



ISSN: 2633-559X

IN PRACTICE

Nutritional management and updates of diabetes in pregnancy

In this issue:

- ~ Discover how using AI can expand access to DSMES services, enhance diabetes care and education, and make complex information easier and more engaging for people with diabetes.
- ~ Explore the concept of clinical inquiry and the benefits and opportunities it can provide the diabetes care and education specialist.
- ~ Read about how an electronic health record dashboard transformed DSMES data collection experience, insights and advice from an ADCES-Accredited Program.
- ~ Review a CDCES-led, multidisciplinary intervention to expand access to CGM in primary care.

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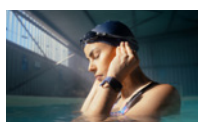
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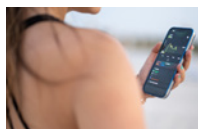
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RYAN STEWART, MS, PA-C; BRITTANY STRELOW, DMSC, PA-C



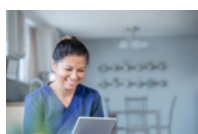
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ADCES in Practice is a journal of ideas. It's a platform for diabetes care and education specialists and other health professionals to share innovations, challenges, successes, and hopes with colleagues. That's why we are excited to dedicate this page to you, our readers.

We invite you to write to us with your thoughts and impressions about articles we've published. We welcome your reactions and questions about what you've read in these pages. We call on you to comment or expand on the concepts and strategies put forth. We ask that you support or challenge our authors' words, as you see fit, and to give them the opportunity to hear and respond to you.

Our hope is for open and honest discourse that leads to improved care and outcomes for our patients. You may send your comments to adcesinpractice@gmail.com.

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IN PRACTICE

A PUBLICATION OF THE ASSOCIATION OF DIABETES CARE & EDUCATION SPECIALISTS

Editor

Amy Hess Fischl, MS, RDN, LDN, BC-ADM, CDCES

Staff Liaisons and ADCES Content Editors

Diana Pihos, MA

Danielle McNary-Moran

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ADCES in Practice is the official magazine of the Association of Diabetes Care & Education Specialists. It is a bi-monthly, peer-reviewed publication intended to serve as a reference source for the heart, art and science of diabetes self-management education and to provide practical tools and strategies that directly apply current research and best practices.

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Production Editor Manager: Divya Jyoti Munjal

Advertising Office

Sage Publications

Elisabetta Palanghi Sheffield

Account Executive, Commercial Sales

Email: elisabetta.sheffield@sagepub.co.uk

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ADCES Headquarters

125 S. Wacker Drive, Suite 600

Chicago, IL 60606

Phone: 312.601.4864

adces.org

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Summer Fun, Travel, and Our Impact on Patient Preparedness



AMY HESS-FISCHL, MS, RDN,
LDN, BC-ADM, CDCES

Living in the Chicagoland area, I have experienced the four seasons my entire life. For those of you who do not have the seasons, my question to you is: Are you as excited about summer as I am? After the cold and snow, then the ramping up of our gardens and foliage, summer has always blown my mind. Granted, I do wear shorts in the winter, but it is FOR REAL now! Flip flops, tank tops, shorts . . . and you are not looked at like a crazy person in the summer, at least! Ah—the joys of summer—I can hike with my dog knowing his poor feet won't freeze, and I can spend hours gardening with the extended daylight hours. That also means we as diabetes care and education specialists have more opportunities to promote our active lifestyles with the people with diabetes we work with—and encourage them to do the same.

Talking to my patients about their summer vacation plans is always a highlight for me. I get to live vicariously by reminiscing on when I was in those locations and adding some trip ideas to my growing lists of "Oh the Places You Will Go!"

These conversations segue into me "doing my day job"—helping them create a plan for travel and activity with diabetes. Every one of my patients knows my spiel: "Bring 2-3 times the

amount of supplies you think you need; if flying, carry everything on with you; bring backup to your backup—if needed, rent a secondary pump, bring extra MDI supplies, and for the love of all that is holy, wear medical identification and bring hypoglycemia treatment with you always."

Just recently, as a patient of mine was going on vacation, we had our usual conversation about supplies, specifically preparing her for the trip to Barcelona and Paris. Everything was going great until she realized she brought the wrong supplies with her. She only had Omnipod pods for the DexCom G6 and not the new DexCom G6/G7 pods that she was using. She immediately reached out to us to problem-solve. Although she had her long-acting insulin, she really wanted to stay on the pump. She was able to connect with the International JDRF/Breakthrough T1D group, located another American using the same G6/G7 pods that she needed near Paris and Voila, and she was off and running again. This was an amazing display of the power of the diabetes community, and it was so fortunate that the stars aligned and there was someone else who had the supplies she needed. That may not always be the case, so preparing for every possibility is ideal but may not be practical. But working with

people with diabetes and learning about their vacation successes and misses are important for us to do our jobs better. Ask them what went well, what they would recommend others do in the same situation, and how we can work together to better prepare for next time. I am well aware that my relationship with my patients is mutually beneficial. We can both learn from each other, which is extremely advantageous for me to be able to “pay it forward” and pass it along to others who are in the same situation.

I know that all the people with diabetes I work with do not get a vacation from their diabetes, but if I can help in some way to get them uber prepared, then they can enjoy their time with minimal worry.

I hope your summers are fantastic and you embark on amazing adventures. I am always

looking for more cool places to go, so feel free to share your vacation experiences with me and any diabetes-related experiences you may have had during them!

Please be on the lookout for questions throughout the year that will be posted in various locations, such as in the monthly member newsletter and on social media. Thanks to all of you who sent in your insights to our inaugural question: What is your advice to the diabetes care and education specialist early in their career? If you have any other ideas of what you would like to see in *AIP*, send it my way!

In the immortal words of Earnest Tubbs and Lorreta Lynn (if you don't know who they are, look them up!), “Keep those cards and letters comin’.” I always look forward to hearing from you! ■

ADCES Service and Leadership

There Is Space for All



President

VERONICA J. BRADY,
PHD, RN, FNP-BC, ACRN, BC-
ADM, CDCES, FADCES

Can you believe that it has been over 6 months since I began this journey as president of ADCES?!

The saying that “the journey of a thousand miles begins with one step” (Lao Tzu, Chinese philosopher) is so true. I never would have thought when I attended my first CB meeting that it would lead me to where I am today. I think this holds true for many of those in leadership positions. We never think that we have what it takes to be a leader until someone trusts us with the opportunity.

Speaking of leadership, ADCES offers many opportunities for us to explore, use, and enhance our leadership skills, from participation in our local CB/LNG and engagement with the COIs to working on national committees and serving on the board of directors to the “highest offices” of president-elect, president, and immediate past president. Each of these roles offers a unique way in which to lead. CB/LNGs are the boots-on-the-ground leaders who organize and lead member activities at the local level. COIs allow opportunities to interact and share insights with constituents across the United States. National committees afford chances for involvement in activities such as research, professional practice,

annual conference, technology, and membership. Lastly, should you desire, board service allows for participation in the leadership of the Association. In essence, there is something for everyone.

By this time, you have received the ballot for ADCES 2026 elections. I ask that you listen to the brief videos, read the bios of each candidate, and think carefully about what each of these potential leaders are saying to you, knowing that you have the power to influence the future of “your” Association. Often, we feel that our voices are not heard, but voting is a way to give voice to our support for those that we believe in. Casting your vote is another way to be involved with the Association. It would be awesome this year to have record numbers of our members vote for our future leaders.

Furthermore, as you cast your vote, I want you to think about your skill set and how you can best use them to grow and strengthen the Association. While we continue to navigate the ever-changing landscape of health care, we must continue to lead the way as the premier source for educational needs and resources for people living with and at risk for diabetes. As a leader, you have the ability to make friends and influence

people 😊. That influence can be used to advocate for the specialty, organize educational activities, encourage membership, or explore innovative ways to use technology.

So whether you are looking to lead locally or nationally, think about how your skills and talents can be best used in service to the organization

and those who benefit from the education/information that we provide. I look forward to seeing many (or at least some) of your names on an ADCES application in 2026 for a leadership opportunity in 2027. ■

PS: Please vote!

Wishing you peace and joy in the journey.



Acute Otitis Externa

A Hidden Risk for People With Diabetes

BRIAN BURROUGHS, MSPAS, PA-C, BC-ADM, CDCES

RYAN STEWART, MS, PA-C

BRITTANY STRELOW, DMSC, PA-C



Acute otitis externa (AOE), known as “swimmer’s ear,” is an infection and inflammation of the external auditory canal, primarily caused by bacteria.¹ Patients may present with ear pain, discharge, pruritus, hearing loss, jaw pain, or fever. Infections, including ear infections, pose significant risks for people with diabetes (PWD), often leading to poorer outcomes compared to the general population.²

Chronic hyperglycemia in PWD impairs immune function, reducing the body’s ability to fight infections.³ Additionally, microvascular damage and neuropathy compromise blood flow and sensory function in the ear, potentially diminishing pain perception and allowing infections to advance unchecked.

Pseudomonas aeruginosa is commonly

associated with AOE, and in PWD, it can result in significant inflammation and necrosis.⁴

Necrotizing otitis externa (NOE) should be considered if PWD present with AOE. NOE is a severe infection that extends from the auditory canal to nearby soft tissue and the skull base, potentially leading to temporal bone osteomyelitis. Symptoms may include facial nerve paralysis, sensorineural hearing loss, and vertigo.⁵ Although clinical diagnosis is key, CT or MRI can provide supportive confirmation.

Topical antibiotics, with or without steroids, are the first-line treatment for uncomplicated AOE. Systemic antibiotics are typically not recommended initially but should be considered for PWD due to immunosuppression and increased NOE risk. Systemic antibiotics are

particularly warranted if there is evidence of systemic involvement, severe local inflammation, or failure of topical therapy. Management of NOE may require an otolaryngologist or infectious disease specialist.

