailing why some common everyday tasks demand more cognitive work than others and, thus, why DSM’s many and varied demands can quickly overwhelm individuals with low or declining ability.

## Frequent Mismatch Between People’s Abilities and the Cognitive Demands of Everyday Tasks

Literacy is a capacity for using written information in any form to carry out a wide variety of everyday tasks. Definitions

commonly refer to the broad thinking skills needed to use that information: “ability to identify, understand, interpret, create, communicate and compute” (1).

Table 1 gives a concrete sense why this general information processing capacity is critical to learning and managing self care. It lists sample items for five levels of task difficulty on the major literacy surveys, the percentage of Canadian adults functioning at each level and the type of instruction that most benefits people at each proficiency level. Results are from the survey’s document scale, but its prose and numerical scales show the same pattern because all are highly correlated.

Nearly half of Canadian adults function at proficiency Levels 1 or 2 – the two lowest. This mirrors the pattern in other survey nations, including the United States and Australia (2). At Level 1, one in five (21.5 per cent [%]) Canadian adults is routinely capable (has an 80% chance) of correctly performing only the simplest tasks, such as totalling a bank deposit entry. The 27.1% of adults who are proficient at Level 2 can carry out tasks that require locating and coordinating two pieces of information, not just one, as long

**Table 1: Cognitive difficulty of everyday tasks and per cent (%) of Canadian adults who peak at each level on the International Adult Literacy and Skills Survey (IALSS) document scale, ages 16 and older**

Difficulty level	Sample literacy tasks at this difficulty level*	Adults peaking at this task difficulty level		
		% <sup>†</sup>	Processing skills <sup>‡</sup>	Training potential <sup>§</sup>
5	Use calculator to determine cost of carpet for a room Use table of information to compare two credit cards	17.9	Command of higher order processing	Can gather, infer information and patterns on own
4	Use eligibility pamphlet to calculate government benefits Explain difference between two types of employee benefits			Learn well in college format
3	Calculate miles per gallon from mileage record chart Write brief letter explaining error on credit card bill	33.5	Minimum for coping	Mastery learning with written materials and hands-on experience
2	Determine difference in price between two show tickets Locate intersection on a street map	27.1	Weak	Very explicit, structured, hands-on instruction
1	Total a bank deposit entry Locate expiration date on driver's license	21.5	Very poor	Very slow, simple, concrete, step-by-step, one-on-one instruction

\*Sample tasks are from the 1993 National Adult Literacy Survey (6). The IALSS adopted its design and many of its items.

<sup>†</sup>Refer to reference 7; <sup>‡</sup>Refer to reference 8; <sup>§</sup>Refer to reference 9.

**Table 2: The higher-order cognitive processing required for optimal diabetes self-management (DSM)**

Job of DSM
<p><b>Purpose:</b></p> <ul style="list-style-type: none"><li>• Keep diabetes under daily control in the often changing and unpredictable circumstances of everyday life.</li></ul> <p><b>Goals:</b></p> <ul style="list-style-type: none"><li>• Near term: Keep blood glucose (BG) within normal limits.</li><li>• Long term: Avoid complications and maintain quality of life.</li></ul> <p><b>Major duties:</b></p> <ul style="list-style-type: none"><li>• Coordinate activities that influence BG (food, medication, physical activity).</li><li>• Anticipate effects on BG of those activities and their relative timing.</li><li>• Recognize symptoms indicating that BG is too low or too high.</li><li>• Adjust food, medicine, physical activity (as needed) to maintain or regain optimal BG.</li><li>• Obtain BG data from glucose meter or continuous glucose monitor to determine if BG is trending to hypo- or hyperglycemia.</li><li>• Determine timing and type of corrective action when BG levels are too low (glucose tablets, glucagon, emergency medical care).</li><li>• Detect and seek treatment for complications of elevated BG levels (vision changes, neuropathies, foot ulcers).</li><li>• Plan ahead for the unexpected and unpredictable (delayed meals, delayed or missed medication).</li><li>• Adjust DSM for other influences on BG (infection, emotional stress, insufficient or poor quality sleep).</li><li>• Coordinate DSM with other self-care regimens (comorbidities, polypharmacy).</li><li>• Manage conflicting demands on time and behaviour (DSM, family, work).</li><li>• Update DSM skills and knowledge, as needed (changes in technology, medication, impairments, comorbidities).</li></ul>

as the task is made explicit (“find the difference” between two numbers) and requires only low-level inferences (finding a difference means to subtract).

