ON THE CUTTING EDGE
Diabetes Dietetic Practice Group

NEW FRONTIERS IN DIABETES CARE

Message from the Theme Editor:
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If you're reading this, you likely don't need me to tell you that diabetes is complex. Diabetes' optimal management is often elusive to even the most motivated patient and accomplished clinician. I've lived with Type 1 diabetes for 23 years and have spent my career as an RDN in the diabetes field, so I can confidently confirm: diabetes is both a science and an art. RDNS play an important role in diabetes care, so keeping up with the recent science and art is important as we want to make a positive impact on our patients and healthcare systems.

This OTCE issue, "New Frontiers," goes beyond technology; we explore the most up-to-date, real-life practices of diabetes experts who have proven success and are serving at the forefront of progress in their specialty areas of diabetes care.

LaurieAnn Scher kicks us off by giving us a specific tool to directly improve diabetes care outcomes and health equity utilizing the patient centered framework: Identify, Configure and Collaborate (ICC).

Dr. Kirstine Bell and Xinyi Li help us understand how nutrients beyond carbs affect blood glucose and where to start when providing insulin adjustment education for protein and fat.

Dr. Holly Willis and Mamie Lausch show us how RDNs have the power to help improve insulin management for patients with Type 2 diabetes by assessing the need and advocating for insulin pumps in this population.

An inpatient stay for someone with diabetes can be frustrating and even dangerous without the correct protocols in place. Sandra Miller is the ultimate advocate for patients with diabetes and RDNs as systemic change agents. She shows us how RDNs have the opportunity to drive advancements in healthcare by leading quality and safety initiatives.
THERE ARE MANY WAYS TO HELP A PERSON WITH DIABETES MANAGE THEIR DISEASE:

- Control blood glucose levels through diet, exercise, and medication.
- Monitor blood glucose levels regularly.
- Take medications as prescribed.
- Maintain a healthy weight.
- Stay physically active.
- Educate themselves about diabetes and its management.
- Manage stress.
- Attend diabetes support groups.
- Work with a healthcare provider to develop a personalized care plan.
The “New Frontiers” issue wouldn’t be complete without addressing how the pandemic has changed diabetes care. Since we have become more familiar with telehealth, I challenge you to evaluate how telehealth options present both benefits and drawbacks for your clinic and patient population.

Remote care is here to stay and people living with diabetes have options! Maggie Evans outlines how you can help your patients find their best fit if remote care, education and support can be a successful part of their treatment plan.

We end on an article that reminds us that people with diabetes are people first. Tara Smith motivates us to expand our ideas of diabetes care, education and support. She showcases the importance of patients with diabetes sharing their diabetes journey with others to destigmatize diabetes and provide a much needed supportive space.

My hope is that you finish this issue learning something new and feeling empowered to move your diabetes practice forward!

To our authors and reviewers:
Thank you for sharing your diabetes expertise with our readers and clinicians. We are all unique in our experience and abilities; collaborating is essential to delivering high quality care to people with diabetes.

To our readers: Thank you for your curiosity and dedication to spreading your knowledge to patients and the healthcare community.

To my senior editors: Thank you for your tireless effort to make this an incredible issue.

Identify, Configure, and Collaborate to Make Gains in Diabetes Health and Health Equity
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Introduction
People living with diabetes, healthcare providers, and the people who support them increasingly rely on technology solutions for diabetes management. This technology goes beyond insulin pumps and connected glucose monitoring devices. In 2019, the American Diabetes Association added a dedicated section on diabetes technology to the Standards of Medical Care. Subsequent Standards of Care updates identify diabetes technology as “the term used to describe the hardware, devices, and software that people with diabetes use to help manage their condition, from lifestyle to blood glucose levels” (1). For a particular individual, this may include wellness applications, digital therapeutics, virtual care and education, medication delivery systems (pumps and smart pens), food, exercise and medication tracking and journaling products, connected glucose monitoring devices, and remote health/vital sign monitors, among other solutions. These products provide coaching support, as well as data on uptake and usage and the diabetes metrics that can be used to individualize care and improve outcomes based on the lived experience. The potential for technology solutions to improve diabetes outcomes has been observed in various population groups of people with both type 1 (T1D) and type 2 diabetes (T2D) in research, systematic and umbrella literature reviews (2-7). Technology in its myriad forms has the potential to not only monitor and deliver an intervention (as in the case of a digital therapeutic or insulin pump), but to also provide collected data to clinicians and the person with diabetes to act on, improve outcomes, and support a person-centered approach.

Disparities around the Provision of Technology
Technology is an integral component of the standard of care for people living with diabetes. The American Diabetes Standard of Care states: “Diabetes technology, when coupled with education and follow-up, can improve the lives and health of people with diabetes” (1). And that means that all people living with diabetes should have access to technology. Despite advances in technology, disparities and health inequities persist in diabetes prevalence, prognosis, and health outcomes (5). Social determinants of health (SDOH) including broadband access (8), insurance coverage, and socioeconomic status (SES) have been observed to impact glycemic outcomes in people with diabetes (PWD) in at-risk populations. This has led to the recognition of the need to address SDOH as key factors that impact health outcomes (9). In
recent studies in young adults with T1D, racial-ethnic disparities have been identified in non-Hispanic Black youth with T1D for both continuous glucose monitoring and insulin pump adoption resulting in glycemic disparity (10-12). In addition, it was observed that at-risk populations often do not receive the support needed to be successful with diabetes care including access to and appropriate education for the optimal use of diabetes technology to achieve health equity (5). While much of the current research and literature on technology use in PWD has historically focused on use in adults and children with T1D, it does offer us a lens into disparities around technology access, use and benefits in other age groups and among people with T2D. The COVID-19 pandemic has not only brought to light the issue of health disparities and equity for people living with diabetes and other cardiometabolic conditions, but the swift pivot to virtual care uncovered the need to ensure that all PWD have access to, use of and support for the technology tools required to meet the standard of care and that allow for data capture and remote monitoring.

Technology Enabled Support (TES)
Technology enabled diabetes self-management education and support was seen to provide a significant reduction in A1C compared to interventions without technology in a 2017 systematic review by Greenwood et al (13). From this review, a model referred to as the Technology Enabled Support feedback loop (TES) was developed with the features that prove to be the most effective in supporting self-management. The TES model is a feedback loop that includes two-way communication between the healthcare team and the person with diabetes around patient generated health data that is collected by the technology allowing for technology enabled shared decision making, individualized education and a person centered approach. As the connected health environment has grown over the years through the adoption of medical devices (pumps, smart pens, CGMs), consumer devices (wearables, connected blood pressure cuffs and scales) and digital health products (wellness apps, digital therapeutics), a recently published 2021 umbrella review has shown that “technology-enabled diabetes self-management interventions continue to be associated with improved clinical outcomes” (14).

The technology-enabled environment has allowed for remote, continuous care for people living with diabetes and improved management, but only when access to the required technology is available. According to the ADA, “Adoption of pump therapy in the U.S. shows geographical variations, which may be related to provider preference or center characteristics and socioeconomic status, as pump therapy is more common in individuals of higher socioeconomic status as reflected by race/ethnicity, private health insurance, family income, and education. Given the additional barriers to optimal diabetes care observed in disadvantaged groups, addressing the differences in access to insulin pumps and other diabetes technology may contribute to fewer health disparities” (1). In addition, as evidenced by Dr. Agarwal’s research, the findings point toward the role of other factors in the disparity of technology use by PWD beyond that accounted for by insurance coverage, SDOH, and SES including implicit bias, systemic racism, and individual provider attitudes around technology offerings (16). These factors may be unknowingly contributing to decreased technology access for at risk populations and resulting in poorer outcomes. Findings like these
challenge us to look at our own beliefs and behaviors in working with PWD in order to adopt systematic approaches that will help us avoid inadvertent biases in the provision of technology.

The ICC Framework

In 2020, the Identify, Configure, and Collaborate (ICC) Framework (see Figure) was developed to provide a standardized framework for the implementation of and guidance for the incorporation of technology into the care plan (15). The ICC framework of identification, configuration, and collaboration is put forward as a standardized approach to optimize technology-enabled diabetes and cardiometabolic care and education in order to improve outcomes. The standardized process includes the following 3 steps: (1) Identify appropriate technologies using a shared decision-making process, (2) Configure the technology and the required workflow, and (3) Collaborate for ongoing interpretation and use of Patient-Generated Health Data (PGHD) (17). Identifying the needs and goals of the PWD and configuring the technology based on the person in front of you and their goals will ensure that technology is relevant and useful initially and on an ongoing basis. Furthermore, the ICC framework has the ability to uncover personal and systemic barriers that impact treatment decisions and enable referrals to relevant resources. The framework additionally enables the clinician to provide direction for the incorporation of technology into care in a systematic way in an ever evolving health technology

<table>
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<tr>
<th>Identify</th>
<th>Configure</th>
<th>Collaborate</th>
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<tbody>
<tr>
<td>Assess interest in technology and attitudes towards its value for their health</td>
<td>Set up the technology to meet the person's needs in terms of alert thresholds, alarms, notifications, prompts, reminders, etc.</td>
<td>Discuss with the person how they are going to use the technology on an ongoing basis and issues that may have arisen previously that prevent them from continuing to use the technology</td>
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<td>Understand what the person struggles with in their diabetes care that they want technology to help them manage</td>
<td>Tailor settings to meet their personal situation, health needs, and abilities</td>
<td>Discuss observed data and review for safety and appropriateness of current settings</td>
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<td>Evaluate person's comfort level with technology, readiness, and past experience with diabetes technology if relevant</td>
<td>As a team, create a clear support plan for use of the technology that includes event tracking for a set amount of time if desired</td>
<td>Analyze the information from the device to make changes towards the goal of improved outcomes through informed decision making</td>
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<td>Discover person's data usage limitations and access to the internet</td>
<td>For individuals with connected devices, work with them to ensure that devices are synchronized appropriately and provide them the data and support to enable self-management</td>
<td>Discuss how the person wants to use the technology for their care and support the person towards informed decision making based on their experiences accessing and using the technology</td>
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<td>Discuss cost of the device with the PWD: look at coverage options for a device, including program options available to cover the total individual cost of use (including device supplies)</td>
<td>Provide education (verbal and written) on what to do in the case of technology failures to ensure safety and confidence and encourage person to share this information with their care givers</td>
<td>Re-evaluate the value of the technology with the PWD on an ongoing basis; allow them to decide to remove, replace, or take breaks from technology that is no longer meeting its intended purpose</td>
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<td>Assess with the person any physical or cognitive conditions that may impact technology options</td>
<td>Work with the PWD to ensure that the device is set up properly for their needs; for example: dose corrections, Insulin on Board, bolus calculators, carbohydrate suggestions, etc., are set for their needs and they understand how and why they were set as they were</td>
<td>Use the data captured by the technology in a shared decision making relationship at each visit; discuss what is working for them personally and reconfigure when things are not</td>
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landscape. We have a responsibility to ensure that all PWD have the option to make an informed choice about the use of technology to help them manage their diabetes. The routine identification, configuration and collaboration steps allow the provider to fulfill that responsibility on an ongoing and regular basis in order to reach individual and population health goals.