Effective hyperglycemia management is essential for PWD with AOE because high blood glucose can impair immune responses.^{3,6} Strategies include insulin, oral hypoglycemic agents, and newer injectable therapies such as GLP-1 receptor agonists and GLP-1/GIP dual agonists, which have shown benefits for glycemic management and cardiovascular risk reduction. Continuous glucose monitoring technology should also be incorporated to optimize blood glucose management, providing real-time feedback and enhancing self-management.⁷ Healthy eating and active living are integral components of diabetes management and infection prevention because they contribute to improved glycemic management and overall health outcomes.⁸

Defining glycemic targets is critical, with an A1C <7% being associated with a reduced risk of microvascular complications, including those affecting the ear.⁹ It is important to note that these recommendations apply primarily to adults with type 1 or type 2 diabetes; however, pediatric considerations would require further tailoring of treatment goals and strategies. A multidisciplinary approach addressing infection control, metabolic health, and lifestyle modifications is crucial for optimal outcomes in PWD with AOE.¹⁰ This approach not only supports infection resolution but also helps prevent future complications and recurrence. ■

Brian Burroughs, MSPAS, PA-C, BC-ADM, CDCES, works in family medicine at the Mayo Clinic Health System in Red Wing, Minnesota.

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Employ Artificial Intelligence to Advance Diabetes Cardiometabolic Care

MALINDA PEEPLES , MS, RN, CDCES, FADCES, MAGON SAUNDERS, DHSC, MS, RDN, LD, FADCES, FAC-COR-1,

LAURIE ANNE SCHER MS, RD, CDCES, FADCES, LORENA DRAGO, MS, RDN, CDN, CDCES, AND JANICE MACLEOD , MA, RD, CDCES, FADCES

The diabetes care and education specialist (DCES) has an unprecedented opportunity right now to play a leadership role in their places of practice to transform health care. Artificial intelligence (AI) is here, and we each have a responsibility to bring AI to health care in a way that can help make health care healthy. Diabetes, as a largely self-managed chronic condition, lends itself to the application of AI to help make diabetes care, education, and support available continuously, on demand.

As health care providers, we may think that the technology experts will provide us with the tools we need. At ADCES24 in New Orleans, the authors presented a panel that illustrated that the DCES is integral to the development and workflow integration of AI. The DCES must ensure that AI incorporates evidence-based interventions that address health equity needs and health outcomes. In this article, we summarize some key observations and experiences that we hope will

motivate you to learn more about AI and how you can become involved in this revolution.

The Quintuple Aim

A quick reminder of a way to systematically think about the value and role of the DCES in any innovation is to remind ourselves of the Quintuple Aim (Figure 1) from the Institute for Healthcare Improvement. Health care innovation should address these 5 aims with an equal focus¹:

- improving the patient experience
- improving population health
- improving the well-being of the care team
- reducing health care costs
- advancing health equity for all people, especially those most vulnerable.

AI Definition

“AI” is a term first used by John McCarthy in 1956 and further defined in 2004 by IBM. AI is

According to the US Government Accountability Organization, AI clinical and administrative applications already exist in health care. Examples are displayed in Figure 2.³ In this article, we address clinical applications that are being used by our authors.

AI and Clinical Care

Where does AI fit into clinical care? The “Digital Horizon” framework recently published by Mayo Clinic⁴ gives us a nice way to look at our evolving technology-enabled care models. The care models in Table 1 include “face-to-face” apps and tools that are independently used by people with chronic disease, virtual self-management support that is provided with nonprescribing providers, and virtual diabetes care or treatment provided by prescribing providers—essentially, anywhere health care is taking place.

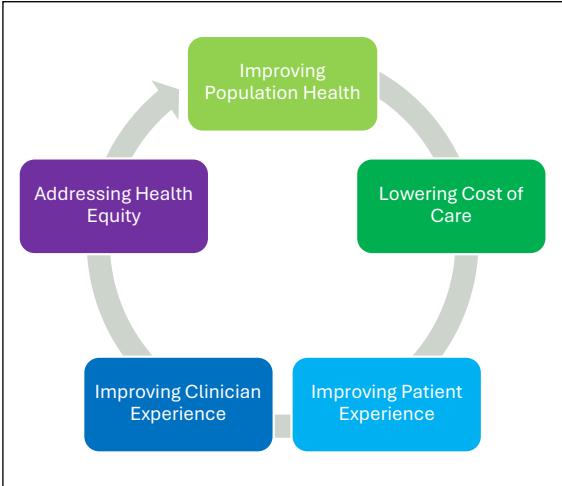


Figure 1. The Quintuple Aim.

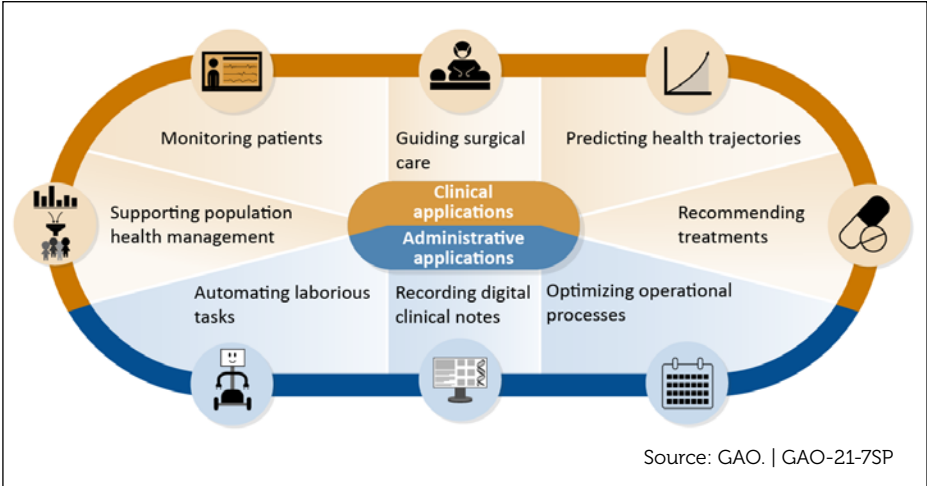


Figure 2. Clinical uses of artificial intelligence.³

technology that enables computers and machines to simulate human intelligence and problem-solving capabilities.² There are several types of AI, and for a more in-depth understanding, refer to our Handout of AI Resources attached as Appendix A and use this to further enhance your AI knowledge.

Table 1 Digital Horizon⁴

Care Models	Care Team
Patient-facing diabetes apps and tools	Connected devices; person with diabetes receives feedback and self-management support independent of care team
Virtual self-management support	Live coaching connected virtually with nonprescribing professionals
Virtual diabetes care	Connect with prescribing professionals who support high-level care planning and management

AI Use in Diabetes and Cardiometabolic Care

Each of the care models listed in Table 1 can integrate AI functionality into their products and processes, but it must be done with caution and with the Quintuple Aim in mind. In the rest of this article, we focus on the patient and provider experience and health equity in the use of AI in diabetes cardiometabolic care.

Health Equity and AI Design

Health equity is a state in which everyone has a fair and just opportunity to attain their highest level of health.⁵ Attaining the highest level of health requires eliminating health disparities and creating accessible social, physical, and economic environments that promote health and well-being for all. Addressing health disparities is necessary to address health inequities, improve overall quality of care, promote population health, and reduce costs. Studies suggest that disparities cost an estimated \$93 billion in excess medical costs and \$42 billion in lost productivity per year and economic losses due to premature death. Taking a deeper look at diabetes, it is estimated that more than 5% of spending on diabetes (\$15.6 billion), one of the costliest diseases in this country, is linked to unnecessary spending associated with disparities.⁶

"The underlying problem of health care spending is health inequity."

—Pierre Theodore, MD,
vice president of health disparities,
Johnson & Johnson Global Public Health

Unfortunately, most of the economic burden for racial and ethnic disparities is borne by the minoritized population groups in the following areas⁷:

- Premature deaths: Black/African American population (69%).
- Economic burden: Native Hawaiian/Pacific Islander (\$23 225) and American Indian/Alaska Native (\$12 351) populations had the highest economic burden per person. Most

of the economic burden was attributed to premature deaths for Native Hawaiian/Pacific Islander (90%), Black/African American (77%), and American Indian/Alaska Native (74%) populations.

- Excess medical and lost of productivity costs: For Asians (55%) and lost labor market productivity: Hispanic/Latino (43%) populations respectively.

AI Design

As the largest employer and funder of health care in the United States, the federal government has a major role to play in the development and use of AI and in mitigating its risks. On October 30, 2023, the Biden Administration released Executive Order 14110 on Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence. This executive order establishes a government-wide effort to guide responsible AI development and deployment through federal agency leadership, industry regulation, and engagement with international partners.

Executive Order 14110 states,

Artificial Intelligence (AI) holds extraordinary potential for promise and peril. Responsible AI use has the potential to help solve urgent challenges while making our world more prosperous, productive, innovative, and secure. At the same time, irresponsible use could disempower workers, stifle competition, and pose risks to national security. Harnessing AI for good and realizing its benefits requires mitigating its substantial risks. This endeavor demands a society-wide effort that includes government, the private sector, academia, and civil society. Executive Order (E.O.) 14110 outlined eight overarching policy areas: 1. Safety and security; 2. Innovation and competition; 3. Worker support; 4. Consideration of AI bias and civil rights; 5. Consumer protection; 6. Privacy; 7. Federal use of AI; and 8. International leadership.⁸

AI Bias, Civil Rights, and Health Equity

“Of all the forms of inequality, injustice in health care is the most shocking and inhumane.”

—Martin Luther King, Jr

AI has power, promise, and the potential to reduce health disparities if implemented with fairness and justice and deployed with equity in mind. To do this well, developers and DCEs must be aware of the “AI iceberg” and find ways to effectively intervene. As with a real iceberg, the AI’s iceberg has areas that are well known and can be visible and invisible. This could include the following.

Computational Bias

AI systems can exhibit various forms of computational bias arising from different stages of the AI development and deployment process. For example, this can include the following:

- training data bias;
- sampling bias (lack of diversity);
- historical bias (data reflect historical inequalities or prejudices);
- label bias (labeling process might be biased in sentiment analysis);
- algorithmic bias: objective function bias, feature selection bias, bias in model architecture;
- deployment bias: user interaction bias (the way users interact with the AI system introduces bias);
- feedback loop bias (when the AI system’s outputs influence future inputs in a way that perpetuates or amplifies bias), bias in real-world contexts (deployment context of the AI system introduces bias);
- measurement and evaluation bias: (performance metric bias and benchmark data set bias (common computer vision benchmarks might have fewer images from certain geographic regions)).

Confirmation Bias

As with face-to-face diabetes care, there can be bias from human-AI interaction. When users tend to accept AI recommendations that align with their existing beliefs and disregard those that do not, this can reinforce their preexisting biases.

Automation Bias

This occurs when users overrely on AI outputs, assuming they are more accurate or impartial than they are. If the AI is flawed, this can lead to biased decisions.