Individuals who function at Levels 1 or 2 are at a great disadvantage because proficiency at Level 3 is the “minimum for coping with the demands of everyday life and work in a complex, advanced society.” Individuals at Level 1 can master unfamiliar tasks beyond Level 1, but will require one-on-one instruction that proceeds slowly, in small steps, with lots of repetition and hands-on practice. In contrast, the 17.1% of Canadian adults who are proficient at the most difficult literacy tasks (Levels 4 and 5) can often grasp and apply highly complex information on their own.

### **Cognitive Mismatch Grows as People’s Abilities Decline With Age**

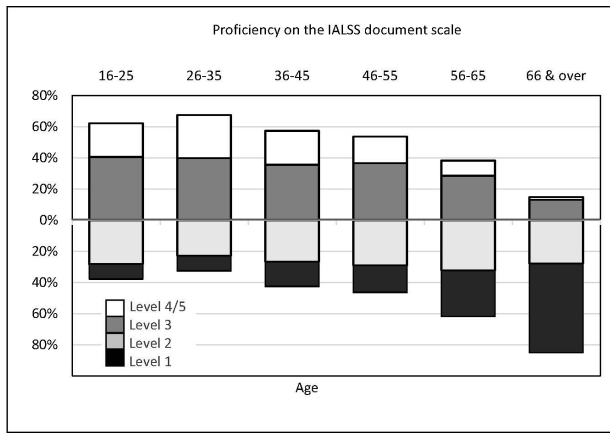
Figure 1 shows how functional literacy trends over the life course: it rises into the 30s, declines slowly into the mid-50s and falls faster with advancing age. Beyond age 65, 87% of adults function below Level 3 and 57% below Level 2, making Level 1 document proficiency the norm among older Canadians. One in five of these older adults reports a diagnosis of diabetes and they account for half of all cases (3).

Indicators of fluid intelligence, such as processing speed and working memory, follow the same downward trajectory, causing learning, reasoning and problem solving to falter and fail increasingly often. Indicators of crystallized intelligence, such as vocabulary and general knowledge (the fruits of intact fluid intelligence earlier in life), generally escape decline until old age. They no longer represent current capacities for information processing, however, so they can disguise declines in the higher order thinking skills so necessary for “coping with the demands of everyday life.” As skills decline, individuals become less able to adhere to their treatment and self-care plans. They make more errors and risk hospitalization for severe hypo- or hyperglycemia.

### **Cognitive Mismatch in DSM**

To reduce errors, we need to know which elements of a task increase its cognitive load and how to spot them. Only then can we strategically select or modify self-care tasks and plans to keep them manageable for an individual.

Cognitive load increases with the complexity of the mental manipulations a task requires to get the work done and done right. It increases, for example, when the individual must identify and integrate more pieces of relevant information, ignore distracting (irrelevant) information, perform more



**Figure 1:** Age-related decline in functional literacy among Canadian adults on the International Adult Literacy and Skills Survey (IALSS). Reproduced from reference 7.

steps, figure out what step to take next, understand more abstract concepts, draw more difficult inferences (“connect the dots”) and evaluate a result. Tasks also become more difficult when not all information is provided and not all steps are spelled out, instructions are missing or confusing, the situation is ambiguous or changing, the tasks or tools are unfamiliar and the person has to work around sensory or motor deficits when performing them.

But DSM is more than the sum of its parts. Like other jobs, its biggest challenge lies in selecting, sequencing and coordinating its parts to achieve its purpose. Table 2 shows why managing diabetes can never be mechanical, like following a recipe. It is relentless in requiring judgment, reasoning and problem solving.

### Strategy for Reducing Cognitive Mismatch and the Hazards it Creates

Cognitive overload makes it impossible to self-manage effectively. Worse, it increases the odds of dangerous mistakes, such as injecting the wrong amount or type of insulin. Bringing a regimen within cognitive reach requires limiting the number, variety and degree of coordination among DSM tasks until the individual can demonstrate mastery of the regimen. Patient safety also requires eliminating or enlisting helpers for any task that invites calamitous errors (sliding-scale insulin dosing for the frail elderly).

The first prerequisite for reducing cognitive mismatch is to identify what adds to a task’s complexity. Supplemental Table 1 illustrates a technique called task analysis that exposes the easily overlooked cognitive hurdles in a seemingly simple use of nutrition labels. It also shows, as with insulin injection, what must not be done. If the individual finds a task too difficult or does it incorrectly, diagnose where in the process their performance broke down. Did they miss a step? Did they eat after taking their medication?