Application of the ICC framework across the entire practice population at each interaction with every person living with diabetes will increase the use of technology tools aligning with the Standards of Care. Using a standardized approach has the potential to address known and unknown disparities in the provision of technology (16). During **Identification (See Table)**, technology that is currently used and options for now and in the future are discussed, recognizing that life with diabetes is not a static situation and technology choices may need to change over time. The identification step is important to determine the right technology at the right time for every person and to educate people who are not ready for technology or who do not know what technology options are available for possible use in the future. During the **Configuration (See Table)** step, as the chosen technology is set up for the individual, the person with diabetes is provided with individualized tools to match their care plan, preferences, abilities, and lifestyle. The education and support required for configuration can be sought from product manufacturers through their websites as well as other more technology informed providers to offer the person with diabetes the most current and supportive care tailored to their circumstances.

**During Collaboration (See Table),** barriers to use and access are observed and discussed alongside the data that is generated from the technology use to make shared decisions that lead towards improved outcomes. The application of this standardized approach should be used for every person with diabetes by every provider. Throughout the process, barriers to access including health insurance coverage, usability issues, access to the internet, etc., will be discovered. The belief is that the application of this framework will help the provider to apply a more equitable approach to technology enabled care and it will help to uncover disparities that lead to inequalities that need to be addressed.

**What Can We Do as Healthcare Professionals**

The ICC model steps help to ensure that technology options are offered to all PWD. If there are people who are unable to obtain (due to cost and/or insurance), unwilling to wear (ashamed of their numbers, do not want something attached, are uncomfortable with technology, don't want so much information, have concerns over privacy), are uninformed about the products (did not know a technology solution was an option, have low health literacy or numeracy, or had a provider who was not tech-savvy or was unwilling or unable to prescribe due to an inability to spend the time required for insurance inquiries and paperwork), or they are presently not ready for new technology, the use of the framework will help to uncover these barriers that can then be addressed. If access to the technology is not an issue, but someone is not using it, the practitioner will be able to ascertain the circumstances and problem solve collaboratively. We all know that having a device is different from using a device, and the ability to use a device and understand the data that it generates to drive improved outcomes requires ongoing support from the care team. While technology is an available tool, it may not be for everyone. In addition, for people who do not know that it is even an option, choosing a technology solution may require hearing about it more than once or learning about it from others, holding it in their own hand, and seeing how it can help them. Having literature and demos to share will help people become more familiar with technology options (15). Identifying, configuring, and collaborating around diabetes technology is a best practice that can easily be adopted by any provider to reach the goal of a more equitable provision of technology for diabetes management.

**Call to Action**

As registered dietitian nutritionists, we work to engage the person with diabetes through diabetes self-management and support towards the goal of improved outcomes. The ICC framework is a useful tool to reinforce this person-centered approach to care. As a provider, when we work with someone to identify-configure-collaborate, we learn much about them, and the system that they live within, to achieve their health goals. The diabetes care and education specialist has been encouraged with a recently published Call to Action (17) to apply the ICC Framework as a standard of care in their various practice settings: the goal is to address disparities in technology that prevent health equity as well as to provide people with available technology tools to improve clinical outcomes.
To help guide decisions regarding technology, use this technology discussion guide as a conversation starter for the PWD and provider.


References:
# A Stepwise Approach to Addressing Technology Disruptions

<table>
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<th>The Fail</th>
<th>The Fix</th>
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| **Insulin pump fails**                        | 1. For a patient who takes insulin, their management plan should include having a copy of their insulin pump settings available in the case of a pump failure. Options include:  
   - Take a picture of their settings on their phone  
   - Record their insulin settings in a note taking app on their phone or computer  
   - Keep a physical copy of their insulin settings in a safe space  
   2. Call the manufacturer  
   - A fix may be possible with technical support on the line  
   - If not, a replacement pump can be sent, usually overnight, if patient is within warranty and currently in the country where they purchased their pump  
   - **Remind your patients to renew their warranty when it is up**, typically every 4 years  
   3. MDI is necessary immediately  
   - Patients should have insulin and the correct dosing and delivery method (syringes for vials and pen needles for pens)  
   - If patients don’t have their insulin settings available, they should call their MD  
   - Basal/bolus insulin is ideal if the patient will be off their pump for several hours or more  
   - A basal insulin dose that equals the total daily dose (TDD) of the basal is a good place to start. For example, if the total daily basal dose in the pump was 20 units, the patient can take 20 units of their basal insulin once daily  
   - Bolus insulin should be dosed as usual per bolus settings  
   - Encourage patients to keep an active Rx for basal insulin at their local pharmacy to pick up on a prn basis  
   - If basal insulin is unavailable, rapid acting insulin can be dosed to replace both basal and bolus every 2-4 hours (dosing should be discussed with MD)  
   - CGM or fingerstick BG monitoring every 2-4 hours  
   - In emergency cases, if the patient has no back up insulin, NPH and Regular insulin can be purchased over the counter at most pharmacies  
   4. Back up pump:  
   - Manufacturers don’t typically give back up pumps to patients traveling anymore, but they can always try by calling ahead of time!  
   5. Educate patients about the risk of DKA  
   - The risk for DKA is highest in patients who do not make their own insulin (or very little insulin) and wear an insulin pump. This is because insulin pumps use only rapid acting insulin, which has an active time of 3-5 hours  
   - Onset of DKA symptoms can occur in as little 2-3 hours with no insulin infusion  
   - A visit to the ER is warranted if the patient experiences vomiting, abdominal pain and shortness of breath |
| **Continuous Glucose Monitoring (CGM) fails** | 1. Call the manufacturer  
   - A fix may be possible with technical support on the line  
   - If not, a replacement transmitter or sensor can be sent if patient is within warranty and currently in the country the patient purchased their CGM  
   2. Fingerstick blood glucose readings  
   - Encourage patients to have a BG meter and strips within their expiration date at home  
   - If your patient does not have a meter or strips at home, no Rx is needed, they can be purchased over the counter  
   - Affordable options are generic brands: CVS, Walmart, Kroger, etc all have their own generic brand of meter and strips that are often half the price of brand name options  
   - If patient is on MDI or a pump, check BG at least before each meal and before bed, more often as they like. Less frequent BG checks may be needed if patient is on oral meds only.  
   3. The emotional impact  
   - Work with your patients to have a plan BEFORE their CGM fails  
   - CGM offers the ability to see BG readings every 5 minutes, some patients check their CGM dozens of times per day  
   - CGM offers alerts, the speed and direction of glucose and sharing capabilities  
   - Eliminating these insights can cause some patients to have anxiety around their diabetes management |
Beyond Carbohydrate Counting: Utilizing Nutrition Factors to Optimize Insulin Dosing

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Abstract

Mealtime insulin dosing in type 1 diabetes (T1D) has traditionally focused solely on the amount of carbohydrate in a meal. However, dietary fat, protein and carbohydrate type (glycemic index) have all been shown to influence the early and late postprandial glycemic responses and mealtime insulin requirements. This review explores the current evidence and practical strategies for adjusting insulin dosing in clinical practice.

Traditionally mealtime insulin dosing in T1D has focused exclusively on carbohydrate. However, since 2015, the American Diabetes Association has recommended individuals with T1D receive education on insulin dosing on fat and protein content to improve glycaemic control (1). This review explores the current evidence on the impact of protein, fat, and glycemic index (GI), both individually and in combination, on postprandial glucose levels and practical insulin management strategies to improve glycemic control.

Although this review focuses on the evidence for how to dose for fat, protein and GI, it is important to take a more holistic approach in clinical practice and also consider what is consumed, the context in which it is consumed in, and any cultural, religious or other health considerations. Healthy eating is central to overall health and diabetes management and should form the cornerstone of dietetic counselling in T1D.

Glycemic Impact of Dietary Fat

Dietary fat influenced the postprandial glucose response in all seven studies published at the time of a 2015 systematic review (2). Meals high in both carbohydrate and dietary fat reduced the early glycemic response (first 2-3 hours after the meal) and delayed the peak glycemic level but caused sustained hyperglycemia in the late postprandial period (3 hours onwards after the meal) compared to high carbohydrate, low fat meals (2). For example, Smart et al reported that the addition of 35g fat to a meal containing 30g of carbohydrate increased the postprandial glucose level by ~90 mg/dL at 5 hours in children with T1D (2). A subsequent study by the same group showed that when dietary fat (30-50g) was consumed without carbohydrate or insulin, the early postprandial glucose response was lowered (0-4 hours) but then there was a dose-dependent increase in glycemia, reaching statistical significance between 6-8 hours (3). Furthermore, we have shown the relationship between dietary fat with carbohydrate and glycemia is dose-dependent. Stepwise increases in the dietary fat content (0g, 20g, 40g, and 60g) result in dose-dependent reductions in the early glycemic response (0-2 hours) and, subsequently, dose-dependent increases in the late glycemic response (2-5 hours). As a result, the addition of dietary fat was also protective against the risk of hypoglycemia in the late postprandial period. Interestingly, the type of dietary fat (saturated, monounsaturated or polyunsaturated fat) made no clinically or statistically-significant difference to the postprandial glycemic response (4).

Dietary fat is hypothesized to influence postprandial glycemia through a number of physiological mechanisms (5). Firstly, dietary fat slows gastric emptying, which accounts for the reduced early postprandial glucose response and delayed peak glucose level (2). Secondly, dietary fat induces acute insulin resistance at least 2 hours after circulating free fatty acid levels increase (2). In the absence of sufficient insulin (as in T1D), glucose levels rise. Acute insulin resistance may also induce increased hepatic glucose output, further increasing glycemia (2). Thirdly, glycerol can be used in the production of new glucose molecules through gluconeogenesis (5). However, this metabolic pathway is generally associated with the fasting state rather than the fed state as it
promotes the release of new glucose into circulation. Incretin hormones (GLP-1) have also been implicated in influencing postprandial glycemia following a meal (5).

**Evidence on the Glycemic Impact of Protein**

Protein also has a significant impact on the postprandial glycemic response in T1D, as demonstrated in several systematic reviews (2,6). This is best illustrated by Paterson et al, who demonstrated that 30g carbohydrate with increasing amounts of protein (0g, 12.5g, 25g, 50g and 75g) decreased the early glycemic response (up to 1 hour after the meal) and increased the late glycemic response (2.5 to 5 hours after the meal) in a dose-dependent manner in children and adults with T1D (7). As with dietary fat, the magnitude of the effect differs depending on whether carbohydrates are also consumed. When protein is consumed without carbohydrate, 75g of protein is needed before a statistically significant effect on glycemia is seen. By about 3 hours postprandially, this protein quantity resulted in a blood glucose level similar to that of 20g of carbohydrate without insulin (8). However, when protein is consumed with carbohydrate, as little as 12.5g protein significantly impacts postprandial glycemia (7). Our group has also explored the impact of the types of protein on glycemia. We concluded there was no clinically relevant, nor statistically different, impact, on postprandial glycemia between five animal protein types (beef, chicken, salmon, eggs and whey protein) (under review, presented in a symposium at ADA 2021). Lastly, in addition to their individual impacts, dietary protein and fat also have an additive effect when consumed together (2,6). In other words, the total glycemic impact following consumption of both fat and protein together will equate to the sum of their individual glycemic impacts.

Dietary protein likely influences postprandial glycemia through similar physiological mechanisms as dietary fat, including delayed gastric emptying, gluconeogenesis, acute insulin resistance and incretin hormone release (5). Protein stimulates the concurrent release of both glucagon and insulin, opposing hormones which together facilitate the storage of amino acids through insulin and hepatic glucose release to maintain glycemia (5).