Addressing each of these computational biases involves careful consideration at all stages of AI development, including diverse and representative data collection, fairness-aware algorithm design, and ongoing monitoring and evaluation in deployment.⁷

Health System Bias

In addition to mitigating the aforementioned biases, it is critical to keep the current state of our health system in mind and the prevailing biases that already exist in our clinics and practices. We must therefore develop a plan to mitigate the systemic biases that already impact access to services, quality of care, and reproductive and preventive care. Included among these biases are racial and ethnic, gender, socioeconomic, geographic, LGBTQ+, disability, and age. Unless these biases are kept in mind and addressed at every opportunity, AI can widen health disparities instead of delivering on its promise by improving diabetes and cardiometabolic care. AI has power and promise, but it needs to be deployed intelligently.

Role of DCEs in Equitable AI Development and Implementation

“Artificial intelligence has potential, promise, and power, but we must keep humans on top of and in the loop to enhance health equity.”

—Magon Saunders, DHSC, MS, RDN, LD, FADCEs, FAC-COR-1 (2024)

The DCES has a critical role as we use these AI technologies to enhance diabetes and cardiometabolic care. The following 4 steps can guide us to participate in the development and use of equitable AI.

1. Practice responsible AI: Engage diverse staff, be ethical, values-focused, fair, and inclusive. Work to reduce all the aforementioned biases and always keep humans in the loop.
2. Explainability and interpretability: Be able to explain and interpret AI data and the processes to various audiences, especially our clients, using layman terms.
3. Bake in equity: Bake in equity into every step of the AI process and use checklists and checks and balances to ensure that the process is unbiased. Inclusivity and equity should be the guiding principles in every aspect of AI implementation. By thinking of equity in everything, we can ensure a more just and balanced health care system. Our diverse clients with diabetes and the DCES should be encouraged to get involved in this stream of work. DCESs must be at the research, clinical trial, and AI tables.
4. Build self-efficacy: As a DCES, our goal is to help our patients to better self-manage their diabetes and to build self-efficacy. Therefore, we must empower our clients and use AI to help them better manage their diabetes and other medical conditions.

Taking all 4 of these steps will go a long way in building equity into the AI process.

Best equity practices for the DCES in AI Implementation in diabetes and cardiometabolic care include:

- Work with advocates: Ensure equity practices and policies are considered throughout the AI process.
- Build diverse expert teams: Assemble multidisciplinary teams with diverse expertise, including data scientists, clinicians, ethicists, and social scientists, to inform, develop, and evaluate AI systems. Diversifying the AI workforce will help to

mitigate some of these risks.

- Standardize protocols: Ensure that everyone is treated the same and that there is no discrepancy in treatment.
- Continue to work to improve diabetes self-management and patient efficacy: AI is a “shiny new toy” that has the potential to improve diabetes and cardiometabolic care, but adding this to a broken, expensive health care system will not achieve the outcomes we seek unless we double down on our efforts to build equity into our practices and fix the areas that are broken.
- Humanize the AI process: Keep humans in and on top of the AI loop.
- Provide continuous training and professional development: Provide ongoing education and training for health care providers on AI technologies to ensure they are proficient in using and interpreting AI tools.
- Ensure that all AI interactions are ethical: Given the extensive incentives in this space, when incentives drive the AI system, ethics will suffer.⁸⁻¹¹

It is important to remember that equity is in the minutiae, so we must “bake” equity into all AI policies and practices to harness AI’s power and promise. Health equity is a team sport; the team should look like the America we serve. Order matters; amazing, positive AI advances will not help much in a dysfunctional society where trust, physical and mental health, and so on have broken down. We must continue to work to build trust and to improve whole-person care for the clients that we serve. Most importantly, in the race to build more powerful AI, we cannot forget the people with diabetes, the technology’s users, and the most vulnerable in our society. We must strive to build humane technologies, share understanding, and support fairness and justice.

Finally, as DCESs, we must put ethics before incentives. Current AI incentives can create a dangerous spiral and support harmful technology. Unless we consider equity, ethics will suffer. Lastly,

we cannot lose sight of why we came to diabetes care. Let's keep our clients, their self-efficacy, and equity front and center!

Workflow Integration for AI Solutions

Although many of us may think that AI is the "new thing," as noted earlier, it was first defined by IBM in 2004. Indeed, AI is already being used in diabetes cardiometabolic solutions, in part, due to the following:

- There are massive amounts of data from devices.
- Computational power on large-scale data is available.
- Algorithms for metabolic management have been developed and validated.
- Care can be delivered at individual and population levels.
- National standards for medical and education care have been established.

AI is already in use in diabetes care and education, including in the following ways:

- automated insulin delivery;
- EMR data extraction, discovery, and smart phrases;
- continuous glucose monitors (CGM) and data visualization;
- connected insulin pens, insulin dosage algorithms;
- diabetes coaching apps;
- retinopathy and neuropathy diagnosis and care;
- meal planning.

Integrating patient-generated health data to integrate the resulting data from these diabetes technologies into clinical practice include the following:

- use of information to trigger a visit, call, or notification;
- ability to provide educational resources within the solution—"just in time";
- 2-way messaging to communicate to answer questions, provide guidance, support, and so on;
- consolidation and analysis of data to suggest

or perform an action or enter into the electronic health record.¹²

DCES Roles With AI

As a DCESSs, we can contribute to both the development and implementation of an AI-enabled product in the technology-enabled care model. Specifically, the DCES can ensure equitable care and integration into the clinical workflow and demonstrate the added value of AI as a clinical tool.

To illustrate how the DCES is integral to the use of AI in clinical care, we present a synthetic wound care solution based on an aggregate of current wound care solutions in clinical use as enhanced by AI means. Machine learning is applied to a vast wound care encounters data set. Very large numbers (in the millions) are required in the data set to ensure relevant output. Furthermore, to avoid sampling bias, these encounters need to include individual patients of varying ages from a wide range of ethnic groups with a variety of skin tones and visit and wound data.

The data set inputs include:

- wound size and depth
- color as assessed by AI image analysis
- disease state and comorbidities
- age of wound at encounter
- patient health markers
- glucose values
- relevant lab values
- standards of care in wound care.

The application of data processing and machine learning to this large data set was used to develop a wound treatment and prediction algorithm that identifies the likelihood of wound closure or maintenance that can then be applied in ongoing clinical care for future patients. With the addition of each new encounter, AI can continue to learn, and the wound treatment and prediction algorithm improves in its ability to predict outcome and direct care.

The care team applies the wound treatment and prediction algorithm via HIPAA-compliant AI processing on patient-generated health data to

create tailored, individualized, data-driven care plans based on individuals' data to uniquely guide the care for each person.

This example wound care solution includes the additional uses of AI to create the following:

- Standardized documentation is created using an AI scribe feature (eg, SOAP note generation).
- AI automated patient education assignments based on smart phrases or key word trigger within a patient's care note.
- Automated referrals are made, including DCES follow-up for glycemic management based on smart phrases or reaching set threshold levels from connected glucose data (CGM or blood glucose monitoring data) based on information determined by the wound treatment and prediction algorithm.
- Messaging follow-up is sent using natural language processing after a clinical visit to coordinate care, provide support, schedule follow-up visit, and support people in self-managing their condition.
- Chat summarization is created to guide messaging, clinical care, self-management, and education requirements.
- Nutrition education needs assessment is made based on food intake data from AI analysis of food recall information collected during an in-person visit or logged food journal reports to create tailored meal plans (note: meal planning example is included in the next section of this article).

This AI-driven wound care solution illustrates only 1 example of the value of the DCES in the application of AI in patient care. With the clinician as the expert, health care can take advantage of the power of AI. The vast knowledge, training, and clinical expertise of the DCES enables the application of AI to evaluate large amounts of patient clinical information to not only create a product solution but also to automate the provision of appropriate clinical care. AI has the potential to improve care and workflow and maximize clinician hours. With the DCES included

in the process, the solution is more likely to be relevant, include best equity practices, and improve clinical workflow.

DCES and Use of Large Language Models

Another example of the use of AI by DCESs is large language models (LLMs). LLMs are advanced AI models that process and generate human language.¹³

These models have extensive amounts of data from books, web pages, and articles that allow them to answer questions, create content, and write essays with some level of reasoning. LLMs are a type of generative AI specifically designed to mimic human text and create context, images, and audio or code. Examples of LLMs include OpenAI's ChatGPT, Google's Gemini, Meta's LLaMA, and Microsoft's Copilot integrated OpenAI-productivity model. They can help streamline research, education material development, and patient education strategies. This article provides insights on how these AI tools can be leveraged in a clinical setting while highlighting their practical applications and limitations.

AI Tools You Can Use for Research and Presentations

Today's LLMs can generate text and content, assist with literature search, answer complex questions, create images, develop scientific professional presentations and patient presentations, and even translate languages, which makes them incredibly versatile for diverse tasks.

Utilization of an LLM begins when the user enters a query or a prompt. The query may be a question, such as, "What is the scientific evidence of intermittent fasting and type 2 diabetes in adults?," or a task, such as "Create a 10-slide presentation about intermittent fasting and type 2 diabetes for adults. Include definition of intermittent fasting; types of intermittent fasting; scientific research on intermittent fasting; benefits and contraindications" (see Table 2). The response to the text-typed question included 3 accurate references and conclusions but missed a key finding from one study. The outline provided in

Table 2 ChatGPT Example 1

Response from ChatGPT to the text-typed question: “What is the scientific evidence of intermittent fasting and type 2 diabetes in adults?” (ChatGPT4) October 30, 2024.

Answer:

Research on intermittent fasting (IF) for managing type 2 diabetes in adults suggests that IF may improve insulin sensitivity, reduce blood glucose levels, and potentially lead to diabetes remission. A study published in The Journal of Clinical Endocrinology & Metabolism found that intermittent calorie-restricted diets helped some participants achieve diabetes remission, defined as maintaining normal blood glucose levels without medication for at least a year. Nearly 55% of study participants experienced remission after a three-month IF regimen, and 90% reduced their medication use, including insulin

Endocrine.org.

Another study indicated that IF can contribute to weight loss and reduce insulin resistance, both of which are beneficial for managing type 2 diabetes. Fasting periods appear to help the body rely more on stored fat, reducing blood sugar levels and improving insulin effectiveness. However, while IF shows promise, it is crucial for patients to undertake it with medical supervision, as fasting can carry risks for those with blood sugar management issues

Oxford Academic.