The second prerequisite is recognizing the cognitive demands of instruction itself. Good teaching orders learning by the complexity of the concepts and mental operations to be mastered. Supplemental Figure 1 illustrates how diabetes professionals can use Bloom’s taxonomy of cognitive learning objectives (4) to do that. Good instruction also limits its cognitive demands to those intrinsic to learning the material by introducing it clearly, contextualized and logically organized, and by anticipating common misconceptions and errors that impede learning (5). It requires mastery at each level before moving to the next, re-teaching the individual (as necessary) to achieve it. There is no mental test for assessing the normal range of cognitive capacity in a quick, nonthreatening manner, nor is one needed. An individual’s errors in self-care pinpoint where to better fit plans and instructions to their needs.

**Supplementary information:** For additional tables and figures, please click [here](#).

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# Blood Glucose Monitoring Supports for the Visually Impaired

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Elaine M. Cooke



Susan Harris

Diabetic retinopathy (DR) is the leading cause of vision loss in people of working age (1). The prevalence of DR in people with diabetes is estimated to be 35 per cent, with vision-threatening DR present in 12 per cent (1). While some visually impaired people may be able to use any blood glucose meter, others may need a meter with easier-to-read numbers and/or speech capabilities; they may also need help using the meter to obtain a blood glucose result. Visually impaired people with diabetes may find it helpful to use an Accu-Chek® FastClix (Roche Diabetes Care, Canada) lancing device for lancing the finger to obtain a blood drop. This device uses a drum of six preloaded lancets, so individual lancets do not need to be handled (2). Used lancets are stored within the drum.

If handling blood glucose test strips is difficult, the Accu-Chek® Guide meter strips come in a spill-resistant SmartPack® vial making it easy to get one strip out at a time (2). The strip also has the widest dosing area on the market (2). An alternative to lancets and strips, the Freestyle Libre (Abbott Canada) flash glucose monitoring system uses a sensor applied into the upper arm once every 14 days. The sensor can be scanned with either a Freestyle Libre reader or a compatible smartphone using a Freestyle LibreLink app (3). There is more functionality with the app. For example, individuals with diabetes could permit diabetes educators and physicians to view their results online. The original FreeStyle Libre system was for adults 18 years or older. The new FreeStyle Libre 2 system is authorized for people with diabetes four years and older. When utilizing the FreeStyle LibreLink app, available for either system, a text-to-speech function can be turned on, which will allow glucose readings with the unit of measure and trend arrow direction to be spoken. Other optional functions that may be turned on with the new FreeStyle Libre 2 sensor and the FreeStyle LibreLink 2 app, include alerts for either high or low blood

Table 1: Meters for the visually impaired		
Meters with easy-to-read numbers		
Contour® Next One	Ascencia Diabetes Care (United States)	White numbers on black background.  Can connect to the Contour® Diabetes app (4)
OneTouch Verio Reflect™	LifeScan Canada	White numbers on black background.  Can connect to OneTouch Reveal™app (5)
Accu-Chek® Guide	Roche Diabetes Care, Canada	White numbers on black background.  Strip ejector button for easy disposal of strip (1)  Can be paired with the mySugr app (6)
Accu-Chek® Aviva Connect Accu-Chek® Aviva Nano	Roche Diabetes Care, Canada	White numbers on black background
Meters with a talking function		
FreeStyle Libre 2 system (replacing the FreeStyle Libre original system)	Abbott Canada	Text-to-speech function as discussed above.  FreeStyle LibreLink apps are only compatible with certain mobile devices (3)
Oracle®	Tremblay Harrison Inc., Canada	Talking feature can be turned on during setup.  Available in English or French (7)

The information above is from the manufacturers' websites; we are unable to provide any independent review of these meters.

glucose levels and the ability to share data with others (3).

Meters that have easier to see/read numbers or a talking function may be of assistance to the visually impaired (Table 1).

According to the Diabetes Canada 2018 clinical practice guidelines, to confirm the accuracy of blood glucose monitoring, self-monitored blood glucose (SMBG) results should be compared with the laboratory measure of fasting

plasma glucose (FPG) (after at least an eight-hour fast) at least annually or when the glycated hemoglobin (A1C) does not match logged blood glucose values (7). At blood glucose levels greater than 4.2 mmol/L, a difference of less than 15 per cent between FPG and SMBG levels is considered acceptable (7).