**Insulin Dosing for Dietary Fat and Protein**

Much of the literature exploring insulin dosing for fat and protein use meals high in carbohydrate, fat and protein: this is representative of realistic meals, which often contain a combination of macronutrients in practice. Furthermore, both nutrients have similar effect on postprandial glycemia (i.e. delayed impact with substantial late postprandial hyperglycemia). Therefore, this section will consider insulin dosing strategies for both fat and protein together. It should be noted though, that given the additive glycemic effect of fat and protein, insulin adjustments recommended for the macronutrients in combination will likely be greater than for the nutrients individually.

It is clear from the body of evidence, that additional insulin is needed to overcome the sustained postprandial hyperglycemia seen following meals high in fat and/or protein (9,10). One systematic review concluded that for high fat, high protein, carbohydrate-containing meals, between 24%-75% more insulin was beneficial for glucose control (10). The percentage increase will be determined, in part, by the amount of fat and/or protein in the meal and the individual’s sensitivity to the macronutrients. For example, a randomized cross-over trial in adults with T1D showed the addition of 50g dietary fat increased the insulin requirement by 42% (12.6 ± 1.9 units vs. 9.0 ± 1.3 units, respectively), using a closed-loop control system (11). Even with this additional insulin, the high fat meal still resulted in a significantly higher glucose response, indicating insulin requirements may need to be further increased. Another randomized within-subject trial in adults with T1D reported that following the addition of both 40g of fat and 27g of protein to 50g of carbohydrate, 65% more insulin was required on average to achieve control than the insulin dose calculated from their usual insulin to carbohydrate ratio (ICR) (12). There were considerable interindividual differences, with insulin dose increases ranging from 17% to 124% (12), indicating a clear need to individualize insulin dosing adjustments in practice.

Two recent systematic reviews (9,10) exploring the optimal insulin dosing strategies for high fat and protein meals concluded that a dual-wave bolus was superior to a normal bolus. This is logical given the delayed glycemic response to both fat and protein. However, the optimal split and duration is unclear due to the substantial variation between individual studies. We have shown that the optimal split to achieve glycemic control is related
to the amount of fat in the meal (4). For a lower fat meal (20g fat), the optimal split was ~75/25% over 75 minutes on average but as the amount of fat increased, the split evened out and the duration lengthened, with a very high fat meal (60g fat) needing ~50/50% over 105 min to achieve optimal postprandial glycemia (4). Hybrid closed-loop systems do not allow for dual-wave boluses. One study with a very high carbohydrate content (75g), showed the hybrid system could adjust the basal insulin dose adequately for the additional fat and protein contents and did not result in an increased glycemic response (13). For lower carbohydrate meals, it may be beneficial to reduce the carbohydrate entered to reduce the risk of early hypoglycemia resulting from the proportionally higher fat and/or protein content.

For patients using multiple daily injections (MDI), there is less published evidence to guide the optimal insulin dosing for high fat, high protein meals. The only two MDI studies in a systematic review both investigated a split dosing strategy that mimics the dual-wave bolus and provides additional insulin during the late postprandial period (10). Campbell et al reported that dosing 100% of the usual insulin dose (determined by the ICR) with an additional 30% (i.e., 130% of usual dose determined by the ICR) given 3 hours postprandially, resulted in improved glycaemic control compared with giving 130% upfront or 100% upfront with no additional bolus (14). In contrast, Smith et al found no difference between dosing 125% upfront vs 100% upfront and 25% after 1 hour (15).

Glycemic Impact of the Glycemic Index (GI)

It is well-established that the amount of carbohydrate impacts postprandial glycemia, however the type of carbohydrate, or GI, also influences the postprandial glucose profile and may have an impact on insulin dose requirements. The GI categorizes carbohydrate foods based on their relative blood glucose impact more than 2 hours in healthy adults (16). High GI foods are metabolized quickly and therefore produce a rapid glucose spike, whereas low GI foods are digested more slowly and thus have lower overall glucose response and lower peak glucose level (16). This holds true in individuals with T1D, with combined results from 98 participants across 7 randomized controlled studies showing the GI altered postprandial glycemia despite identical carbohydrate contents (2). For example, a randomized cross-over trial with children and adolescents with T1D found that meals matched for macronutrient, energy and fiber content but differing in GI (84 vs. 48) resulted in a significantly higher postprandial glycemic response between 30 and 180 minutes following a high GI meal compared to low GI meal (17). These test meals had relatively small amount of fat and protein (~9.5g and ~10.5g, respectively). Given that low GI foods result in a lower early glucose response, there may be an increased risk of early hypoglycemia when insulin is dosed upfront according to the individual’s usual ICR (2).

Emerging research is focusing on the effect of GI in combination of meals high in fat and/or protein in T1D. Adding fat and/or protein to a high GI carbohydrate can blunt the early characteristic postprandial glycemic spike seen with high GI carbohydrates in healthy individuals (18). Furthermore, given fat, protein and low GI carbohydrates can all lower the early postprandial glucose response, there is reason to believe that insulin dosing may need to be adjusted when consumed in combination in T1D. One randomized crossover trial in T1D found that extra-virgin olive oil decreased the early postprandial glycemic spike (0-3 hours post-meal) following a high GI meal but not a low GI meal (19). However, this study also altered the insulin dosing for the high and low GI meals, thus making direct comparison difficult. Further research is warranted into the glycemic impact of high GI carbohydrate vs low GI carbohydrates in the context of high fat and/or high protein meals.

Insulin Dosing for GI

There are few studies investigating insulin dosing strategies for high and low GI meals. A randomized crossover trial in children and adolescents with T1D reported a dual-wave bolus (50/50% split over 2 hours) reduced the postprandial glycemic response by 47% compared to normal bolus in low GI meals (20). There was no evidence on which bolus type is superior for glycemic control in high GI meals, but the dual-wave bolus reduced hypoglycemia in both low and high GI meals. Alternatively, some studies have dosed insulin using an insulin glycemic load ratio (Glycemic load = (GI x carbohydrate content)/100) (21). Some strategies have been proposed for high GI foods, including bolusing 15-20 mins prior to the meal (22) or a superbolus (increased preprandial bolus with a reduced or eliminated basal during the meal in order to increase insulin upfront while minimizing the risk of hypoglycemia later) (23).
### Summary

In summary, dietary fat, protein, and GI all influence postprandial glycemia and likely require adjusted mealtime insulin dosing to improve glycemic control. Meals high in fat and protein reduce the early postprandial glucose response (0-3 hours) but cause sustained late hyperglycemia (3 hours onwards). For individuals using insulin pump therapy, insulin doses need to be increased by ~25-75% and dual-wave boluses are best suited to high fat, high protein meals. However, the optimal split and duration needs to be individualized and matched to the amount of fat/protein in the meal. For individuals using MDI, there is less published evidence, however an additional insulin dose of 25-50% may be beneficial 1-3 hours after the meal. Finally, although this review has focused on the evidence and practical strategies for adjusting insulin for various macronutrients, healthy eating is critical for overall health and diabetes management in individuals with T1D. Furthermore, insulin therapy should be optimized prior to adjusting doses for fat, protein and/or GI, including basal rates, ICR and correction factors.

### References

Type 2 Diabetes and Continuous Subcutaneous Insulin Infusion

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Introduction
Continuous subcutaneous insulin infusion (CSII), also known as insulin pump therapy, is not commonly used by people with type 2 diabetes (T2D), but it is an option that may be worth considering. This article highlights literature that discusses insulin pump therapy used by people with T2D; it concludes with a short discussion on factors to consider for recommending insulin pump therapy for a person with T2D.

Background
Evidence confirms that achieving and maintaining glycemic goals can prevent or delay diabetes complications (1) and reduce diabetes-related healthcare costs for people with T2D (2). In addition to lifestyle factors, medication adherence (which may include insulin pump therapy) can help achieve glycemic goals and cost savings (3,4). The American Diabetes Association (ADA) and the American Association of Clinical Endocrinologists (AACE) have both published algorithms that recommend how and when to introduce various treatments for T2D, which include lifestyle guidance, oral agents, non-insulin agents, and insulin. It is advised that insulin is added in a stepwise fashion after GLP-1 receptor agonists are considered. If the patient presents with weight loss, symptoms of hyperglycemia and A1C > 10% (ADA) or > 9% (AACE) then insulin should be initiated immediately (5,6).

Expert Recommendations for Insulin Pumps for T2D
The ADA and AACE algorithms do not specify when to introduce insulin pump therapy. However, both groups have published separate technology recommendation papers (7,8). The recommendations for use of insulin pumps by people with T2D are stated but not overtly encouraged. Authors of the ADA Standards of Medical Care state that insulin pump therapy is a personal choice and can be considered for people with T2D if the user can safely manage the system, but the guidance stops short of broad recommendations for insulin pump therapy with or without automated insulin delivery (AID) systems (8). Authors of the AACE algorithm also stop short of broad recommendations of insulin pumps for people with T2D. According to the AACE recommendations, certain people with T2D may consider traditional pump therapy (non-AID) as another option over multiple daily injections (MDI); AID systems are not part of the current recommendations (7). Researchers have identified the lack of expert recommendations in the literature pertaining to insulin pump use for T2D (9). Reasons for the reluctance of expert recommendations for AID systems is likely related to the lack of research among people with T2D.
Insulin Use and Insulin Pump Therapy in T2D

Some healthcare providers might not recommend the use of insulin pump therapy (or insulin for that matter) for people with T2D due to the increased availability of new, non-insulin therapy options. Despite the availability of more pharmacological choices, recent National Health and Nutrition Examination Survey (NHANES) data showed that among participants with any type of diabetes, only ~25% were using insulin between years 2015-2018, although this was an increase from ~20% insulin use from 2007-2010 (10). Despite the increase in insulin use in recent years, only 50.8% of people achieved an A1C < 7% compared to 57.4% of people between 2007-2010 (10). A 2018 analysis from 20 countries, including the United States (US), reported only ~43% of patients with T2D achieve and/or maintain recommended glycemic goals (11). Healthcare providers may wonder why glycemia was worse when more people were using insulin.

Given that an initial T2D diagnosis can be delayed for many years, it is difficult to say exactly how long it takes before a person with T2D will require exogenous insulin. Once it is determined that insulin is required, basal insulin is commonly started at a low dose and gradually titrated up. However, with time, basal insulin alone may not be enough. Blonde et al analyzed pooled data from people with T2D in the US who initiated basal insulin (12). Of participants in the 11 randomized controlled trials who started basal insulin (n=2,494), 49% did not achieve an A1C goal of < 7% by 6 months. Similarly, of patients in clinical settings who started basal insulin (n=9,098), 72% did not achieve an A1C goal of < 7% by 6 months. Intensifying therapy with the addition of mealtime insulin and MDI may be useful, but some people still will not reach desired glycemic targets. For example, a post-hoc analysis of the OpT2mise trial showed that after an 8-week MDI insulin intensification period, 231 of 254 (91%) people with T2D who had A1C > 9.0%, did not achieve an A1C < 8% (13).

It is possible that the limited use of CSII in people with T2D may be related to therapeutic or clinical inertia. It is also possible that healthcare providers are unaware of how CSII technology can be effectively utilized in people with T2D. Literature review can improve understanding of CSII use in T2D and knowledge of therapeutic options may help overcome inertia (14).

CSII Research in T2D

Literature suggests insulin pump therapy is likely equivalent to MDI for some people, and that it may be of added benefit for others. Exploration of the data can shed light on the utility of this therapy, including who may be most likely to benefit. Keep in mind that technologies have advanced significantly over the past years and not all studies have used comparable technology. Also, keep in mind that T2D is a heterogeneous disease, which makes it more difficult to make general conclusions about the effectiveness of treatments, including CSII therapy.