IF's effectiveness depends on the type and duration of fasting, and individual factors such as medication use and lifestyle. Additionally, some experts caution that IF might not suit everyone and recommend personalized approaches based on individual health profiles.

Response from ChatGPT 4 to the text-typed task (October 30, 2024): Create a 10-slide presentation about intermittent fasting and type 2 diabetes for adults. Include definition of intermittent fasting; types of intermittent fasting; scientific research on intermittent fasting; benefits and contraindications.

Answer:

Slide 1: Intermittent Fasting and Type 2 Diabetes: Benefits and Considerations	• Subtitle: An Overview of Research, Health Benefits, and Contraindications • Your Name, Date, and Organization (if applicable)
Slide 2: Introduction to Intermittent Fasting (IF)	• Definition: Intermittent fasting (IF) is an eating pattern that cycles between periods of fasting and eating, focusing on when to eat rather than specific foods. • Purpose: Explores how IF can impact metabolism, insulin levels, and blood sugar management.
Slide 3: Types of Intermittent Fasting	• Time-Restricted Eating (TRE): Eating within a specified window, such as 16/8 or 14/10. • Alternate-Day Fasting (ADF): Fasting every other day. • 5:2 Method: Eating normally for five days, with two non-consecutive days of restricted calories. • Extended Fasting: Fasting for 24 hours or more occasionally (not typically recommended for diabetes without medical supervision).
Slide 4: Scientific Research on IF and Type 2 Diabetes	• Weight Loss & Insulin Sensitivity: Studies suggest IF promotes weight loss, improving insulin sensitivity, an essential factor for type 2 diabetes. • Remission Potential: Research shows that calorie restriction and fasting can contribute to periods of remission for some adults with diabetes Endocrine.org Oxford Academic Reduced Medication Dependence: Evidence from multiple studies indicates IF can reduce or eliminate the need for medications in some cases (consult medical advice).
Slide 5: Mechanisms of IF in Managing Diabetes	• Insulin Reduction: Fasting reduces insulin secretion, allowing insulin levels to drop and increase fat-burning processes. • Cellular Repair: Fasting can stimulate autophagy, a cellular repair process that may improve beta-cell health and function. • Increased Metabolic Flexibility: Fasting may help the body switch between glucose and fat for fuel, aiding blood sugar control.
Slide 6: Potential Health Benefits of IF for Type 2 Diabetes	• Improved Blood Sugar Control: Reduced fasting blood glucose and HbA1c levels. • Weight Loss & Maintenance: Supports fat loss while preserving lean muscle mass. • Cardiovascular Health: Reduced cholesterol, blood pressure, and inflammatory markers, all critical for type 2 diabetes management.
Slide 7: Contraindications of Intermittent Fasting	• Hypoglycemia Risk: Fasting can cause low blood sugar, particularly in those on insulin or certain medications. • Not for Everyone: Contraindicated for pregnant/breastfeeding individuals, those with eating disorders, or people with type 1 diabetes. • Caution With Medications: Adjustments may be needed for individuals taking blood sugar-lowering medications.
Slide 8: Practical Tips for Safe IF Implementation in Type 2 Diabetes	• Medical Supervision: Work with a health care provider to determine a safe fasting regimen. • Hydration: Prioritize water and electrolytes to stay hydrated during fasting. • Start Gradually: Begin with shorter fasting periods to assess tolerance. • Monitor Blood Sugar: Regular monitoring is essential, especially during the early phases of IF.
Slide 9: Conclusion and Key Takeaways	• Individualized Approach: IF can offer benefits for adults with type 2 diabetes, but it should be personalized and medically supervised. • Health Benefits: Improved insulin sensitivity, blood sugar control, weight management, and reduced medication dependency. • Risks and Considerations: Hypoglycemia, medication adjustments, and contraindications mean that IF is not universally recommended.
Slide 10: References and Further Reading	• Citations: Provide references for the studies, articles, and clinical guidelines mentioned. • Suggested Reading: Include links to additional resources on IF and diabetes care.

This outline offers a balanced overview of intermittent fasting's potential benefits and risks, with practical considerations to guide registered dietitians and health care professionals in discussing IF with patients who have type 2 diabetes.

This outline offers a balanced overview of intermittent fasting's potential benefits and risks, with practical considerations to guide registered dietitians and health care professionals in discussing IF with patients who have type 2 diabetes.

Response from Microsoft Copilot to text-typed task (October 30, 2024): "Create a graphic for a presentation titled *Intermittent Fasting and Type 2 Diabetes in Adults*."



response to the text-typed task was clear and effective, offering a time-saving resource for clinicians.

To create a graphic, use the task, "Create a graphic for a presentation titled: Intermittent fasting and type 2 diabetes in adults." Choose different LLMs to see which one offers the most suitable result. Microsoft Copilot can assist in creating visual aids, such as infographics that simplify complex information into digestible graphics.

By understanding how each tool functions, DCEs can choose the right LLM to meet their specific needs in diabetes care and education.

How Is AI Changing Meal Planning?

LLMs can be utilized to generate detailed and personalized meal plans. The ability of ChatGPT to create personalized and varied meal plans for persons with obesity, cardiovascular disease, and type 2 diabetes accurately depends significantly on the input provided. Prompts should include specific nutritional rules, including target energy intake and nutritional content (ie,

fat, carbohydrate, protein, iron, vitamin C), to generate accurate meal plans. The knowledge-based data yielded 99% in nutrients accuracy, whereas ChatGPT-based recommendations achieved 91% mean nutrient accuracy. Including specific energy targets in the prompts increased meal plan precision, and ChatGPT's capacity for variety made 7-day meal plans more appealing to patients. Registered dietitians and DCEs should review these plans to confirm nutritional accuracy, cultural suitability, and cost-effectiveness.¹⁴

Table 3 shows the result by ChatGPT when prompted by LD to generate a 1-day meal for a Colombian woman from Medellín with type 2 diabetes, specifying 1500 calories; 50 g of carbohydrate per meal; 15 g of protein at breakfast, 25 g at lunch, and 25 g at dinner; fewer than 15 g of saturated fat daily; and 20 g of dietary fiber. LD also requested that all nutrients be indicated for each food item and that the menu be printed in English and Spanish. Although most instructions were followed, the initial output did not include caloric values, dietary fiber totaled 42 g, protein at breakfast was slightly below target,

Table 3 ChatGPT Example 2

Response from ChatGPT to the text-typed question: Create 1-day menu for a Colombian woman from Medellin, Colombia. Calories 1500. 15 grams of protein for breakfast, 25 grams of protein for lunch, and 25 grams of protein for dinner. Fewer than 15 grams of saturated fat per day and 20 grams of dietary fiber. Indicate all nutrients on each food. Print menu in English and Spanish. Meal Plan: 1500 Calories		
Breakfast: Oatmeal With Greek Yogurt and Berries		
English:	• 1/2 cup rolled oats, cooked in water (27g carbs, 5g protein, 2g fat, 4g fiber) – 150 calories • 1/2 cup plain Greek yogurt (6g carbs, 10g protein, 0g saturated fat) – 60 calories • 1/4 cup fresh strawberries (3g carbs, 0g protein, 0g fat, 1g fiber) – 12 calories • 1/4 cup fresh blueberries (5g carbs, 0g protein, 0g fat, 1g fiber) – 20 calories • 1 tbsp chia seeds (5g carbs, 2g protein, 2g fat, 4g fiber) – 60 calories	Total Nutrients: • Calories: 302 • Carbohydrates: 46g • Protein: 17g • Saturated Fat: 1g • Fiber: 10g
Spanish:	• Avena con Yogur Griego y Bayas • 1/2 taza de avena, cocida en agua (27g carbohidratos, 5g proteína, 2g grasa, 4g fibra) – 150 calorías • 1/2 taza de yogur griego natural (6g carbohidratos, 10g proteína, 0g grasa saturada) – 60 calorías • 1/4 taza de fresas frescas (3g carbohidratos, 0g proteína, 0g grasa, 1g fibra) – 12 calorías • 1/4 taza de arándanos frescos (5g carbohidratos, 0g proteína, 0g grasa, 1g fibra) – 20 calorías • 1 cucharada de semillas de chía (5g carbohidratos, 2g proteína, 2g grasa, 4g fibra) – 60 calorías	Nutrientes Totales: • Calorías: 302 • Carbohidratos: 46g • Proteína: 17g • Grasa Saturada: 1g • Fibra: 10g
Lunch: Grilled Chicken Salad With Avocado and Beans		
English:	• 3 oz grilled chicken breast (0g carbs, 25g protein, 0g fat) – 120 calories • 1 cup mixed greens (3g carbs, 1g protein, 0g fat, 1g fiber) – 10 calories • 1/2 cup black beans (20g carbs, 7g protein, 0g saturated fat, 7g fiber) – 110 calories • 1/4 avocado (3g carbs, 1g protein, 2g saturated fat, 3g fiber) – 60 calories • 1 tbsp olive oil dressing (0g carbs, 0g protein, 2g saturated fat) – 120 calories • 1 small orange (24g carbs, 1g protein, 0g fat, 3g fiber) – 60 calories	Total Nutrients: • Calories: 480 • Carbohydrates: 50g • Protein: 25g • Saturated Fat: 4g • Fiber: 14g
Spanish:	• Ensalada de Pollo a la Parrilla con Aguacate y Frijoles • 3 oz de pechuga de pollo a la parrilla (0g carbohidratos, 25g proteína, 0g grasa) – 120 calorías • 1 taza de hojas verdes mixtas (3g carbohidratos, 1g proteína, 0g grasa, 1g fibra) – 10 calorías • 1/2 taza de frijoles negros (20g carbohidratos, 7g proteína, 0g grasa saturada, 7g fibra) – 110 calorías • 1/4 de aguacate (3g carbohidratos, 1g proteína, 2g grasa saturada, 3g fibra) – 60 calorías • 1 cucharada de aderezo de aceite de oliva (0g carbohidratos, 0g proteína, 2g grasa saturada) – 120 calorías • 1 naranja pequeña (24g carbohidratos, 1g proteína, 0g grasa, 3g fibra) – 60 calorías	Nutrientes Totales: • Calorías: 480 • Carbohidratos: 50g • Proteína: 25g • Grasa Saturada: 4g • Fibra: 14g
Dinner: Lentil Soup With Sautéed Vegetables and Plantain Chips		
English:	• 1 cup cooked lentils (30g carbs, 18g protein, 0g fat, 15g fiber) – 230 calories • 1/2 cup sautéed zucchini and bell pepper (6g carbs, 1g protein, 0g fat, 2g fiber) – 30 calories • 1 tbsp chopped cilantro (0g carbs, 0g protein, 0g fat) – 0 calories • 1/2 small baked plantain, sliced (14g carbs, 1g protein, 0g fat, 1g fiber) – 60 calories	Total Nutrients: • Calories: 320 • Carbohydrates: 50g • Protein: 20g • Saturated Fat: 1g • Fiber: 18g
Spanish:	• Sopa de Lentejas con Vegetales Salteados y Chips de Plátano • 1 taza de lentejas cocidas (30g carbohidratos, 18g proteína, 0g grasa, 15g fibra) – 230 calorías • 1/2 taza de calabacín y pimiento salteados (6g carbohidratos, 1g proteína, 0g grasa, 2g fibra) – 30 calorías • 1 cucharada de cilantro picado (0g carbohidratos, 0g proteína, 0g grasa) – 0 calorías • 1/2 plátano pequeño, al horno en rodajas (14g carbohidratos, 1g proteína, 0g grasa, 1g fibra) – 60 calorías	Nutrientes Totales: • Calorías: 320 • Carbohidratos: 50g • Proteína: 20g • Grasa Saturada: 1g • Fibra: 18g
Summary of Daily Totals		
• Calories: 1502 • Carbohydrates: 146g • Protein: 62g • Saturated Fat: 6g • Fiber: 42g		
This meal plan maintains balance in calories and macronutrient distribution while staying within the saturated fat limit and exceeding the fiber requirement for better blood sugar management and digestion.		