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## ASK THE EXPERT

# Perspective of a Home Care Dietitian

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**Robin Clark**

I have had the opportunity to work with an expert in her field, Robin Clark, a CDE and registered dietitian (RD) with over 26 years of clinical experience in a variety of roles. Most recently, she has taken on a part-time position working in home care. This role is unique

in that she serves as a consultant for a number of areas, including supportive living, community living and long-term care facility seniors. In this position, she has the opportunity to serve many rural communities that historically have been underserved, particularly in the area of nutrition support. Recently, I had the chance to sit down and ask Robin a few questions about her unique perspective as a RD, CDE in the home-care environment.

**Melanie:** What is most rewarding about your unique position as a registered dietitian and certified diabetes educator in home care?

**Robin:** I have served as a diabetes educator in this community for many years. I started out in acute care and outpatient diabetes management. So many seniors I now see, I've actually

known since they were initially diagnosed with diabetes. I've had the opportunity to follow them through the continuum of diabetes care and throughout their lifespan. At this point, serving mainly the geriatrics population, I find you can have a huge impact on their quality of life.

**Melanie:** What challenges exist for seniors living with diabetes in supportive living facilities? Living at home?

**Robin:** I find there is more of a balancing act between nutritional needs and diabetes management. This is a difficult balance when the patient's autonomy may be compromised. For example, in facility, a patient may not have as much choice in terms of what or when they can eat. Other issues that come up include, but are not limited to:

- Decreased appetite, chronic risk of dehydration
- Social/emotional food choices
- Palliative/end-of-life decisions and diabetes management decisions
- Chronic issues that come up as we age, which can have more nutritional implications. These issues can include, but are not limited to, wound care, maintaining muscle mass, dentition issues, decreased motor skills and presbyphagia (changes in swallowing in older adults).

Overall, this is a very rewarding area to work in and I would highly recommend to any RD, CDE who has the opportunity.



# Moving From Pediatric to Adult Care

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Early adulthood is an exciting period in a person's life. It is when most adolescents finish high school and move on to the next phase of their lives. They become more independent and may even start living on their own for the first time. It is also during this tumultuous period that many young adults with diabetes transition from the children's health-care setting to new providers who treat adults.

Because of the need to constantly manage their condition and have regular medical checkups, adolescents with diabetes transitioning into adult care experience some unique challenges. While their care team is changing, there may also be significant changes in the supports a young adult has around them, especially if they move to a new location for work or postsecondary education. There may be new health issues that young adults with diabetes face, such as those related to starting new relationships and the potential use of alcohol or drugs. As they move into the adult health-care system, these individuals are expected to take on more responsibility for managing their care. For some, this move can be a welcome change, while others may prefer to delay leaving their pediatric care team. In either case, there are both potential risks and benefits associated with the transition to adult care, of which everyone involved needs to be aware.

## Recent Research

We recently completed a research program around adolescent diabetes transition involving the Janeway Children's Health & Rehabilitation Centre (St. John's, N.L.), Markham Stouffville Hospital (Markham, Ont.) and SickKids Hospital (Toronto, Ont.). In Ontario, of the 2,525 young adults with diabetes we followed, 47 per cent (%) had a greater than 12-month gap in diabetes care following their transition, and 9.5% had no primary care visits during the usual transition period from 17 to 19 years of age (1). There was also an increase in the rate of diabetes-related hospital admissions in the period following transition, with 17.7% having a hospital admission for diabetic ketoacidosis (2). In both Ontario and Newfoundland, we found wide variations in the processes used for transitioning patients into adult care, including differences in the type of adult provider to whom patients are transferred (3,4). While the situation for transition has improved across the country, with many diabetes programs now offering transition programs and dedicated resources for adolescents, our research illustrates the need for further work to ensure that young adults are well supported during this period and are receiving regular diabetes care.

One initiative we helped undertake to improve the

transition experience at the Janeway Children's Health & Rehabilitation Centre was the development of a single-session transfer clinic (5). This clinic includes education sessions for young adults, group sessions with a psychologist for their parents/guardians, meeting their new adult care providers and touring the new facility to which they will be transferred. Adolescents with diabetes and their parents who attended the first several clinics reported satisfaction with the program. Initiating this type of clinic did not require additional staff or any significant expenditures. With a little planning, this type of clinic can be incorporated into a larger program of transition supports or be a first step to improving transition care at a smaller centre.