Reznik et al conducted a multicenter study (the OpT2mise trial) with 331 individuals who had T2D for an average of 15 years. In this study, participants who achieved A1C < 8% on MDI after the 2-month run-in period were excluded, while those with A1C 8% – 12% were randomized to use either CSII or optimized MDI therapy for 6 months. A1C improved significantly more in the CSII group compared to the MDI group at study end (mean difference -0.7% in favor of CSII, p<0.0001). TDD insulin use was also lower in the CSII group compared to the MDI group (about 97 versus 122 units/day, respectively; p<0.0001). Body weight increased slightly (about 1 – 1.5 kg), but not
significantly, in both groups and it was not different between groups (p=0.250); hypoglycemia also did not differ between the groups (16).

Similarly, Pickup et al completed a meta-analysis and meta-regression on five of the same studies used in the Dicembrini et al analysis, however, Pickup et al excluded subjects with missing data, thus, only including data from subjects who completed the studies that compared CSII to MDI (n=590) (17). Pickup et al found the mean difference in A1C from all trials was -0.4% (95% CI -0.86 to -0.05) favoring CSII. Hypoglycemia was not analyzed. Mean weight did not differ between groups in this analysis. TDD insulin was, on average, 24 units less for CSII (26% reduction) compared to MDI at study completion (17). Pickup et al concluded that the best candidates for CSII are those with elevated A1C despite attempts to optimize their MDI regimen; they also stated that those with the greatest improvements had the highest A1C and the highest insulin dose at baseline (17).

Finally, a recent retrospective review of 3,592 type 2 insulin pump users further supports the aforementioned data; this review showed a decrease in A1C (-1.3%) after 90 days of pump use, with the greatest reduction (-2.3%) in people with a baseline A1C of > 9% (18). This review also showed an approximate 30% reduction in TDD insulin and a reduction in weekly hypoglycemic events (18).

Not achieving glucose target on MDI is one factor to consider for recommending insulin pump therapy to someone with T2D. Other factors could also be considered (see Table).

### Table. Indications and Considerations for Insulin Pump Therapy in T2D*

**Factors that may support insulin pump therapy**

1. A1C or Time-In-Range (TIR) goals not attained with optimized MDI
2. Nocturnal hypoglycemia occurs when attempting to optimize long-acting insulin
3. Patient frequently misses doses of MDI regimen (e.g., forgetting to carry insulin, reluctance to take additional injection, cognitive decline, etc.)
4. Patient intentionally or unintentionally stacks insulin causing hypoglycemia or risk for hypoglycemia
5. Patient desires the convenience of technology that can calculate bolus including correction dose to aid in diabetes management
6. Collaboration between patient and health care provider would be better with downloadable data.

**Other considerations when planning insulin pump therapy**

1. Will there be a disadvantage if non-insulin agents that might offer other benefits are stopped (i.e., a GLP-1 for cardiovascular benefit or appetite-suppression)?
2. Does patient have adhesive sensitivity that would interfere with infusion set or pod wear?
3. Is patient interested in or willing to learn technology?
4. Is there a good support system for pump therapy (e.g., knowledgeable diabetes team including educator, supporting family)?
5. Does patient meet criteria required by insurance company to have technology covered?
6. Is cost acceptable to patient?


Attention to preconceived beliefs (barriers) to pump use—such as technical skills or cost—should be evaluated. For example, simple insulin dosing regimens can be effective for people with T2D, thus reducing the need for technical savvy with pump use. Bergenstal et al showed that in people with T2D using MDI, a simple algorithm (with fixed boluses) could be used instead of advanced carbohydrate counting with insulin-to-carbohydrate ratios (19). The simple algorithm (fixed boluses) can be applied to people using pumps. Related, in the OpT2mise trial, most patients used fixed boluses, not the bolus calculator, and 38% of the original CSII group had mild cognitive impairment (16).

The cost of insulin pump therapy is often seen as a barrier. Pump therapy and the associated supplies are expensive and may not always be covered entirely by insurance. However, some research suggests...
pumps may become economically advantageous due to significant decreases in diabetes medications and healthcare utilization with pumps compared to MDI (20). Additionally, various pump and technology companies may offer financial support (www.diabeteseducator.org/docs/default-source/practice/educator-tools/cgm-and-pump-cost-savings-resource.pdf).

Conclusion

CSII is not indicated or needed for all people with T2D, but it may be beneficial for some patients who require MDI. Currently, most insulin pump studies in people with T2D are limited to traditional pumps and not AID pumps, however, as more research in AID systems becomes available, the guidance for pump use may change. More research is needed to consider the impact of CSII compared to, or alongside, newer therapies for T2D (e.g., GLP-1s, combination therapies) and longer-term outcomes should be assessed. Ideally, future research will consider CGM metrics in addition to A1C and will also consider the impact of CSII together with healthy lifestyle guidance.

References

Quality and Patient Safety Management: New Frontiers in Diabetes Management

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Abstract
New career frontiers for Certified Diabetes Care and Education Specialists (CDCESs) have opened up with the passage of the Affordable Care Act (ACA). A career path in Patient Quality and Safety requires the intersection of clinical expertise in diabetes self-management, project management, quality improvement methodology, and informatics. CDCESs are uniquely skilled to lead quality improvement projects both in the acute care and outpatient care settings.

Background
Establishment of Medicare and Medicaid programs began in 1965 with the passage of Title XVIII and Title XIX of the Social Security Act (1). Congress established a set of conditions for the provision of services to Medicare/Medicaid clients called “Conditions of Participation.” This set of regulations and standards identified the required elements of performance deemed necessary for hospital operations and payment of such services. In efforts to improve the quality, effectiveness, and affordability of care, Congress passed a series of measures beginning with the establishment of Medicare’s Professional Standards Review Organizations in 1972 (2). The Centers for Medicare and Medicaid Services (CMS) was established in 1977. It serves as the federal payer of public health services and defines quality assurance standards and clinical performance metric goals to receive maximum payment for services rendered (3). The National Quality Forum (NQF), a nonprofit organization founded in 1999, defines the national clinical performance goals and safety priorities for healthcare quality improvement upon which the CMS relies (4).

The gradual evolution of quality and healthcare has transitioned from a focus on cost savings to a focus on data driven quality improvement initiatives. In 2010, as a condition of participation in CMS, the move to value based healthcare was intensified with the passage of the Patient Protection and Accountable Care Act (known as the Affordable Care Act (ACA) or Obama Care) (5). The act includes financial incentives to improve quality of care, reduce patient harm and control cost. The Hospital Inpatient Quality and Reporting (Hospital IQR) program requires hospitals to electronically submit specified quality data to CMS. Failure to report data or meet all Hospital IQR requirements including performance standards, are subject to a reduction in payments. Reported metrics are available to the public through the Care Compare website.

In August 2021 CMS released updated regulations pertaining to the Hospital IQR program which finalized the adoption of two glycemic management electronic clinical quality measures: Hospital Harm-Severe Hypoglycemia eCQM (NQF #3503e) and Hospital Harm-Severe Hyperglycemia eCQM (NQF #3533e) (6). Severe hypoglycemia is defined as a blood glucose event < 40 mg/dL collected within 24 hours of administration of insulin or other antihyperglycemic agent (6). Patient death or serious disability resulting from hypoglycemia is considered a serious patient care management event and reporting is required (7). Severe hyperglycemia is defined as one reading > 300 mg/dL or two consecutive days with one reading > 200 mg/dL (6).

Achieving blood glucose control within a beneficial target range is associated with improved clinical outcomes such as reduced rates of infections, reduced length of stay, and improved perioperative outcomes in the non-critically ill patient population (8). Hypoglycemia is associated with increased in-hospital mortality, longer hospital stays and higher medical costs (9). Hypoglycemia events in the hospital are among the most common adverse drug events. Approximately 40% of identified adverse drug events reported to the Medicine Patient Safety Monitoring System involve insulin and/or oral glucose management drugs (10). In a study published by the Office of the Inspector General, drug related errors
represented 31% of all adverse hospital events among Medicare patients; of those events, hypoglycemia was the third most common cause (11). Severe hypoglycemia events are largely avoidable by careful use of antihyperglycemic medication and monitoring.

A Case Study
My journey in the realm of patient safety and quality improvement began in 2008 with a severe hypoglycemic event that resulted in poor outcomes for a patient. This incident spurred our hospital to action. Our project's dual goal was to improve glycemic management (maintain blood glucose between 71 -179 mg/dL in the hospital setting while reducing hypoglycemic harm events (BG < 40 mg/dL). Our success hinged on senior leadership emphasizing the importance of improving outcomes, physician leadership and engagement, healthcare team collaboration, and data analytics that drove our continuous performance improvement cycle. As the sole CDCES employed by our acute care facility, I was asked to lead a root cause analysis of the event. Analysis revealed a multitude of failure modes that contributed to the event and increased our risk of future events. Multiple insulin order sets prevented our nurses from becoming proficient in providing a standard of care approach. Symptoms of hypoglycemia were unrecognized due to lack of education and focus as a preventable adverse event. A lack of nurse-driven hypoglycemic protocols resulted in treatment delays and inadequate post-event monitoring. Other opportunities for improvement included insulin and meal timing alignment, a need to empower nurses to speak up on behalf of the patient, poor data collection, analysis and tracking of glycemic trends.

The gold standard for glucose management in the inpatient setting is basal bolus with prandial dosing for meal time coverage (8,9). There are numerous touch points for insulin medication error including wrong time, omission error in correctional insulin, prandial insulin, and basal insulin, or wrong dose (12). Our own in-house beta testing of order sets proved that when prandial insulin is ordered, it increased risk of errors in dosing and missed dosing.

Methods: Our team researched published protocols and collaborated with physicians and nurses to develop an agreed upon basal/bolus insulin order set. To overcome prandial dosing error and confusion, we developed a modified basal bolus correctional scale that incorporates prandial insulin into the correctional insulin dose. The final insulin version of the insulin order sets used at our facility were unique to our organization (See Figure 1). The effectiveness of our approach can be attributed to the removal of potential administration errors and glycemic excursions that result from prandial insulin dosing errors. Coverage for glucose excursion starts at 101 mg/dL and includes calculation of prandial dosing in the plan. Four correctional bolus order sets are available: low, normal, high, and Custom. Basal dosing is weight-based. Blood glucose metrics were closely monitored and tracked to establish confidence in the safety and efficacy of the approach. Order sets included nurse-driven hypoglycemia treatment orders and guidance on when to hold insulin based on a change in status.

Order sets were initially on paper with paper charting, however, later the order sets were incorporated into the Electronic Medical Record system. The Clinical informatics team was engaged in the process, onboarding all physicians by loading the order sets within their “favorites.” Clinical Informatics oriented the physician to our glycemic management tools and our standard protocol for management. Physician buy-in was achieved by physician led mentoring, incorporating goals in contracting, and continual metrics feedback. Some inpatient facilities also involve the pharmacists as part of the integrated team.

Nursing guidance was built into the order sets instructing nurses to communicate with the physicians about blood glucose excursions using a standard nursing communication approach known as SBAR (Figure 2). Nurses are trained on the order set and have access to place the orders when verbal orders are given. All nurses review glycemic management during our annual nursing skills days. New nurses receive training on glycemic management, reading glucose trends, spotting high risk patients and communication methods with physicians as part of new nursing orientation. This training is provided on an ongoing basis by myself or other clinicians with a CDCES.