and the food options were somewhat generic. A follow-up prompt to include the caloric value of foods and increase breakfast protein from 10 g to 15 g successfully addressed these issues.

Developing Effective Patient Education Materials and Resources

LLMs can assist in creating a wide variety of educational resources tailored for diabetes care, including responses to commonly asked questions. Microsoft's Copilot also adds the ability to create custom images that can be used for patient education, social media posts, and slide decks. Here is how AI can be applied to different educational resources:

- **Patient FAQs:** LLMs can be used to prepare responses to frequent patient questions. For example, if a patient asks about the impact of low- and no-calorie sweeteners on blood glucose levels or asks what they should eat after being diagnosed with metabolic dysfunction-associated steatotic liver disease, the DCEs can create an AI-generated response that is evidence-based, patient-friendly, and culturally relevant.¹⁵
- **Recipe creation:** DCEs can generate sample vegetarian, Mediterranean, or culturally specific recipes that align with diabetes management goals by providing an LLM with details about the patient's dietary preferences, budget, or restrictions. An example query might be, "Provide a vegetarian lasagna recipe without garlic using spinach that costs \$3 per serving"
- **Slide decks and infographics:** Microsoft Copilot and similar tools allow users to create visually appealing, informative slides or infographics. Infographics could use a prompt like, "Generate a slide on the benefits of fiber in blood glucose management," and quickly receive engaging visuals to support patient education sessions. LLMs can help you create slide decks, infographics, and graphics.
- **Language:** For patients who speak different

languages, LLMs can help translate and create educational materials in various languages. Have native speakers and DCEs review the educational materials for accuracy before sharing them with patients.

- **Titles:** When you need imaginative titles for articles, classes, or webinars, LLMs can serve as a creative assistant to generate fresh, engaging options.

Exploring and Minimizing Hallucinations

LLMs are prone to hallucinations, which are outputs that are fabricated, inconsistent, and different from the user's intent.¹⁶ For example, the user prompts the LLM to provide references for the topic on sarcopenia on men over the age of 50. When checking the references, some appear to have incorrect titles, and others have the correct authors but incorrect journal names. This would be a case of hallucinations.

To minimize hallucinations:

- ensure specific and detailed input (prompt)
- cross-check all references when doing research
- review and revise all output.

In summary, AI tools, especially LLMs, offer transformative potential for DCEs working in diabetes-cardiometabolic care by helping gather research, developing patient education materials, and facilitating language-appropriate resources. Using platforms like ChatGPT, Gemini, and Copilot can enhance productivity, empower patient-centered education, and support ongoing professional knowledge building. However, because AI can produce inaccurate results, users should always verify AI-generated information with reliable sources to ensure accuracy.

Conclusion

By thoughtfully integrating AI solutions into their practice, DCEs can increase access to their services and continue to improve diabetes care and education while making complex information more accessible and engaging for people with diabetes.

The ADCES24 panel that spoke during

one of the General Sessions concluded with the challenge to the DCES to increase their understanding of AI, look for ways to get involved with the use in their practice, and work with the association to learn how to move to the next generation of DCES practice. In a companion article, Macleod discusses short-term action steps and longer term plans to put in place to lead in building the bridge to optimal diabetes-cardiometabolic care leveraging AI.■

Malinda Peeples  <https://orcid.org/0000-0003-4097-1584>

Janice Macleod  <https://orcid.org/0000-0001-8689-4938>

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Appendix A. AI Resources for the DCES

ADCES 2024 Panel Presentation: Employ Artificial Intelligence to Advance Diabetes-Cardiometabolic Care

Moderator/Speakers: Malinda Peeples, MS, RN, CDCES, FADCES; Lorena Drago, MS, RD, CDN, CDCES; LaurieAnn Scher, MS, RD, CDCES, FADCES; Magon Saunders, DHSc, MS, RDN, LD, FADCES, FAC-COR-1; Janice MacLeod, MA, RD, CDCES, FADCES

Action steps to take now to build AI acumen:

- Follow, listen, learn, join the conversation. Many of these recommended AI experts are not thinking

about the role of the DCES. That is our job. We can add valuable perspective and discover and promote opportunities for DCESSs to be at the table by providing thoughtful responses to posts.

- Dr. Bertlan Mesko: MedicalFuturist.com; <https://www.linkedin.com/in/bertalanmesko/>
- Dr. Eric Topol: <https://www.linkedin.com/in/eric-topol-md-b83a7317/>
- Dr. Harvey Castro: harveycastromd.info; [linkedin.com/in/harveycastromd](https://www.linkedin.com/in/harveycastromd)
- Tom Lawry: <https://www.tomlawry.com/>; <https://www.linkedin.com/in/tomlawry/>
- Sergei Polevikov: AI Health Uncut: sergeiAI.substack.com; [linkedin.com/in/sergeiai](https://www.linkedin.com/in/sergeiai)
- Read the Coalition for Health AI Blueprint for Trustworthy AI: https://www.coalitionforhealthai.org/papers/blueprint-for-trustworthy-ai_V1.0.pdf
- Read: Lawry T. Hacking health care: how AI and the intelligence revolution will reboot an ailing system. Routledge; 2023
- Read: American Medical Association. Augmented intelligence in medicine. Accessed February 28, 2024. <https://www.ama-assn.org/practice-management/digital/augmented-intelligence-medicine>.
- Explore AI training and certification offerings at the American Board of Artificial Intelligence in Medicine: <https://abaim.org/>
- Review National Academy of Medicine: *Code of Conduct for AI in health, healthcare and biomedical science*: <https://nam.edu/programs/value-science-driven-health-care/health-care-artificial-intelligence-code-of-conduct/>
- Keep up with publications on AI in healthcare by following Jan Berger from GE Health on LinkedIn who summarizes and provides link to relevant articles: <https://lnkd.in/eR7qichj>
- Follow the Consumer Technology Association linkedIn: <https://www.linkedin.com/company/consumer-technology-association/> and read their Standards documents on AI
 - National AI Policy and Regulatory Framework
 - Artificial Intelligence in Health Care: Practices for Identifying and Managing Bias (ANSI/CTA-2116)
- Make a list of every repetitive task you do over and over each day as you provide consultations, teach classes, document your visits. How could AI help? Use the Chat GPT Prompt guides and cheat sheets here to learn how to refine your prompts to optimize output:
 - Chat GPT Prompt Cheat Sheet by the Medical Futurist, Dr. Bertlan Mesko: <https://www.linkedin.com/in/bertalanmesko/recent-activity/all/>
 - Chat GPT Cheat Sheet by Dr. Harvey Castro (AI expert and medical doctor: https://www.linkedin.com/posts/harveycastromd_chatgptthehealthcare-thegptpodcast-harveycastromd-activity-7090635508002811904-3hxxw/
- Make a list of what you could do to help clients, if freed from the rote, repetitive tasks. Read this related LinkedIn post:
<https://www.linkedin.com/pulse/healthy-eating-diabetes-person-list-foods-avoid-janice/>
- Lean in. Embrace the change. Be part of the solution.

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Federal Resources on AI

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Nutritional Management and Updates of Diabetes in Pregnancy

ALEFIYA FAIZULLABHOY, MBA, MS, RD, CDCES, CDN, FAND



Pregnancy: A Window to the Future

The World Health Organization refers to maternal health as the health of persons during pregnancy, childbirth, and the postnatal period. Ensuring maternal health and well-being is important, and pregnancy is a time where most persons will be invested in their own self-care because of implicit benefits to the fetus. However, pregnancy is a significant life change, and coupled with a diagnosis of gestational or pregestational diabetes, a pregnant person may experience a rollercoaster of physical and emotional changes. Providing collaborative care, support, and understanding should be a focal point soon after gestational diabetes (GDM) is diagnosed or pregnancy is confirmed in a person with pregestational diabetes.

Diabetes self-care behaviors provide a strong framework to support a healthy pregnancy and should be used as tools by the diabetes care and education specialist (DCES) to assist with self-management skills for persons with diabetes in pregnancy.

What’s in a Name? GDM and Pregestational Diabetes

It is important to understand the differences between pregestational diabetes and GDM. As the name suggests, GDM is diabetes diagnosed during pregnancy and per the 2017 *World Journal of Diabetes*, defined as “any degree of hyperglycemia recognized for the first-time during pregnancy.” Typically, most persons without a significant history are screened between 24 and 28 weeks of gestation. Persons may be screened earlier depending on known risk factors, such as prior history of GDM, polycystic ovarian syndrome, or history of macrosomia (ie, large birth weight baby; ≥4000 g). Table 1 lists these risk factors. The American College of Obstetricians and Gynecologists (ACOG) suggests the 2-step approach for GDM screening. This involves a 50-g 1 hour glucose test administered in the nonfasting state followed by a 100-g 3-hour glucose tolerance test if positive. A diagnosis of GDM is based on 2 values equal to or more than

the cutoff. See Table 2 for the 2-step approach and diagnostic criteria. Table 3 outlines the 75-g 2-hour glucose test diagnostic criteria that is administered in some situations, depending on the community the practice serves.