## Everyone Has a Role to Play

The keys to a successful transition are preparation and making sure that the adolescent makes new connections with an adult care team. Everyone involved can play a role to make sure these things happen. For adolescents with diabetes, taking on more responsibility for making appointments and refreshing their knowledge about self-management are good first steps. It is important, too, for the adolescent to ask questions if they are unsure about something and to alert people if there are any issues. For parents, it is important to talk to their child's pediatric providers to understand what will happen when their child transfers into adult care. Parents can help their child take on more responsibility for their care (e.g. in ordering supplies) before they leave pediatric care. For providers working with adolescents, it is important to start the preparations for transition early, so that families have the time to prepare and adolescents are ready to become more independent. Confirming that there is an adult provider who will take over their care is critical. Special efforts should be made to connect with those adolescents who have irregular clinic attendance during their teenage years. Those who are already having issues with accessing care and managing their diabetes are at a greater risk for not establishing a good relationship with an adult provider.

For those who take care of adult patients, recognize that your new patients are adults who are still maturing. Even though they may not be acutely ill, they are in a period of increased risk for adverse events and should be monitored closely. Providers should follow up with young adult patients who do not attend initial clinic appointments. Finally, our research shows the importance of family doctors in supporting young adults with diabetes during transition. Primary care physicians may not directly manage a transitioning adult patient's diabetes, but they are an

important connection to the health-care system and can help identify major health issues. For young adults with diabetes, we found that seeing a family doctor regularly during their transition period is associated with a decreased risk of diabetes-related hospitalization (1).

Most of the actions needed to ensure a successful transition are fairly easy to take. The challenge is that everyone is busy. Young adults have lots of other things going on in their lives during this period and may not prioritize their diabetes care. Providers may have many other issues that need to be discussed during a clinic visit. Some families may want to put off discussions about leaving pediatric care. However, everyone involved needs to make the time to ensure young adults with diabetes continue to receive the care they need and avoid unnecessary problems, where possible.

Transition is an important step in an adolescent's diabetes care journey. While there are risks, most make this transition without any major issues. This transition period is an opportunity to provide enhanced education to adolescents living with diabetes. If done well, the transition to adult care can help establish or continue a healthy lifestyle, which will

have positive impacts for the rest of an individual's life. It can also be the beginning of a long, positive relationship with a new care team.

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# Considerations When Prescribing Diabetes Medications in Older Adults

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Diabetes management in older adults (aged 65 years or older) requires careful consideration given the heterogeneity of this population. Some older adults live independently, while others may rely on caregivers or reside in long-term care. The presence of multimorbidity and geriatric syndromes, such as cognitive dysfunction, frailty, polypharmacy, depression and falls, can also impact diabetes self-care and management strategies (1). Physiological changes that occur with aging can affect the pharmacokinetics and pharmacodynamics of drugs (2,3). Consequently, older adults are more susceptible to developing adverse drug-related events, such as hypoglycemia, which can lead to complications, emergency department visits and hospitalizations (4). In this article, the physiological changes of aging relevant to pharmacotherapy and dosing considerations of diabetes medications in older adults (Table 1) are discussed.

The physiological changes of aging with respect to metabolism and elimination are of particular importance in older adults with diabetes. Age-related changes of the liver lead to decreased hepatic blood flow and liver volume,

resulting in changes in drug clearance. Drugs that undergo Phase I metabolism (oxidative reactions via cytochromes P450) usually have reduced clearance, whereas those that undergo Phase II metabolism (glucuronidation) are preserved (2,3). With aging, there is also a reduction in renal mass, number and size of nephrons, and a decline in glomerular filtration rate. Therefore, diabetes medications that are cleared by the kidneys (e.g. metformin, sulfonylureas, sodium-glucose cotransporter-2 [SGLT2] inhibitors, dipeptidyl peptidase-4 [DPP-4] inhibitors and glucagon-like peptide-1 [GLP-1] receptor agonists) are eliminated more slowly and, as a result, there is potential for drug metabolites to build up, leading to toxicity (2,3).

Clinicians should always perform medication reconciliation and review the patient's comorbidities and estimated glomerular filtration rate (eGFR) prior to prescribing medications and during transitions of care. Deprescribing and/or consolidating medications into long-acting formulations and simplifying the diabetes regimen should be a priority (5-7). Furthermore, the principles of "start low, go slow"