Results: Data analytics was initially performed by pulling point of care glucose results from the electronic medical record and using Excel. More recently our healthcare system progressed to use of GlycemiCareTM for real time individual patient tracking trends and RedCap for data analytics. Our hospital participates in the Society of Hospital Medicine Electronic Quality Improvement Program (eQUIPS) for glycemic management. The continuous improvement process cycle of: 1) plan, 2) do, 3) study, and 4) act was used throughout this project to achieve and sustain these results. We
Figure 1. Insulin Correctional Scale Standard Dosing For Blood Glucose Less Than 70 Follow Hypoglycemia Protocol

<table>
<thead>
<tr>
<th>AC daytime Q4/Q6 Coverage</th>
<th>HS and/or NPO Coverage</th>
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<tbody>
<tr>
<td>71 - 100 = none</td>
<td>71 - 100 = none</td>
</tr>
<tr>
<td>101 - 150 = 2 units</td>
<td>101 - 150 = none</td>
</tr>
<tr>
<td>151 - 200 = 4 units</td>
<td>151 - 200 = 2 units</td>
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<tr>
<td>201 - 250 = 6 units</td>
<td>201 - 250 = 4 units</td>
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<tr>
<td>251 - 300 = 8 units</td>
<td>251 - 300 = 6 units</td>
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<tr>
<td>301 - 350 = 10 units</td>
<td>301 - 350 = 8 units</td>
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<tr>
<td>351 - 400 = 12 units</td>
<td>315 - 400 = 10 units</td>
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<td>12 units &amp; call MD</td>
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-have achieved our goal to maintain glycemic control and low rates of hypoglycemic events. Our facility has ranked in the top decile for performance within the Society of Hospital Medicine eQUIPS. We maintain a rate of within range for greater than 70% of the hospital stay and have a very low rate of hypoglycemic events. Our hypoglycemia event rate is less than 3.5% and the rate of severe hypoglycemic events (< 40 mg/dl) remains stable at less than 0.1%. Senior leadership and our chief medical officer championed standardized use, resulting in > 95% compliance with sole use of these approved order sets.

Payments will be adjusted based on the composite performance score. CMS publishes performance rankings on the Physician Compare website, which will be available for public viewing in 2022. Maintaining a Hemoglobin A1C < 9.0% is a CMS National Quality Strategy measuring the effectiveness of direct contract entity management of chronic conditions. Other realms where quality and diabetes management intersect are clinical care management such as critical care management bundles, sepsis and reduction of hospital readmissions.

DCES Role in Quality and Patient Safety

Now is the time to take action and seek out opportunities in quality improvement and patient safety. Increase your awareness of quality improvement tools, policies and regulations that are driving change in the healthcare environment. Seek out opportunities within your organization to lead quality improvement projects and initiatives. Other potential venues for quality management initiatives are primary care practices, long term care facilities, assisted living facilities and home health services. Expand your skill set in quality improvement tools with training in informatics, lean six sigma, project management and quality improvement and performance improvement. For additional resources and training on quality improvement and patient safety explore resources available.

Figure 2. SBAR for Hyper/hypoglycemia

**Situation**
Notify the physician if:
"Your patient has a..."
- Blood glucose > 200 mg/dL x 2 in the last 24 hours or > 200 mg/dL x 1 and insulin has not been adjusted in the last 12 hours and/or
- Blood glucose < 70 mg/dL

**Background**
Inform the physician of
- Blood glucose trend
- Total daily dose of insulin given in the last 24 hours
- Glycemic medication order, dose and time
- Steroids
- Dietary intake or nutrition source
- Renal status

**Assessment**
I am concerned about persistent hyperglycemia or hypoglycemia

**Recommendation**
Alert physician if
- Correctional insulin is > 50% of total daily dose
- Steroids were adjusted, oral or enteral intake changes, or change of status
- Patient is not on approved insulin order set
- Document alert and action in the chart
on the Academy of Nutrition and Dietetics website EatinrightPro. The Informatics practice group on EatinrightPro provides information regarding the field of informatics (14).

References
Is Telehealth Our Answer to Improved Diabetes Care Delivery, Equity and Clinical Outcomes?

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Abstract
Historically, diabetes care has been required to be completed with an in-person visit every 3-6 months. Telehealth visits can offer convenience and improvements to our modern healthcare system (1). The response of healthcare providers and systems via the quick adaptation to, and private companies' development of, virtual care during the pandemic has demonstrated impressive flexibility and promising steps towards technical and regulatory innovations. While significant challenges do exist, including access to technology and patients managing multiple and complex health conditions, telehealth also offers the opportunity to address gaps, such as missed appointments and improved data collection, in quality patient care. Registered Dietitian Nutritionists (RDNs) have an important role to play in advocating for and becoming experts in remote diabetes care and education.

Introduction
How often do your patients miss or reschedule appointments due to a transportation issue, a scheduling conflict or a financial concern? Telehealth could be a viable remedy for these issues and other common blockers affecting healthcare delivery, patient self-efficacy and clinical outcomes.

Telehealth, also referred to as "telemedicine" or "remote" healthcare, is the use of electronic data, reporting and telecommunication technologies (e.g., phone, video call and chat messaging) to provide care when the patient and provider are not in the same physical space at the same time (1). For a telehealth visit, the patient and providers need only a device with internet or cellular access to connect.

Since the start of the COVID-19 pandemic, virtual care has been increasing in acceptance and use (2). Some establishments have seen as much as an 8000% increase in remote care compared to before the pandemic (3).

Remote clinical care has previously been viewed as an inferior substitute to in-person care, that healthcare only really counts when the patient is physically in front of the provider (1). Virtual visits became necessary during the height of the pandemic and has continued even through reopening of outpatient clinics and indoor activities as well as the implementation of mask mandates.

The current state of telehealth is surprisingly diverse. Telehealth can be more than just a 1:1 visit between provider and patient. Using on-demand education resources, like videos, PowerPoints and asynchronous voice or chat messaging, offers patients and providers a better way to individualize care (1).

Currently, a variety of telehealth delivery channels exist including: integrated digital and physical care platforms like hospital systems; convenience care platforms like Hims; care management platforms like Omada; Omnicare retail health like Walmart; unified virtual care platforms that join primary and chronic care together like Teladoc; and technical infrastructure like Google Cloud and myChart (1).

RDNs with diabetes care interest, experience and expertise are a necessary part of this growing arena of care and can help shape the future of it.

Addressing Equity
Only about one third of adults with diabetes receive the comprehensive care recommended by the ADA. Even more disheartening, those most likely to miss out on complete diabetes care are people with diabetes who are newly diagnosed, not on medications, younger than 65 years of age, of lower socioeconomic status and without health insurance (4). This also happens to be the group of people most likely to benefit from remote visits.
Moreover, only 26% of all people with diabetes are meeting glucose and heart health targets (4).

These numbers are likely due to a variety of factors including: limited access to medical care, health insurance and income limitations; and lack of access to physically and emotionally safe environment for exercise and to fresh, affordable food. Rural populations in particular experience adverse health outcomes at higher rates compared to urban and suburban populations (5). They also have a much more difficult time obtaining an appointment with and getting to an appointment with a specialist for diabetes. Patients living in a rural area have a 40% higher preventable hospitalization rate (6).

Telehealth can help solve a few of these problems. Compared to before the pandemic, telehealth visits increased twenty-three fold during the pandemic, with endocrinology and diabetes care being one of the highest users (2). Virtual care is optimal for certain conditions, particularly chronic conditions such as diabetes, hypertension and hyperlipidemia. Data review and evaluation and conversations around lifestyle are the focus of the appointments for people with diabetes and associated co-conditions, which can be completed remotely. Biometric data including glucose, blood pressure and weight can all be taken easily at home with the right devices. And lifestyle data like food logs, exercise, stress management and sleep habits are just as efficiently reviewed, if not more so, virtually (2).

### The Current Legal and Billing Status

Virtual care visits allow RDNs and other providers to see patients anywhere as long as both parties have an internet connection. However, many states require certain types of providers, including RDNs, to have licensure in the state the patient resides and is physically present in at the time of the visit. This is often a confusing, grey area and is continually changing. Additionally, RDNs are encouraged to check your state requirements for screen share capabilities which allow the PWD and the care provider to view the data together. Currently, physicians, nurses, mental health providers and pharmacists are required to have licensure in the majority of states to provide care to patients living in them. Many providers are now obtaining licenses in multiple states to be able to meet this need.

Arizona, California, Colorado, Michigan and Virginia do not require RDNs to obtain formal licensure beyond their certificate, therefore any RDN can provide care to patients residing in these states. The other states hold partial or full exclusivity of practice by RDNs and so subsequently require RDNs to be licensed by the state whose residents they provide care to (7).

### Opportunities in Telehealth

As healthcare providers, RDNs must remember that we ask a lot from our patients with diabetes. Diabetes is a 24/7 job that often makes people living with it feel tired and shameful. We ask our patients to: bring their glucose readings and notes about eating, exercise and sleep habits; show up on time consistently; be an active participant in their visits; and understand complex information. These burdens are often underestimated. Little has changed in healthcare in the past several decades and that’s where telehealth

<table>
<thead>
<tr>
<th>Table 1. Examples of Telehealth Opportunities</th>
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<tr>
<td><strong>Patient</strong></td>
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<tr>
<td>Digital apps/connected monitoring devices for tracking</td>
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<tr>
<td>Saving time and money on childcare and appointment travel</td>
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<tr>
<td>Someone living with blindness can avoid coordinating help and travel for an appointment</td>
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<tr>
<td>Medication taking habits improved via text message or in-app messaging reminders and home delivery and automatic refills of prescriptions.</td>
</tr>
<tr>
<td>Improved access to on-demand education</td>
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<tr>
<td>Decreased exposure to COVID-19</td>
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Tips for Successful Virtual Visits

- Meet your patient where they are with their technology fluency/knowledge
- Check in often to ensure you understand your patient and your patient understands you
- Minimize the complexity and risk for technical difficulties by limiting the number of applications the patient has to use
- Encourage your patient to find a quiet, private space for their visit
- Have patients upload their data, including medications and vital signs, beforehand, or if they are recording manually, request they have it ready to review together
- Make sure there is no sensitive data that could be visible in your video display
- Offer on-demand education instead of exclusively requiring a patient to show up at a certain time

Ongoing clinical support. With the right tools, telehealth can also more effectively tackle medication optimization and other diabetes needs like pump and CGM supplies. Text message or in-app messaging reminders, logging medications and home delivery and auto shipment of medications make things easier for the patient.

Trust building. Beyond convenience, offering virtual visits can even improve trust between provider and patient as many patients view it as a safer option than coming in person where they could be exposed to not just COVID-19, but to other viruses and bacteria that could put them at risk for illness.

Potential Challenges

Telehealth certainly comes with potential obstacles, but being aware of and preparing for them can help patients and providers address them head on.

Physical exam. There is no substitute for laying eyes on the patient. High quality photos, videos and shared provider visit notes can help bridge this gap. However, photos and videos cannot fully replace an in-person visit for those with multiple chronic and complex conditions. Educators have found it quite possible to teach insulin injection technique through use of cameras but there is still a need for inspecting and palpating insulin injection or infusion sites.

Technical challenges. Technology will fail. Even people who are quite tech savvy may struggle with uploading data and connecting devices if there are multiple applications or software to use. Those who are less tech savvy may benefit from phone calls and discussion rather than connected devices with data sharing and video visit.