Pregestational diabetes is diabetes, either type 1 diabetes or type 2 diabetes, that is present prior

Table 1. Guidelines for Diabetes Screening

First Visit: Early Screen	24-28 Wk
History of GDM	All pregnant persons
History of macrosomia (≥4000 g)	
Unexplained fetal demise/anomaly	
Diabetes in first-degree relative (parent, sibling)	
Consider if overweight (BMI of 25, or if Asian American >23)	
Obesity of BMI >30	
Polycystic ovarian syndrome	
A1C ≥5.7%, impaired glucose tolerance, or impaired fasting glucose ^a	

^aIf an A1C is obtained antepartum at any point during pregnancy and is greater than or equal to 6.5%, this is diagnostic of type 2 diabetes, and no further screening is indicated.

Table 2. Diagnostic Criteria for Gestational Diabetes: 2-Step Approach^a

Time	Plasma glucose mg/dl
Fasting	≥95
1 h	≥180
2 h	≥155
3 h	≥140

^aGestational diabetes based on Carpenter-Coustan criteria: 2 values equal to or greater than cutoff. Two-step approach: For 50-g glucose load, if ≥130-140 mg/dL, refer for the 3-hour test, 100-g glucose load (different programs may set different threshold cutoffs based on the population served).

Table 3. Diagnostic Criteria for Gestational Diabetes: 1-Step Approach^a

Time	Plasma glucose mg/dl
Fasting	≥92
1 h	≥180
2 h	≥153

^aOne-step approach is 2-hour, 75-g glucose load. One value equal to or greater than cutoff signals gestational diabetes.

to pregnancy. It is suggested that preconception counseling should be part of routine diabetes care starting at puberty for all persons with diabetes who have the potential for childbearing, especially given that 41% of pregnancies in the United States are unplanned. In the pregestational diabetes population and the prediabetes population, it is suggested that preconception counseling should aim for A1C levels of <6.5% if this can be safely achieved without the risk of hypoglycemia. Preconception education should include a comprehensive nutrition assessment, lifestyle recommendations, and diabetes self-management education.

As per the Centers for Disease Control and Prevention, in the United States, about 5% to 9% of people develop GDM, and 1% to 2% have pregestational diabetes.

Pregnancy: What Changes Can Be Expected?

During pregnancy, there is an ongoing supply of glucose to the fetus from the mother that is the fetus's main source of nutrition. It is crucial to recognize that pregnancy is an insulin-resistant and ketogenic state. This is characterized by an increase in human placenta lactogen, progesterone, prolactin, placental growth hormone, and cortisol. As pregnancy progresses, insulin resistance increases typically around 16 weeks of gestation and continues until around 36 weeks of gestation.

In persons without diabetes, insulin production is sufficient to combat the increasing insulin resistance. However, in persons with pregestational diabetes and GDM, if not met, insulin requirements can result in hyperglycemia that has maternal and fetal implications. It is important to counsel this population on the implications of hyperglycemia and extremes in glucose variability. Suboptimal or poorly managed diabetes in pregnancy can result in birth defects, high blood pressure, and risk of preeclampsia, hydramnios, macrosomia, neonatal hypoglycemia, and stillbirth. It can also lead to an increased risk of developing obesity, hypertension, and type 2 diabetes for the offspring later in life. In

pregestational diabetes, the risk of anomaly is related directly to the A1C value within the first 10 weeks of conception.

The DCES plays an important role in providing diabetes self-management education in this population. Counseling should include discussion on glycemic targets in pregnancy, lifestyle, and behavioral management with an emphasis on medical nutrition therapy. In both GDM and pregestational diabetes, insulin is the preferred medication for management.

Are There Different Glycemic Targets for Pregnancy?

In the late end of the first trimester, increased estrogen levels can increase insulin sensitivity and thereby maternal hypoglycemia. This contrasts with the increasing insulin resistance as pregnancy progresses. Hence, it highlights the need for ongoing glycemic management throughout pregnancy in a person with pregestational diabetes or GDM. Both ACOG and the ADA recommend that persons with GDM and pregestational diabetes self-monitor blood glucose at least 4 times a day. This includes a fasting glucose level and a 1-hour or 2-hour postprandial glucose check. Table 4 lists these targets for persons with GDM and pregestational diabetes. In some cases, where glycemic management is challenging and for those with pregestational diabetes, self-monitoring is useful if it can include premeal checks as well. A1C levels are not routinely monitored in pregnancy because the physiological increase in red blood cell turnover during this period can falsely lower A1C. As an average measure of glycemia, it can also miss the variability and postprandial hyperglycemia that may occur in pregnancy. Although fructosamine may offer some benefit, this is not routinely drawn in persons with pregestational diabetes or GDM and is not able to predict fasting or postprandial hyperglycemia, both of which are associated with maternal and fetal outcomes.

Continuous glucose monitoring (CGM) is a useful tool to track trends and provide insights in

Table 4. Self-Monitoring Blood Glucose Targets for Persons With Gestational and Pregestational Diabetes

Time of Check	Glucose Target
Fasting blood glucose (8-10-h fast)	<95 mg/dL If on medication, <90 mg/dL
1 h from start of meal	<140 mg/dL
2 h from start of meal	<120 mg/dL

glycemic variability. The CONCEPTT (Continuous Glucose Monitoring in Women with Type 1 Diabetes in Pregnancy Trial) trial demonstrated that the use of real-time CGM in pregnancy for persons with type 1 diabetes had positive outcomes for decreased large for gestational age births, severe neonatal hypoglycemia, and length of infant hospital stays. It improved maternal time in range without an increase in hypoglycemia. CGM offers many benefits and is being used much more frequently in persons with GDM and type 2 diabetes. The use of CGM provides an overall view of glycemic trends and may be especially helpful when used to safely adjust insulin in this population. It is beneficial to individualize use of CGM based on factors such as treatment regimens, preferences, and circumstances. The ADA Standards of Care recommend that CGM should be used as an adjunct to self-monitoring blood glucose. The FDA has approved DEXCOM G7 and both Freestyle Libre 2 and Freestyle Libre 3 for use in pregnancy. Targets set by the International Consensus on Time in Range (TIR) has suggested target ranges for persons with type 1 diabetes in pregnancy. These are listed in Table 5, but they do not

Table 5. Continuous Glucose Monitoring Targets for Persons With Type 1 Diabetes in Pregnancy

Metric	Type 1 Diabetes
Time in range based on target sensor glucose 63-140 mg/dL	>70%, >16 h, 48 min
Time below range <63 mg/dL	<4%, <1 h
Time below range <54 mg/dL	<1%, <15 min
Time above range >140 mg/dL	<25%, <6h

endorse a particular type of device or its accuracy or need for alerts and alarms. For the person with pregestational diabetes, who may be used to different glycemic targets when nonpregnant, counseling about these changes must be established, ideally in the preconception period if possible.

The Role of Medical Nutrition Therapy, Physical Activity, and Stress Management

Medical nutrition therapy should be the cornerstone of counseling in pregnancy. Many times, there is a tendency to decrease carbohydrates to achieve euglycemia. Urine ketone testing may be helpful to prevent extremes in meal planning and starvation ketosis. Diabetes-related ketoacidosis can pose a risk for persons with type 1 diabetes and for some persons with type 2 diabetes and GDM. This can present at lower glycemic values in pregnancy and have serious consequences for the mother and fetus. Counseling should be provided to promote appropriate weight gain and a nutrient-dense meal plan. Table 6 outlines weight recommendations per trimester as per the 2020-2025 Dietary Guidelines for Americans. The guidelines recommend energy requirements stay the same as for the nonpregnant person in the first trimester, with an additional 340 Kcals in the second trimester and 452 Kcals in the third trimester. The guidelines for weight gain and caloric recommendations have remained unchanged. An RDN well versed with diabetes in pregnancy can help the person aim for balanced meals with complex carbohydrate choices, a combination of polyunsaturated and monounsaturated fats, and protein. In pregnancy, the carbohydrate recommendation is 175 g per day, at least 71 g of protein and 28 g of fiber. Vitamin supplementation with at least 400 µg of folic acid is recommended preconception, and this is increased to 600 µg in pregnancy. The ADA offers sample meal plans and menu ideas that may be helpful as a guide to the DCES working with this population. [See the resource section for a link.](#)

Table 6. Weight Gain Recommendations in Pregnancy Based on Body Mass Index

Body Mass Index	Weight Gain
<18.5 kg/m ²	28-40 lb
18.5-24.9 kg/m ²	25-35 lb
25-29.9 kg/m ²	15-25 lb
>30 kg/m ²	11-20 lb

Barring any medical restrictions, persons with diabetes in pregnancy should be encouraged to include daily physical activity. As per ACOG, pregnant persons should ideally aim for at least 150 minutes of moderate intensity physical activity per week. For persons with type 1 diabetes and type 2 diabetes or GDM on insulin, safety precautions to prevent and treat hypoglycemia should be discussed. It is important to recognize that hypoglycemia in pregnancy is blood glucose values of ≤ 60 mg/dL. Fast-acting glucose source and/or glucagon prescriptions should be discussed and provided to these persons.

As per ACOG, depression occurs in 1 of 10 persons in pregnancy, and anxiety is also common. For the person with diabetes, enjoying the pregnancy may sometimes be challenging, especially with the expectations regarding glycemic management. Referral to a mental health specialist should be considered if this affects activities of daily living. The DCES can play a role in promoting mental health by providing tools for healthy coping.

Is Medication Necessary for Management of GDM and Pregestational Diabetes?

In many cases, despite lifestyle management, hyperglycemia may persist because of increasing insulin resistance as pregnancy progresses. If fasting or postprandial hyperglycemia persists, medication intervention must be considered because there are multiple maternal and fetal risks associated with hyperglycemia. Insulin is considered the “gold standard” for treatment of both GDM and pregestational diabetes. We know that persons with type 1 diabetes always need insulin; however, insulin is preferred for both GDM and type 2 diabetes as well. Insulin does not cross

the placenta and is used to lower the mother’s blood glucose, which in turn prevents high blood glucose going across to the fetus. For persons with GDM, intermediate acting insulin is typically prescribed to help with fasting hyperglycemia, and bolus insulin may be needed as well. For persons with type 2 diabetes, basal bolus therapy may be the preferred course of therapy. Insulin does need frequent titration because of changing needs throughout pregnancy, and a frank discussion regarding these expectations should be had with the person to better prepare them for the change. In some cases, insulin pump therapy may be an option; however, as with any therapeutic intervention, there should be a person-centered discussion for best route of medication.