**Table 1: Prescribing considerations in older adults with diabetes**

Diabetes medications	Dosing and prescribing considerations in elderly	Contraindications
Metformin	<ul style="list-style-type: none"> <li>• Start at 500 mg once or twice daily and increase by 500 mg weekly (start at a lower dose of 250 mg twice a day for those 80 years or older)</li> <li>• Do not start in patients with renal impairment (eGFR 30-44 mL/min per 1.73 m<sup>2</sup>)</li> <li>• Conservative dosing of maximum 1,000 mg daily for patients who are frail or those with eGFR 30-44 mL/min per 1.73 m<sup>2</sup></li> <li>• Use long-acting formulation, if available, to decrease pill burden</li> </ul>	<ul style="list-style-type: none"> <li>• eGFR less than 30 mL/min per 1.73 m<sup>2</sup></li> <li>• Hepatic impairment (increased risk of lactic acidosis)</li> </ul>
Sulfonylureas	<ul style="list-style-type: none"> <li>• Use long-acting formulations</li> <li>• Do not use in patients who skip meals or who have inconsistent food intake as this will result in hypoglycemia</li> <li>• Monitor closely for hypoglycemia when used in the setting of cytochrome P450 2C9 (CYP2C9) inhibitors, monoamine oxidase inhibitors, salicylates, sulfonamides, beta-blockers, nonsteroidal anti-inflammatory drugs, alcohol and/or insulin</li> </ul>	<ul style="list-style-type: none"> <li>• eGFR less than 30 mL/min per 1.73 m<sup>2</sup></li> <li>• Hypersensitivity to sulfonamides</li> </ul>
Meglitinides	<ul style="list-style-type: none"> <li>• Useful for patients who skip meals as the dose can be omitted</li> <li>• Monitor closely for hypoglycemia when used in the setting of CYP3A4 and OATP1B1 inhibitors</li> </ul>	<ul style="list-style-type: none"> <li>• Severe hepatic impairment</li> <li>• Do not use with concurrent gemfibrozil and/or clopidogrel therapy</li> </ul>
DPP-4 inhibitors	<ul style="list-style-type: none"> <li>• Dose reduction required in the setting of renal impairment, except for linagliptin</li> <li>• Saxagliptin may increase risk of edema and heart failure</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid use in patients with history of pancreatitis</li> </ul>
GLP-1 receptor agonists	<ul style="list-style-type: none"> <li>• Dose reduction required in the setting of renal impairment</li> <li>• Avoid use in patients with anorexia or weight loss</li> <li>• Ensure patient is able to manage injection and/or has caregiver who can administer</li> </ul>	<ul style="list-style-type: none"> <li>• eGFR cut-offs vary for drugs within this class</li> <li>• History of multiple endocrine neoplasia syndrome 2</li> <li>• History of medullary thyroid cancer</li> </ul>
SGLT2 inhibitors	<ul style="list-style-type: none"> <li>• Counsel patients on maintaining hydration to avoid falls and hypotension; and signs and symptoms of genitourinary infections and euglycemic diabetic ketoacidosis</li> <li>• May require adjustments of doses of blood pressure medications and diuretics when starting medication</li> <li>• Avoid use in patients with anorexia or weight loss</li> </ul>	<ul style="list-style-type: none"> <li>• eGFR cut-offs vary for drugs within this class</li> </ul>
Insulin	<ul style="list-style-type: none"> <li>• Morning basal insulin is recommended as overnight gluconeogenesis is not as prominent. Titrate basal insulin based on the fasting blood sugar</li> <li>• Easier for administration if caregiver involved</li> <li>• Use fixed-dose mealtime insulin to avoid errors for patients who have difficulty counting carbohydrates or have cognitive dysfunction</li> <li>• Avoid using insulin sliding scales. Use a simplified correction scale for meals (e.g. if blood sugar is more than 10, give two additional units of mealtime insulin; if more than 16, give four additional units of mealtime insulin)</li> <li>• Avoid insulin at bedtime as it increases the risk of hypoglycemia overnight when symptoms may go unrecognized</li> <li>• Longer-acting insulin analogs are preferred due to lower risk of hypoglycemia compared to NPH</li> <li>• For patients who cannot manage insulin administration and rely on a caregiver who can only come once a day: simplify the regimen to once daily basal insulin with oral agents (type 2 diabetes) or combine once daily basal insulin with either NPH or premixed (type 1 or insulin-dependent diabetes)</li> </ul>	<ul style="list-style-type: none"> <li>• Hypersensitivity to insulin</li> </ul>

DPP-4, dipeptidyl peptidase-4; eGFR, estimated glomerular filtration rate; GLP-1, glucagon-like peptide 1; SGLT2, sodium-glucose cotransporter-2.

and “use the lowest dose” should serve as important guides in order to avoid the risk of hypoglycemia and poor outcomes in older patients.

## Prescribing Considerations in Older Adults

### Metformin

Metformin is considered first-line therapy for individuals with type 2 diabetes. It is advantageous to use this drug in older adults because of its very low risk of causing hypoglycemia (8).