Convenience and cost savings. The convenience of telehealth for patients is undeniable. For a variety of reasons, many people with diabetes live with physical conditions like difficulty walking and seeing, so being able to stay at home, even without assistance from another person, eases the burden of the visit. When the patient can take a call or log in on the computer at home, they save money and time they would have spent traveling to their appointment, finding child or adult care if they are a caregiver, and/or taking time off work. Even home delivery of prescriptions, which are underutilized, save a trip to the pharmacy and are typically cheaper when sent on a quarterly cadence versus picking up monthly.

Remote patient monitoring. Providers have the opportunity for remote monitoring with telehealth care, which includes automatic and timely updates in relevant clinical data, like blood glucose and blood pressure. There are dozens of devices, like glucometers, continuous glucose monitors, blood pressure monitors, weight scales, activity trackers and food logs, available that connect with a wire and/or wirelessly to different software and apps. Many smartphone apps can now sync with different EMRs and population management software that provide data analytics and clinical insights to both patient and provider.

Data beyond the numbers. Viewing photos of your patients’ pantry or utilizing video chat with your patient while they walk through the grocery store is undeniably superior compared to talking in theory of healthy food choices or reviewing a food diary. Remote sessions allow for you to see in real-time, the actual foods, labels, portions and emotions your patients are bringing to the table.

RDNs have the opportunity to be creative in their remote care. Take a moment to think of the most effective way to provide education and support. Would you want to be a fly on the wall in your patient’s home? In their pocket when they’re at the grocery store or out to eat? This can become reality with telehealth.
Getting the data. Patients may have difficulty transferring data to their provider or remembering to upload it. Sending reminders and having tutorials available can help patients know when, why, and how to get their data to their provider.

Health equity. Patients with limited English proficiency use virtual healthcare half as often as patients who are proficient in English. Utilizing professional interpretation services is necessary when a provider is not a native speaker of the patient’s preferred language. This also means language responsive web pages and providing education material in the patient’s native language is important to address this inequity (13).

Summary
Telehealth visits for diabetes and chronic care, that is, completing diabetes outpatient care or DSME-S via voice/video call and/or chat messaging are here to stay. While we are still exploring the long-term outcomes, there are many clear benefits and opportunities including logistical convenience for both patients and providers, improved data collection and analysis, a more accurate and comprehensive look at a patient’s home life and fewer no-show appointment rates.

These benefits also come with challenges. Access to the necessary technology, for example a smart phone and/or computer and internet, will prevent many people, particularly older adults, patients who live in rural areas and those with lower cognitive function, from participating in and getting the benefits from telehealth. Accessibility, like the ability to see a screen or hear the provider well, also poses a challenge for patients who do not have caregiving assistance. Some challenges can be addressed on an individual basis (accessibility), while others are systemic (internet access).

It’s our job as diabetes experts to advocate for remote care for our patients, not only for their clinical outcomes, but also for their mental wellbeing around their diabetes care (14). Can our healthcare system policies, protocols and payment structures keep up with our world’s technological advancements? Clinical guidelines are starting to be established for diabetes technologies, including the use of telehealth (15). Whether working in private practice, in a hospital system, industry or community setting, RDNs, as trusted providers and patient advocates, can be the experts in technology and lead their team in implementing and upholding diabetes telehealth in their practice fields.

We have never had the momentum like this to truly reshape for the better the way healthcare is delivered (16). Telehealth may never fully replace in-person chronic care visits, but it can provide a safe, cost effective, clinically equal, and potentially superior, offering for you, your care team and your patients.

References


Advancements in Diabetes Care: Remote Diabetes Programs

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Abstract
This article reviews various remote diabetes programs offered for individuals with diabetes. It will summarize the different ways in which these programs offer services to those with diabetes and potential costs that users may incur when using these services.

Introduction
According to the CDC, more than 34 million people in the United States have diabetes (1). People with diabetes are at high risk for developing heart disease, stroke, and other complications such as kidney failure, blindness, and amputations. 1 in 4 health care dollars spent in the United States is attributed to diabetes health care costs with an average annual cost of $16,752 for people with diabetes (2). Remote diabetes programs utilize advancements in technology to cover a gap in diabetes care by giving people the resources they need regardless of their location. Creation and utilization of remote diabetes care platforms is the wave of the future in delivering care to those with diabetes. Individuals can utilize remote programs regardless of their proximity to healthcare and can also increase access to care for those who need it. Smart phone technology is continuing to become increasingly accessible, with 85% of Americans owning a smartphone: this creates a perfect opportunity to provide people with diabetes additional care and resources outside of what their health insurance plan covers. This accessible, on demand access to technology is paving the way for education and delivery of diabetes care. This article presents some of the popular remote diabetes programs that people with diabetes can either purchase or utilize through their employer-sponsored health care plan.

mySugr Coaching
mySugr is a remote diabetes program founded in 2012; driven by its motto “make diabetes suck less,” mySugr is based in Vienna, Austria and currently has more than 3 million registered users in 79 countries. mySugr offers users various ways to engage with its login-based platform. It also provides a coaching service that pairs users with a CDCES coach. Users can download the app for free to start using free services such as logging, progress reports, estimated Hemoglobin A1c values, challenges and secure data backup. The PRO features on the app include all of the basic features along with a bolus calculator, express support, PDF/excel report data, meal photos, blood sugar reminders and additional challenges. Users in the United States ($49.00/month) and Germany are eligible to purchase the “mySugr Full Bundle” which gives access to the PRO version of the app and pairs patients with a CDCES coach. The bundle also provides patients with an Accu-Chek Blood Glucose Meter, FastClix lancing device with lancets, and unlimited test strip delivery based on the app’s estimation of test strip usage. This bundle option allows users to connect with a diabetes coach for remote coaching services, which can consist of reviewing blood glucose values with patients, providing diabetes education, and setting dietary and lifestyle behavior goals for diabetes management. The mySugr coaching program received accreditation from ACDES in 2020. mySugr does not require a prescription from a healthcare provider to subscribe to the program.

mySugr surveyed patients using their mySugr Bundle services and found that patients dropped their average glucose levels from 154±55 mg/dl to 138±50 mg/dl (3). The survey also evidenced a 20% increase in testing frequency in patients using the bundle. 86% of those surveyed were happy with the remote diabetes coaching services they received.

Dario Blood Glucose Monitoring System
The Dario Blood Glucose Monitoring system (Dario) was released in 2011. Dario provides digital health solutions to help patients make long-term changes for their health by utilizing a range of devices to gather real-time patient health data to create an individualized approach. Dario provides patients with an all-in-one system that contains everything patients need to monitor blood glucose values: a glucometer, lancing device, and
storage in one compact device that fits in a purse or pocket. The Dario meter is Android and iPhone compatible and can be plugged directly into the headphone or charging port of the patient’s smartphone. The test strip is then inserted directly into this device and the patient’s reading will populate directly into the app. The app provides patients with reports that they can use to monitor their blood glucose values, ranging from 7, 14, and 30 days. The reports, graphs, and data can be easily shared with anyone from the user’s cell phone. The app also offers users tools for carbohydrate counting, food and activity logging (5). Dario offers a many options for subscription services starting at $30 per month for their basic program which includes lancets, unlimited test strips, and access to the app, but not the Dario meter. The most popular “Pro” version includes the Dario meter, lancets, unlimited test strips, access to the DarioHealth App and a personal coach, all for $40 per month. The personal coach feature with Dario provides patients with an overview of the app features, a review of health management and a goal setting discussion. The personal coach is also available to chat within the app and for phone calls. The premium version ($85 per month) provides the same features as the “Pro” version, with the addition of a personal CDCES (4) who will call patients directly for monthly check-ins. Dario does not require a prescription to use the glucose meter and services.

Dario reports an 80% retention rate with users after one year. Dario users have experienced results such as a 10% increase in in-range glucose levels, and 58% of users reduced hyperglycemic events in those with Type 2 diabetes (T2D) after one year using the app. 38% of users reduced their hypertension by one stage after using the app for three months. Users with T2D also saw a 14% average reduction in their average blood glucose levels after using the app for 12 months (6).

**Livongo Blood Glucose System**

Founded in 2014, the Livongo program is a remote monitoring system that works with employer-sponsored health plans to provide diabetes care and management. In 2017, Livongo launched a diabetes prevention program for those diagnosed with pre-diabetes. If individuals are interested in using the program for weight management and hypertension, they can also qualify for a blood pressure cuff and weight-integrated scale. Users are allowed to start with one program and add additional programs for which they are eligible for at a later date. When individuals enroll in the Livongo for Diabetes program, they are sent a connected blood glucose meter with strips and lancets in the mail. When used the meter automatically uploads data to the paired app: this provides users with insights and data on their blood glucose readings. After each blood glucose check, users are provided with a personalized message to help them manage their diabetes.

Individuals are able to directly order more strips from the meter itself with just a click of a button and the strips are directly shipped to the patient’s doorstep. Livongo provides coaching and support for users. Users can ask questions through phone calls, email and text. Users can also set alerts for high or low blood glucose levels and opt to have designated family members or friends receive alerts when blood glucose levels are out of range.

Within one year of using the app, Livongo users have seen a 25% decrease in average days with a hypoglycemic reading. They have also shown a 1.4% reduction in estimated A1c from the self-reported values at registration (7).

---

**Remote Program Components**

<table>
<thead>
<tr>
<th>Metric Provided?</th>
<th>mySugr</th>
<th>9amHealth</th>
<th>Dario</th>
<th>Livongo</th>
<th>Level2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meter Type</strong></td>
<td>Accuchek Guide Me</td>
<td>NA</td>
<td>Dario Meter</td>
<td>Livongo Meter</td>
<td>Dexcom G6</td>
</tr>
<tr>
<td><strong>Unlimited Strips?</strong></td>
<td>Yes</td>
<td>NA</td>
<td>Yes</td>
<td>Yes</td>
<td>None needed</td>
</tr>
<tr>
<td><strong>Coaching</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Blood pressure Cuff</strong></td>
<td>Yes, user needs to purchase</td>
<td>Yes, included in subscription</td>
<td>Yes, user needs to purchase</td>
<td>Yes, with HTN subscription</td>
<td>No</td>
</tr>
<tr>
<td><strong>Medications provided?</strong></td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Level2 Diabetes Program
The Level2 diabetes program utilizes wearable technology to help users learn and understand how to manage their blood glucose. They target consumers with T2D diagnosis in the last two years and those who are taking certain diabetes medications. Level2 incorporates continuous glucose monitoring by using the Dexcom G6 and Fitbit wearable technology. They advertise that their tracking system helps users learn exactly how “food, exercise, sleep, and mood affect their blood sugar” (8). Level2 also utilizes coaches to help their users interpret data and set goals for behavior change. Users also have access to a clinical care team (doctors, nurses, dietitians and endocrinologists) who can provide medication adjustments virtually. Level2 promotes a whole-person philosophy, incorporating the mind, body and lifestyle factors to help people manage their diabetes. Participants interact with their care team through phone and messaging services that cater to an individual’s lifestyle, goals and schedule.

Level2 has helped users to achieve an average of 76% time in range. 48% of users have also reduced GMI (glucose management indicator) which indicates the average A1c level that would be expected based on mean glucose measured) within 30 days of using the Level2 app.

9am.health
9am.health is an up-and-coming company that is aiming to change the way healthcare is provided and make life better for people who live with chronic conditions. 9am.health's co-founders and many of its employees have diabetes themselves and understand the frustrations that come with living with a chronic condition. 9am.health aims to support users who have T2D, hypertension and/or hyperlipidemia.