Both metformin and glyburide cross the placenta, and studies have linked glyburide in pregnancy with a higher risk of neonatal hypoglycemia and increased neonatal abdominal circumference. It is recommended that metformin be discontinued prior to the end of the first trimester if it was taken to treat polycystic ovarian syndrome. Oral medication with these classes of drugs should be considered only if there are barriers to insulin and only after discussing the risk profile of these medications with the pregnant person.

Care in the Fourth Trimester

The first 12 weeks after delivery, also referred to as the fourth trimester, is a critical period for maternal health. During this time, there is a shift from the mother to the newborn and can often result in gaps in care for the mother. Diabetes in pregnancy for both GDM and pregestational diabetes can be markers for cardiometabolic risks. For the person with pregestational diabetes, it is important to ensure smooth transitions of care after delivery. For these persons, a postpartum plan must be in place, ideally in the third trimester, to adjust for the decreased insulin needs, which may be even lower than prepregnancy needs. For persons with GDM, a postpartum screen between 4 and 12 weeks is recommended to rule out prediabetes and diabetes.

Breastfeeding has many benefits, including decreasing the risk of type 2 diabetes for both the mother and the offspring, and should be encouraged with appropriate resources. Referral to a lactation consultation and collaboration with service providers to increase breastfeeding is recommended.

Summary

Diabetes in pregnancy can be daunting, with a seesaw of emotional and physical changes. The DCES can be a font of knowledge and support during this time. By participating in shared decision-making and providing positive reinforcement, the DCES can support the person during the pregnancy. Utilizing the ADCES7 Self-Care Behaviors as the framework, the DCES can empower the person to navigate the pregnancy journey with confidence and care. ■

Alefiya Faizullahoy, MBA, MS, RD, CDCES, CDN, FAND works with Northwell Health, in New Hyde Park, NY.

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Virtual Continuous Glucose Monitoring Initiation Service (virCIS)

A Certified Diabetes Care and Education Specialist-Led, Multidisciplinary Intervention to Expand Access to **Continuous Glucose Monitoring in Primary Care**

CHELSEA SOBCZAK, MPH, SEAN M. OSER, MD, MPH, CDCES, MEREDITH WARMAN, MPH, ASHLEY DAFFRON, PHARMD, DANIKA BUSS, BA, SARA WETTERGREEN, PHARMD, TAMARA K. OSER, MD, JESSICA A. PARASCANDO, MPH, AND BONNIE JORTBERG, PHD, RDN, CDCES

Over 38 million Americans have type 2 diabetes (T2D), with 1.2 million Americans diagnosed every year.¹ Diabetes is the eighth leading cause of death in the United States, and the total annual cost of diabetes is over \$400 billion.^{1,2} More than 90% of people with T2D receive their care not in endocrinology but in primary care settings.³⁻⁵ This means that primary care presents a unique opportunity for accessible and equitable diabetes care, including providing access to continuous glucose monitors (CGMs). Currently, the most rapid growth of CGMs is in primary care.⁶ However, challenges such as lack of clinician expertise or confidence with CGM prescribing and glucose data interpretation must be addressed. Certified diabetes care and education specialists (CDCESs) have been shown to improve diabetes care, yet it has been reported that only 36% of primary care practices employ a CDCES, whether part-time or full-time.^{7,8}

There are numerous clinical, behavioral, and psychosocial benefits associated with CGMs, including improved glycemia.⁹⁻²⁰ The 2024 American Diabetes Association (ADA) Standards of Care in Diabetes recommends CGM use for people with type 1 diabetes (T1D) or T2D using insulin in their treatment, including basal-only insulin regimens.²¹ A key addition to the 2025 ADA Standards of Care includes considering CGM use in adults with T2D on glucose-lowering agents other than insulin.²² Medicare has aligned CGM coverage criteria with these recommendations and extended it for problematic hypoglycemia as well, even in the absence of insulin therapy.²¹ Numerous organizations, including the Association of Diabetes Care and Education Specialists, recommend CGM use to support improved glycemia and the use of CGM metrics in diabetes management.²⁴ Despite the clinical, behavioral, and psychosocial benefits of CGM use in people with T1D and T2D, access is limited beyond endocrinology practices. A national survey of 632 primary care professionals (PCPs) demonstrated that only 38.6% of respondents had ever prescribed a CGM.⁷ However, the same study demonstrated that nearly three quarters of PCPs

were moderately or very likely to prescribe CGMs with additional resources.⁷

Virtual diabetes management has been shown to be an effective alternative to in-person diabetes care delivery, benefiting diabetes outcomes such as glycemia and perceived disease burden.²⁵ Remote monitoring is a form of telehealth that—by definition—occurs when the patient and care team are not present together for face-to-face care. Remote monitoring of CGM data, for example, can identify glucose patterns and enhance shared decision-making between the provider and patient.^{9,26} Recent research has shown that CGM use, when used in conjunction with telehealth visits and telemonitoring interventions, improves glycemic management and reduces diabetes distress.²⁷⁻²⁹ Virtual CGM initiation and data interpretation are also linked to increased patient confidence and engagement and can facilitate timely clinical care.^{10,30}

To address disparities in access to CGMs and extend the reach of CDCESs to primary care practices that did not have access to these critical resources, our team designed and implemented a virtual CGM Initiation Service (virCIS) where a CDCES played a leading and critical role, among other clinical team members. This article's objective is to describe the feasibility of implementing a virtual CGM service to help primary care practices enhance CGM usage among their patients with diabetes.

Methods

Study Design

virCIS was designed and implemented as part of a larger trial, described in Figure 1. The coprimary objectives of virCIS were (1) to provide virtual CGM initiation and interpretation services to patients with diabetes whose primary care practices chose to participate in virCIS while (2) concurrently educating and preparing the participating practices to undertake this work themselves, without virCIS, after completing their participation. The virCIS team consisted of several part-time multidisciplinary providers, including a registered dietitian nutritionist (RDN) CDCES,

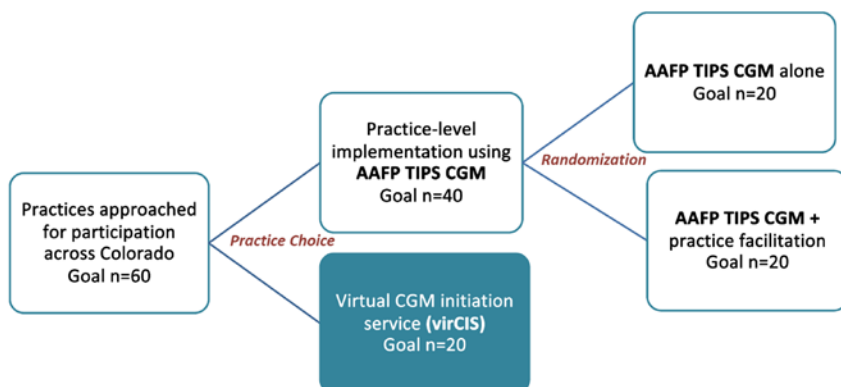


Figure 1. PREPARE 4 CGM study diagram.

two clinical pharmacists (PharmDs), two family medicine physicians, and several administrative staff who assisted with screening, scheduling, and managing patients' progress through the service visit schedule.

Protections

This project was reviewed and approved by the Colorado Multiple Institutional Review Board (Protocol 21-4269) and registered with ClinicalTrials.gov (NCT05336214).

Practice and Patient Recruitment

Practices were recruited broadly across the state of Colorado. Primarily, information about the study and recruitment were incorporated into newsletters shared with our robust, statewide network of practice transformation organizations, professional organizations, health systems, and primary care practices. Team members also provided information at events such as practice transformation organization meetings, a state health department forum for CDCEs across the state, and Colorado Medicaid regional diabetes programs. All attendees of events, members of newsletter lists, and organizations that expressed interest were sent an invitation to apply to participate.

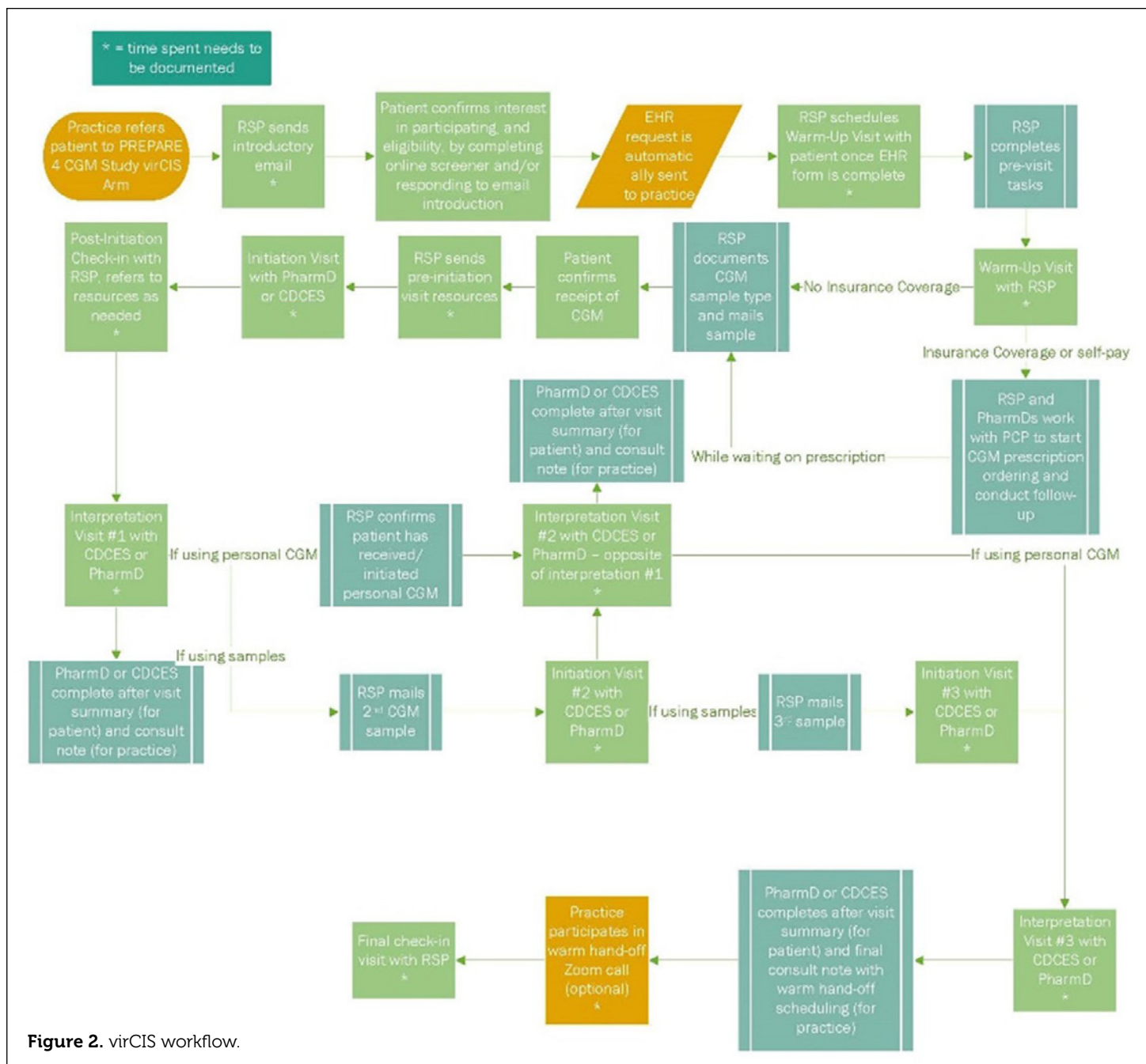
Only primary care practices in Colorado with an interest in learning to incorporate CGM use into practice workflows were included in the study. Practice access to refer to virCIS was triggered by a practice indicating their