The typical starting dose of metformin is 500 mg once or twice a day, with weekly increases of 500 mg until glycemic control is achieved or up to a maximum effective dose of 2,550 mg per day (9). Given the age-related physiological changes, for adults aged 80 years or older, it is reasonable to start at a lower dose of 250 mg twice a day and cautiously increase by 250 mg weekly, up to a maximum of 1,000 mg per day (10). Using long-acting formulations of metformin are desirable to minimize the pill burden for older patients, many of whom are already on numerous medications.

The initiation of metformin is generally not recommended when the estimated glomerular filtration rate (eGFR) is between 30 to 44 mL/min per 1.73 m<sup>2</sup> and continuation of metformin is contraindicated when eGFR is less than 30 mL/min per 1.73 m<sup>2</sup> (11). Metformin should not be prescribed in patients with hepatic dysfunction. It is important to monitor vitamin B12 levels periodically as long-term use can result in vitamin B12 deficiency (12). The side effects of metformin are dose dependent and can be minimized by instructing the patient to take metformin with meals (12).

### DPP-4 Inhibitors

Gliptins are safe to use in older adults due to their minimal risk of hypoglycemia and are weight neutral (13). Sitagliptin, alogliptin and saxagliptin require dose adjustments for renal impairment. No dose adjustments are required for linagliptin in patients with renal impairment; however, safety has not been established for eGFR less than 15 mL/min per 1.73 m<sup>2</sup>.

### GLP-1 Receptor Agonists

GLP-1 receptor agonists offer cardiovascular protection and renal protection, can be beneficial for weight reduction and have low risk of hypoglycemia (14,15). No dose adjustments are needed for liraglutide, semaglutide and dulaglutide in the setting of renal impairment. However, an alternative agent should be used when eGFR is less than 15 mL/min per 1.73 m<sup>2</sup>. Exenatide and lixisenatide should be used cautiously in patients with renal impairment.

Older adults who are frail and/or experiencing weight loss and poor appetite may not be the best candidates for GLP-1 receptor agonists due to its weight-reduction properties. Additionally, those who are unable to manage injections due to cognitive dysfunction, decreased visual acuity or issues with dexterity will need to depend on a caregiver for medication administration.

### SGLT2 Inhibitors

The use of SGLT2 inhibitors is becoming more common as they have been shown to have cardiovascular and renal benefits, and have a low risk of hypoglycemia (16,17). SGLT2 inhibitors have been shown to be safe and effective in older adults compared to younger adults (18). Dose adjustments are required for SGLT2 inhibitors in the setting of renal impairment.

Older adults who are prescribed SGLT2 inhibitors are more susceptible to dehydration, which subsequently can lead to orthostatic hypotension and falls (13). Therefore, it is important to counsel patients to keep hydrated throughout the day and to adjust the doses of antihypertensives and diuretics.

### Insulin secretagogues

Sulfonylureas are frequently used due to their low cost and efficacy in lowering glucose levels. However, these medications are associated with high risk of hypoglycemia and should be used cautiously in older adults. Those who are frail, have inconsistent eating patterns and/or cognitive dysfunction are at a higher risk of adverse events (13). Gliclazide-modified release is preferred over glyburide due to its lower risk of hypoglycemia (13). Individuals and/or their caregivers should be instructed to monitor glucose checks frequently when first initiating the medication.

Meglitinides can be useful in older adults when eating patterns are erratic and can be omitted if a patient skips a meal. Also, they have a lower risk of hypoglycemia compared to glyburide (13).

### Insulin

The use of insulin in older adults requires close monitoring as complex insulin regimens are often difficult for them to manage, and can lead to errors, hypoglycemia and increased diabetes distress (19). Morning basal insulin instead of bedtime is preferred in older adults to avoid overnight hypoglycemia as gluconeogenesis is not as prominent overnight compared to younger adults (19).

It is generally safe to start basal insulin at 10 units in the morning, or to prescribe 0.1 units/kg for frail elderly, lean individuals or those with renal impairment. Basal insulin should be titrated based on fasting blood sugars, aiming for individualized targets based on the Diabetes Canada guidelines (13). Long-acting insulin analogs are preferred over NPH as there is less hypoglycemia (13). Sliding scales should be avoided as they have not been shown to improve hyperglycemia and can lead to hypoglycemia (20). Additional considerations are presented in Table 1.