Remote Diabetes Monitoring Program Comparison

<table>
<thead>
<tr>
<th>Conditions</th>
<th>mySugr®</th>
<th>9am.Health®</th>
<th>Dario¹</th>
<th>Livongo²</th>
<th>Level2³</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG Meter</td>
<td>Accuchek Guide Me with unlimited test strips</td>
<td>Agamatrix, included in subscription with unlimited test strips per patient request</td>
<td>Dario BG Meter with unlimited test strips</td>
<td>Livongo BG Meter with unlimited test strips</td>
<td>Dexcom G6 CGM</td>
</tr>
<tr>
<td>Blood Pressure Cuff</td>
<td>Included depending on subscription</td>
<td>Included in subscription per patient request</td>
<td>User needs to purchase</td>
<td>With hypertension subscription</td>
<td>No</td>
</tr>
<tr>
<td>Diabetes Care and Education Specialist</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Physicians</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Medications provided?</td>
<td>No</td>
<td>Yes, DM, HTN and lipid meds</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Website</td>
<td>mysugar.com</td>
<td>9am.health</td>
<td>dariohealth.com</td>
<td>hello.livongo.com</td>
<td>mylevel2.com</td>
</tr>
<tr>
<td>Starting price</td>
<td>$49/mo or free if employer has as part of employee benefits</td>
<td>Starting at $25/mo</td>
<td>$70/mo or free if employer has as part of employee benefits</td>
<td>Starting at $64.99/mo or free if employer has as part of employee benefits</td>
<td>Free for UHC insurance users, not available for anyone else</td>
</tr>
</tbody>
</table>

The company provides users access to a primary care physician, virtual pharmacy, virtual/remote lab draw, and coaching/education services. Users can access a virtual primary care physician who can prescribe medications needed to manage diabetes, hypertension and hyperlipidemia. Users can also complete all their necessary lab work from the comfort of their own home. At-home lab work allows the team to adjust medications and improve treatment plans. Once users have access to their primary care physician and complete lab work, the pharmacy is able to ship medications directly to the user's doorstep. 9am.health also provides users with a team of specialists who can answer their questions and assist them with setting goals to help them manage their diabetes, hypertension and hyperlipidemia. At this time, 9am.health offers these services for $25/month for a single online prescription, individual treatment plan, unlimited messaging with the medical team, and free shipping. For an additional $10/month, users can add additional medications (per medication) and an additional $15/month provides regular lab testing, which allows users to reduce their time spent in waiting rooms, alleviate worry regarding renewals/refills, and minimize insurance coverage barriers (11).

Editor's note: There are several other integrated programs that allow those living with diabetes to utilize technology and a remote team of experts such as Welldoc and Cecilia Health (12, 13).

Conclusion
Advancements in technology have provided opportunities for remote diabetes programs to flourish. These programs are available for people with diabetes, regardless of location. Some programs are offered and used in part with a person's current existing healthcare offerings, or can be bought as a standalone program. As a professional working with people with diabetes, knowledge and expertise of these programs can help practitioners provide recommendations for the best program for their patients.

References
The Power of Patient-Driven Storytelling within Peer Support Groups for People with Type 2 Diabetes

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Abstract
Living with Type 2 diabetes (T2D) can be challenging, particularly with limited support and the stigmas associated with it. Patient storytelling within the T2D community can address the issues surrounding stigma and improve knowledge of diabetes itself, as well as improve patients' outlook and attitude towards diabetes self-care and management. Sharing stories fosters a collaborative and supportive learning environment that allows patients to problem-solve and share their strategies on how to make living with T2D easier. With technology, storytelling isn't limited to in-person support groups, but can be done through patient advocacy organizations and diabetes online communities via social media.

Introduction
Storytelling can be a powerful tool when seeking to find a community that can relate to the challenges and triumphs of living with a chronic condition such as T2D, one often stigmatized as a "lifestyle disease" (1). In addition to being one of the ways experiential learning can be incorporated into a formal learning environment, storytelling allows people to share their personal experiences in multimedia such as social media, online support groups and forums, in-person support groups, articles, live virtual meetups, panels, videos, photos and print media. This article aims to discuss the importance and power of patient storytelling within the T2D community and explore how registered dietitian nutritionists (RDNs) can use storytelling to help their patients with T2D connect with their peers and improve their health outcomes and knowledge about diabetes.

The use of storytelling among patient communities isn't new. With the increasing use of social media network platforms, such as joining Facebook groups or the "Diabetes Online Community" (DOC) to build peer support communities, patients are more connected than ever to share their experiences living with a chronic condition such as T2D (2). T2D management and care are complex and mostly done by the patient with support from healthcare providers. Knowing this, existing research has studied the impact of peer support on people with T2D. Peer support has been shown to have a positive impact on diabetes self-management education (DSME) (1-3).

While peer support and storytelling aren't the same, the latter is used in peer support settings to promote camaraderie and community around a shared issue. But why is storytelling powerful? The reason lies in how the human brain is hardwired to use stories to enhance memory and connect with other human experiences. In an article published by the University of Berkeley's Greater Good Magazine and Cerebrum, respectively, neuroscientist Paul Zak provided insight into why the brain loves stories: personal stories, especially emotional ones with escalating tension, are more likely to be remembered by more of the brain. Part of the reason for this is because the "emotional stimulation is the foundation for empathy," which is driven by the neurochemical oxytocin. When stimulated, oxytocin makes people more trustworthy and compassionate, motivating them to be more sensitive and helpful towards others. However, the medium used to tell a story can make a difference. For example, it's easier for people to resonate with a story if it's told on-camera compared to reading it in a newspaper because of the empathetic transportation and ability to maintain the audience's attention and connection with the story (4-5).

How Stigma, Stereotypes, and Shame Impact Diabetes Management and Self-Care
T2D has been described as a challenging illness to manage. As part of DSME, patients are taught and encouraged to test their blood glucose regularly, make changes to and monitor their eating patterns, and prioritize physical activity.
Depending on the progression of their diabetes and any other existing conditions related to diabetes, patients may need to take multiple medications to reach their glycemic goals and reduce the chances of diabetes-related complications. The burden associated with these tasks is called "diabetes distress" (6).

However, many people with T2D experience shame and stigma due to the stereotypes of T2D being labeled as a "lifestyle disease" (7). As a result, people living with T2D report feelings of isolation, discrimination, fear of complications, and are likely to forego essential aspects of daily management. This sentiment is strong in those with T2D who are on insulin and perceive the need for increased medication as diabetes failure rather than perceiving T2D as a progressive illness (8).

Evidence shows diabetes is closely tied to one's socioeconomic status such as income, education, access to healthcare, and access to quality, healthy foods. The prevalence of diabetes increases with lower socioeconomic status (9). Research also shows diabetes disproportionately impacts people of color who, depending on the culture, may harbor stigmatizing sentiments about T2D and are less likely to disclose or confide in others about their condition (8).

T2D patients have reported feeling judged when injecting insulin in public, facing workplace discrimination, and were less likely to accept management techniques that aren't discreet such as self-monitoring blood glucose. The stigma and stereotyping of T2D also keep patients from disclosing or confiding in others about their diagnosis (8).

<table>
<thead>
<tr>
<th>Benefits of Storytelling</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved Knowledge of Diabetes</td>
<td>Nutrition, medications, monitoring techniques, progression of diabetes, etc.; using new knowledge to educate others</td>
</tr>
<tr>
<td>Improved Coping Skills</td>
<td>Acceptance of diagnosis, improved perspective on diabetes self-care, sense of empowerment</td>
</tr>
<tr>
<td>Improved Management Skills</td>
<td>Increased glucose monitoring, taking medications in a timely manner, exercising, eating well, effective stress management</td>
</tr>
<tr>
<td>Improved Problem-Solving Skills</td>
<td>Using information from shared experiences to resolve own challenges with diabetes</td>
</tr>
</tbody>
</table>

Why T2D Patient Storytelling is Essential to Addressing Stigma and Improving Diabetes Self-Management

The power of patient storytelling with T2D which can lead to improvements in self-management while actively addressing stigma is evident in several studies that have shown storytelling can promote a sense of community, empower patients to be more active and engaged with their own self-care and management, and improve their knowledge about diabetes (1-3). While aiming to prevent complications from diabetes, and when used within the DSME structure, people with T2D sharing their stories can also improve problem-solving skills by learning tips from their peers (1-3).

But what does storytelling entail? Storytelling doesn't necessarily mean patients gathering in a small, in-person group. As mentioned earlier, people with T2D are sharing their experiences in digital spaces, specifically social media. Social media platforms such as Facebook, Twitter and Instagram have been popular venues – even leaving a comment under a social post detailing one's experience with diabetes is a new form of storytelling. Patient advocacy organizations and groups such as Beyond Type 2, Women of Color with Diabetes and Diversity in Diabetes have provided further opportunities for people with T2D from marginalized communities to share their perspectives on the impact of systemic racism, negative experiences with healthcare providers, and more on their ability to manage diabetes. Within these circles, patient advocacy organizations aim to empower patients to be their own best advocates. Table 2 lists notable online peer support communities for people with diabetes.

Finding and building connections through shared experiences promotes awareness about essential topics related to diabetes management. In a group-based study on storytelling in diabetes management by Guicciardi et al, participants improved their understanding of nutritional aspects of diabetes care (2). In the study, group conversations were generated by participants who were unclear about fully-cooked pasta being higher on the glycemic index compared to al dente-cooked pasta or how much protein was provided by a can of tuna. Table 1 lists the other benefits of storytelling.
Storytelling can be transformative. From the study referenced above, patients shared the following perspectives when asked to reflect on their experiences within the group (2): one participant stated that as a newly diagnosed patient, people who had been living with diabetes longer were role models for success; another shared that without the workshop, they wouldn’t have found it challenging to take ownership of their diabetes; and one participant mentioned that being in a non-medical environment was beneficial because diabetes was discussed in real-world terms, not as if they were being lectured from a textbook by a healthcare professional.

Patients with T2D can have trouble accepting their diagnosis, sometimes based on misconceptions about diabetes, such as a diagnosis representing a failure to control one’s eating habits (e.g., eating too much sugar), believing one’s life is over, or assuming diabetes complications are inevitable (experienced generally from seeing another person, most likely a family member, experience diabetes-related complications). Storytelling allows patients to be part of a supportive learning environment, where they can be inspired or feel represented when others discuss their challenges of daily diabetes management and their strategies to overcome such struggles. These issues can address anxiety surrounding checking glucose, nutrition (including information about fad diets), how to manage diabetes in social situations, exercise, and how to handle diabetes distress. Insight from others’ perspectives can change what it means to live with diabetes without one’s personhood being defined by it. It allows patients with T2D to find empowerment to accept their

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Association of Diabetes Care and Education Specialists</td>
<td>A resource to find in-person and online peer support communities</td>
<td><a href="https://www.diabeteseducator.org/living-with-diabetes/peer-support">https://www.diabeteseducator.org/living-with-diabetes/peer-support</a></td>
</tr>
<tr>
<td>The Beyond Type 2 Community by ADA x BT2</td>
<td>A free desktop and mobile app hosted by non-profit organizations, Beyond Type 2 and the American Diabetes Association for people with T2D and loved ones to share resources on diabetes management, stories, and connect with others for virtual meetups</td>
<td><a href="https://community.beyondtype2.org">https://community.beyondtype2.org</a></td>
</tr>
<tr>
<td>DiabetesSisters</td>
<td>A non-profit organization for women with diabetes to connect online or in-person</td>
<td><a href="https://diabetessisters.org/">https://diabetessisters.org/</a></td>
</tr>
<tr>
<td>Diabetes Social Media Advocacy</td>
<td>A weekly online Twitter discussion on various diabetes-related topics using the hashtag #DSMA to connect with others with diabetes</td>
<td><a href="https://twitter.com/DiabetesSocMed">https://twitter.com/DiabetesSocMed</a></td>
</tr>
<tr>
<td>Diversity in Diabetes</td>
<td>A non-profit organization dedicated to sharing the voices of underserved communities through online events, panels, and conferences, in an effort to spread awareness about health disparities and lack of representation within the diabetes community</td>
<td><a href="https://www.diversityindiabetes.org/">https://www.diversityindiabetes.org/</a></td>
</tr>
<tr>
<td>Sugar Mama Strong</td>
<td>A Facebook group for women with diabetes</td>
<td><a href="https://sugarmamastrong.com/">https://sugarmamastrong.com/</a></td>
</tr>
<tr>
<td>T2D Healthline</td>
<td>A free app for people with T2D that matches individuals based on diagnosis, treatment, and personal interests</td>
<td><a href="https://t2d.healthline.com/">https://t2d.healthline.com/</a></td>
</tr>
<tr>
<td>Taking Control of Your Diabetes (TCOYD)</td>
<td>A non-profit organization offering practical resources and a peer support group for people with T1D and T2D, as well as loved ones, respectively</td>
<td><a href="https://tcoyd.org/">https://tcoyd.org/</a></td>
</tr>
<tr>
<td>Women of Color Diabetes</td>
<td>An Instagram page for women of color with diabetes to share resources and stories surrounding discussions around race, culture, access, and diabetes</td>
<td><a href="https://www.instagram.com/wodcdiabetes/">https://www.instagram.com/wodcdiabetes/</a></td>
</tr>
</tbody>
</table>
diagnosis, make the necessary changes to manage it, and inspire others.