### Other Noninsulin Agents

Alpha glucosidase inhibitors have modest effect on glycemic control; however, are not usually well tolerated due to side effects (13). Additionally, these medications are prescribed

three times per day, which is not ideal for older adults who require medication management or have cognitive dysfunction. Thiazolidinediones are effective for improving glycemic control, but are not typically used in older adults due to the increased risk of heart failure, edema and fractures (13).

## Summary

In older adults with diabetes, physiological changes of aging, the presence of geriatric syndromes and multiple comorbidities, and polypharmacy are important considerations when prescribing diabetes medications. Avoiding hypoglycemia, decreasing the treatment burden by deprescribing and simplifying the diabetes management plan should be of the utmost importance.

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# Diabetes and Spirituality

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Diabetes management requires time and dedication. About 30 per cent of the Canadian population is impacted directly by type 1 and type 2 diabetes (1). If unmanaged, this condition can result in many undesired complications and damage to the organs, such as the eyes, kidneys, nerves, heart and blood vessels (1).

People have to consciously make daily choices about their food intake, exercise and medication usage in order to manage their diabetes appropriately. Many individuals may seek comfort by relying on friends and family to support them in their diabetes journey. Even more, they may seek religion or spirituality to cope with the condition. All of this can support



and empower patients to make decisions for the betterment of their overall health. A large qualitative study involving focus groups was conducted with 81 participants from African American, American Indian, Hispanic/Latino and Hmong backgrounds (2). Participants reported spirituality as being an important component of their diabetes care and/or having a significant influence on disease perception (2).

Spirituality consists of the focus of our internal existence or belief of a higher power, with or without the application of religion. Spiritual belief can be related to religion only if a person believes that there is a higher power and that they have a relationship with this power. On the other hand, if a person is not religious, spiritual belief is based on life experiences (3).

Given the multicultural Canadian population, “spirituality can also be an aspect of cultural identity (4).” It is valuable to discuss spirituality with clients in order to offer a holistic and patient-centred approach for culturally competent diabetes care.

In current medicine, the focus is largely on pursuing the successful management of a chronic condition with the use of new technological innovations. Optimal diabetes management involves meeting with clients to help them reach target levels for their blood glucose, lipids, blood pressure, etc. The provision of compassionate and spiritual care involves treating the patient as a whole by working on their physical, emotional, social and spiritual well-being (5). Clients may appreciate the involvement of their interdisciplinary team when they are able to work together on a care plan that considers their needs.

Understanding a client’s spiritual beliefs is integral in contributing to their care. Spirituality can be an important component to accepting medical diagnoses, understanding a medical disease and coping with stressful and difficult times. Health-care professionals voice barriers, such as lack of time and inexperience, and difficulty identifying clients that would like to discuss spirituality (6). In addition, identifying patients that would benefit from spiritual assessments could be based on interactions with the client and their spiritual awareness and coping mechanisms. In order to overcome these barriers and put compassionate care into practice, we can adopt efficient tools, such as the FICA and Open Invite questionnaires (6).

In 1996, Dr. Puchalski put together the FICA acronym questionnaire (6).

F: Faith or Beliefs

I: Importance and Influence

C: Community

A: Address

Individual questions are centred around this acronym. For more information, please consult: <https://smhs.gwu.edu/spirituality-health/program/transforming-practice-health-settings/clinical-fica-tool>.

The Open Invite mnemonic questionnaire includes the following (6):

## **Open: Open the door for a conversation about spirituality**

### **Questions for Open:**

- May I ask if you have a spiritual or faith practice?
- How do you cope with difficult times?

### **Invite: Invite to further discuss spiritual needs**

#### **Questions for discussion:**

- Do you find that your spiritual health is impacting your physical health?
- Does your spirituality influence your decision making when it comes to your health?
- Is there a way that your spirituality helps you with your diabetes management?
- Would you like me to include components of your spirituality into your diabetes care?

Encompassing spiritual assessments in clinical practice allows for tailored treatment plans to help health-care professionals understand spiritual preferences, acknowledge the individual’s faith traditions and reach out to discuss spiritual traditions and communities (6). If one believes that their diabetes can be improved with daily prayer or by seeking support from a medicine man for alternative therapies; you can add the patient’s spiritual requests as part of their diabetes care plan (2). Moreover, inclusion of spiritual assessment can help establish a good patient-professional rapport, which is integral to improving diabetes management in a supportive manner. Even more, it allows health-care professionals to evaluate and reflect on their own beliefs, biases, values and needs in relation to health care. Health-care professionals should adopt a holistic approach with clients to identify their physical, emotional and spiritual needs. This will allow clients to receive accessible, fair and safe treatment to support their diabetes care and achieve overall health and well-being.

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