**Practical Applications to Facilitate Storytelling**

RDNs can play an essential role in promoting narrative communication and storytelling among people with diabetes. Several interventions have been used to understand the role of the patient and the facilitator. In the study by Gucciardi et al. (1) storytelling was used primarily in a group setting with adults with T2D. Though diabetes care and education specialists served as the facilitators, patients in this focus group chose to share their personal experiences with diabetes based on their preferred topic of diabetes self-management. Additionally, as a group, the patients determined norms and ground rules for their group, such as participation by all members and being respectful of others' opinions; they also made collective decisions on the weekly discussion topics. The role of the facilitator was to introduce each topic and ask patients to share their prepared stories. In the study referenced above, facilitators needed to strike a balance between being a facilitator and an educator (1). This meant simply validating the patients' thought processes as they problem-solved on their own, waiting to provide information or insight to prevent disrupting the flow of conversation, and practicing active listening without interjecting in the group's discussion.

Considerations for crafting a positive and effective environment for storytelling include finding a safe and secure physical environment or online platform, the format of storytelling, deciding on group size, length of sessions, speaking time among participants, if props such as glucose monitors or other materials related to diabetes management are to be used to assist with storytelling, deciding if topics will be determined in advance or if discussions will be more spontaneous, and if there will be homework for participants following each session. Examples for discussion topics include but are not limited to asking participants to share: their diagnosis story, the role of food and nutrition in their lives, experiences using different diabetes medications, outside support, sharing a time when a patient overcame a challenge with diabetes, and experiences with healthcare professionals, including nutritionists.

**Training for RDN Facilitators**

A systematic review by Gucciardi and colleagues provides further guidance on designing storytelling interventions for facilitators (11). While there is no singular conceptual framework recommended to form an intervention, several frameworks are mentioned such as the cognitive and ecological theories of health behavior, the nursing philosophy of caring and healing, and narrative-autobiographical.

Training for facilitators can cover an array of skills as well. For instance, depending on the group, it may be necessary for potential facilitators to consider studying culturally-appropriate resources prior to the first meeting. Other skills for healthcare professionals include: learning how to manage conflict within a group; creating a nonjudgmental environment; learning different formats of storytelling such as using a talking circle, traditional storytelling; and using technology such as recorded video, photos, forums, and online groups (11).

In addition to those skills, learning about chronic illness – in this case, diabetes – and its impact on quality of life is beneficial. For RDNs, this may include developing a deep understanding of the complex relationship a person with diabetes has with food and nutrition. While making as many healthy eating choices as possible is an essential part of diabetes self-management, it's important to understand the socioeconomic, psychosocial, and cultural aspects that influence a patient's ability to make healthy dietary decisions.

Finally, according to Gucciardi, facilitators should consider how involved they plan to be in group sessions. A facilitator's job is to value and draw out stories from patients. However, this may mean considering becoming an active participant and sharing their own experiences to build trust within the group.

**The Future of Storytelling in Patient-Centered Care**

More research is needed to fully understand the impact of storytelling among people within the T2D community. However, RDNs who work with patients living with T2D should be encouraged to utilize this method by encouraging them to share their experiences with diabetes not only through in-person, formal peer support groups, but also by expanding to blogs and websites, video, and social media groups. Per Greenhalg et al (12), stories not only provide insight into a patient's personal experience but they also allow listeners to reflect and determine how those stories relate to their own lives.
The search for patient perspectives is on the rise. For example, people with diabetes – both T1D and T2D – were front and center at the World Health Organization’s (WHO) Global Diabetes Compact and Informal Consultation of People Living with Diabetes event. The Global Diabetes Compact strives to unite countries around a common agenda to address the diabetes epidemic. As one of the pillars to ensure the Compact’s success, WHO created an informal collaborative arrangement to unite stakeholders, including people with diabetes, to provide insight into their daily experiences. The hopeful benefit of this insight is to learn how diabetes is managed in various countries and identify strategies to address diabetes awareness to each country’s specific needs. Patients are also participating in panel discussions for major organizations and events to promote patient advocacy, inform healthcare professionals on how to improve their relationships with their patients, and address the most pressing issues facing diabetes online communities. To learn more about this initiative, visit https://www.who.int/initiatives/the-who-global-diabetes-compact.

RDNs can make a significant impact among their diabetes patients by fostering or recommending spaces where it’s easy for people with diabetes to connect. To improve self-efficacy, it’s important to ensure patients with T2D identify the issues that matter most to them and their group. It’s also essential these discussions are rooted in fact and do not allow for diabetes misinformation to spread (e.g., diabetes can be cured). Still, RDNs may find it useful to facilitate group discussions using motivational interviewing skills but remain an observer to the group’s interactions. The goal for peer support groups, whether online or in-person, is to allow patients to find a community while learning new skills for self-management. However, RDNs and other nutrition professionals should also consider encouraging their patients to share their stories on other platforms frequented by their fellow T2D community members.

Summary

The T2D community is a historically stigmatized group. From facing stigma and shame surrounding issues such as food, weight, and the use of medication, people with T2D can feel “at fault” for their chronic illness and find it difficult to confide in others. The value of peer support and patient storytelling, including journaling their own experiences, has been shown in several studies to improve diabetes knowledge, increase empowerment and engage with self-management. A powerful way to address the stigmas associated with T2D to improve health outcomes is by providing people with T2D the opportunities to share their stories and words of encouragement to others who may be experiencing similar challenges. RDNs and other nutrition professionals should be encouraged to help their patients find and build connections to make living with diabetes less burdensome while decreasing feelings of isolation. With channels such as social media networks and platforms provided by patient advocacy organizations, RDNs can encourage patients to share their diabetes stories to reach a wide network of others living with the condition.

References

**DPG Educational Stipends – Winter Deadline 2022**

**Educational Stipends**
- Awarded Annually (2 every 6 months)
- Deadlines: Feb 14, 2022
- Up to $650
  - Funding to attend a diabetes-related training or educational event
  - Award by lottery
  - Application is less than 1 page
  - Contact: dce.awards@gmail.com
  - Download application:
    - https://www.dce.org/dpg/get-involved/awards/education
  - More stipends may be awarded if educational event is virtual

**Speaker Stipends**
- Awarded Annually
- Deadlines: Feb 14, 2022
- Up to $500/Speaker
  - Financial support to an organization for a qualified DPG member to speak on a diabetes-related topic at an educational event
  - Application is 1 page to complete
  - Contact: dce.awards@gmail.com
  - Download application at
    - https://www.dce.org/dpg/get-involved/awards/speaker-stipend

**Legislative Stipend Award**
- Awarded Annually
- Deadlines: June 1, 2022
- Annual Stipends of up to $1000 (more stipends awarded if virtual)
  - Financial assistance to attend the Academy’s Nutrition and Dietetics Advocacy Summit
  - Application is 1 page to complete
  - Contact: dce.awards@gmail.com
  - Download application at
    - https://www.dce.org/dpg/get-involved/awards/legislative-stipend

These stipends are great opportunities to become more involved and utilize member benefits.

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Please note: The Certified Diabetes Care and Education Specialist (CDCES) certification was formerly known as the Certified Diabetes Educator (CDE) certification.
CPE Credit Self-Assessment Questionnaire

1. A dietitian asks a PWD about their internet connection when discussing TES. In what part of the ICC framework does that belong?
   a. Identify
   b. Collaborate
   c. Configure
   d. Social Determinants of Health

2. Which of the following is NOT a factor contributing to disparities in use of technology?
   a. Systemic Racism
   b. Implicit Bias
   c. Ageism
   d. SES (Socio-economic status)

3. All of the following except one are true with regard to CSII in T2D
   a. Total daily dose of insulin is less than compared to MDI
   b. Greater glycemic improvements are seen with higher A1c’s when compared to MDI
   c. Automated Insulin delivery (AID) pumps outperform traditional CSII in RCT’s
   d. AACE and ADA recommendations for CSII in T2D are stated but not overtly encouraged

4. Which one of the following would be considered an IQR (Hospital Inpatient Quality and Reporting) clinical quality measure for: Hospital Harm—Severe Hypoglycemia?
   a. Hypoglycemia at <40 mg/dl
   b. Hypoglycemia at <54 mg/dl
   c. Response time > 10 minutes when hypoglycemic symptoms develop
   d. Prandial insulin given no more than 45 minutes prior to the meal

5. Which one of the following would be considered an IQR (Hospital Inpatient Quality and Reporting) clinical quality measure for: Hospital Harm—Severe Hyperglycemia?
   a. Two consecutive days with one reading >200 mg/dL
   b. Two consecutive days with one reading >300 mg/dL
   c. A1c>8%
   d. Lack of basal/bolus order sets to direct insulin therapy

6. Connected glucometers, continuous glucose monitors, blood pressure monitors and weight scales are examples of:
   a. Telemedicine monitoring
   b. Virtual Care monitor
   c. Telemonitoring
   d. Remote monitoring

7. According to the Center for Disease Control ________ of adults with diabetes receive the ADA recommended comprehensive care.
   a. 15%
   b. 25%
   c. 33%
   d. 35%

8. The emotional stimulation caused by storytelling is driven by the neurochemical, ________
   a. Oxytocin
   b. Serotonin
   c. Prolactin
   d. Glutamate

9. It is easier for people to resonate with the story and maintain attention when the story is told
   a. By reading
   b. By direct 1:1 conversation
   c. On-camera
   d. By a health care provider

10. An advantage of all the remote diabetes programs presented in “Advancements in Diabetes Care: Remote Diabetes Programs” includes:
    a. On-going coaching
    b. Providing a meter and unlimited strips
    c. Medications
    d. Virtual lab draw

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4 CPEUs are awarded for reading this issue and successfully completing the quiz. Access quiz and certificate by going on to www.dce.org professional resources. The website automatically logs your CPEU history.
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Let us hear from you!