preference to be trained on CGM implementation through the virtual referral service specifically (rather than the alternative of self-guided CGM implementation using standardized education, training, and implementation materials published by the American Academy of Family Physicians, which will be reported separately). Once practices enrolled PCPs and practice staff, who were invited to attend a 1-hour webinar focused on identifying patients who might benefit from CGM use, a brief introduction to best practices for prescribing, and a brief introduction to CGM data interpretation basics. PCPs from participating practices referred patients who they felt would benefit from CGM use to virCIS. Patient-level inclusion criteria included a diagnosis of T1D or T2D and ages 18 to 89 years. The virCIS team accepted all eligible referrals and initiated contact with referred patients.

virCIS Implementation

After patient referral by their PCP, initial contact was attempted through an introductory email; patients were then contacted by phone, email, and/or text message to complete screening to confirm eligibility and interest in virCIS, which was required before the visit process could begin. Figure 2 illustrates the workflow for patient recruitment, enrollment, visits, and follow-up.

Table 1 details the visit schedule for patients. The virCIS visit schedule started with a warm-up visit to orient the patient to the service and determine next steps regarding CGM type, ordering, and scheduling. If a patient appeared likely to qualify for insurance coverage for personal CGM based on their insurance plan's coverage criteria, the prescription process was initiated by virCIS team pharmacists, and a professional CGM sensor was offered by the virCIS team to get the patient started while waiting on the personal CGM approval and receipt through insurance. If a patient appeared unlikely to receive insurance coverage for a CGM, the patient was offered intermittent use of professional CGM sensors from the virCIS team. In both scenarios, the professional CGM was used in an unblinded



manner so that the patient was able to view their CGM data in real time. Regardless of CGM type, the visit schedule consisted of up to 3 CGM initiation visits and 3 CGM interpretation visits. In keeping with most insurance reimbursement allowances, professional CGMs could be initiated every 90 days, whereas personal CGMs could only be initiated once while a patient used that CGM system. Interpretation visits were spaced 30 to 90 days apart. The workflow was designed for each patient to have at least 1 interpretation visit with the virCIS RDN/CDCEs and at least 1 interpretation visit with a virCIS clinical pharmacist to ensure

emphasis on both nutrition and medication management. After each interpretation visit, patients received an after-visit summary, and a consult note was sent to their referring PCP.

The consult notes were specifically designed to provide meaningful clinical information while also sequentially introducing and advancing referring PCP knowledge and ability to undertake CGM management on their own by the time their patient(s) completed virCIS engagement. The first, second, and third interpretation visit consult notes therefore each had a unique template incorporating progressive levels of

Table 1. virCIS Visit Schedule and Details

Visit No.	Visit Topic and Timing	Provider or Staff	Visit Timing
1. Warm-up	Explain virCIS workflow and timeline, discuss patient questions about virCIS, and determine CGM best suited for patient. Determine if patient may be eligible for CGM prescription coverage, and if yes, initiate process.	RSP	Visit length: 15-30 min
2. CGM initiation 1	Initiate CGM and set up phone app or reader and connect to virCIS account.	RDN/CDCES or PharmD	Timing: As soon as patient receives CGM Length: 45-60 min
3. CGM interpretation 1	Interpret CGM data and discuss diet, physical activity, and DM medications. Goal setting for CGM and lifestyle changes.	RDN/CDCES or PharmD	Timing: 10-14 d after initiation 1 Length: 45-60 min
4. CGM initiation 2	Initiate second CGM sensor and adjust virCIS account connections as needed.	RDN/CDCES or PharmD	Timing: 90 d after initiation 1 Length: 15-30 min
5. CGM interpretation 2	Interpret CGM data and compare with interpretation visit 1. Adjust diet and physical activity and discuss DM medications. Goal setting for CGM and lifestyle changes.	RDN/CDCES or PharmD	Timing: 10-14 d after initiation 2 or 30 d after interpretation 2 Length: 45-60 min
6. CGM initiation 3	Initiate third CGM sensor and adjust virCIS account connections as needed.	RDN/CDCES or PharmD	Timing: 90 d after initiation 2 Length: 15-30 min
7. CGM interpretation 3	Interpret CGM data and compare with data from interpretation visits 1 and 2. Adjust diet and physical activity and discuss DM medications. Goal setting for CGM and lifestyle changes. Discuss transition of CGM care to PCP; offer warm handoff consult to PCP.	RDN/CDCES or PharmD	Timing: 10-14 d after initiation 3 or 30 d after interpretation 2 Length: 45-60 min

Abbreviations: CDCES = certified diabetes care and education specialist; CGM = continuous glucose monitor; DM = diabetes mellitus; PCP = primary care professional; RDN = registered dietitian nutritionist; RSP = research services professional.

provider-directed CGM education. For example, the first consult note introduced and explained the standardized CGM metrics along with their consensus targets for most people with diabetes alongside the referred patient's CGM metrics and an indication of which metrics were and were not meeting those targets. It also included information on which type of CGM was selected and why. The second consult note introduced the standardized 1-page Ambulatory Glucose Report (AGP), how to navigate it, and where to find each of the CGM metrics introduced in the first consult note. The referred patient's AGP report was presented along with indications of which metrics were and were not meeting targets. The note went on to introduce practical tips for prescribing CGMs and for billing for CGM-related services. The third consult note included options for the referring PCP to schedule a warm handoff visit with the virCIS team.

The virCIS team monitored referral and participation rates regularly to identify areas for improvement or bottlenecks in the process. Team members met weekly to discuss emerging challenges and identify solutions using rapid cycle quality improvement. The agility to do this stemmed from a small, focused team and a patient-centered approach.

Data Analysis

Descriptive summary statistics were generated for practice and patient outcome measures and were produced using Microsoft Excel.

Results

Outcome measures and sources are detailed in Table 2. Of 22 primary care practices across Colorado that actively participated in virCIS, 19 referred at least 1 patient to virCIS. As shown in Table 3, a total of 193 patients were referred to virCIS, with 137 indicating interest in participating

Table 2. Outcome Measures and Data Sources

Database or Assessment	Variable(s) Collected	Source of Data	Timing of Completion
Application and Project Management Database	Practice enrollment information: name, location, contact information	Application form completed by practice manager or director	Baseline
Practice Patient Recruitment Database	Patient name, contact information	Referral form submitted by practice	At time of patient referral
Patient Assessment Database: Screening Form	Eligibility, number screened and enrolled, etc	Surveys completed by patient (online) or by patient with assistance from RSP	At enrollment/consent
VirCIS Patient Database	Patient visit records EHR data—medications and medical history	Notes from patient visit, CGM data from either Libre or Dexcom website	At each visit

Abbreviations: CGM, continuous glucose monitor; EHR, electronic health records; RSP, research services professional.

and over half (102 of 193; 52.8%) attending at least 1 virCIS visit. Patients who initially expressed interest in participating in virCIS attended an average of 2.5 visits. Forty-two referred patients participated in all offered virCIS services, completing the 3 interpretation visits that were available to them through the service.

Patients were able to opt out of the initiation visit process if they reported feeling confident in safely and effectively inserting their CGM sensor on their own; this was often the case for patients using personal CGM devices after their first initiation visit with the virCIS team. Sixty-two patients attended a first initiation visit, and 25 and 16 attended a second and third initiation visit, respectively. Thirty-nine percent of patients (16 of 41) who were offered a third initiation visit chose to attend one.

Fifty-three patients who responded to initial outreach attempts were withdrawn without completing a warm-up visit, and 28 were

withdrawn after the warm-up visit but before completing an initiation visit. The most common reason (54 of 92; 59%) for patient withdrawal was becoming lost to follow-up simply due to lack of engagement, where a patient did not respond to outreach after 4 contact attempts using a combination of all available contact methods. Other reasons included declining to participate (often due to inability or lack of desire to use the requisite technology), being ineligible to participate due to age or diagnosis, the PCP rescinding their referral, or data inaccuracies (eg, duplicate referrals or inaccurate contact information provided by the PCP). Table 4 displays the frequencies of reasons for withdrawal of referred patients.

A total of 158 professional CGM sensors were mailed to 75 unique virCIS patients throughout the course of the study, equating to an average of 2.1 sensors per patient who required them at any point during the study. Additionally, 15 patients

Table 3. Overall Patient Participation

No. of participating practices	22
No. of practices referring	19
No. of patients referred	193
No. of patients that had at least 1 virCIS visit	102
No. of patient visits (total)	343
No. of initiation visits (total)	103
No. of interpretation visits (total)	142
No. of patients that completed virCIS	42

Table 4. Reasons for Withdrawal

	Count
Lost to follow-up	54
Declined to participate	31
Ineligible	8
Primary care professional rescinded referral	5
Duplicate record	1
Inaccurate contact info	1

were loaned handheld readers by the study team as an alternative to the associated smartphone apps. The majority of those (52 of 75; 69%) who received professional CGM sensors from virCIS relied on these for CGM interpretation. In other words, these 52 patients were unable to obtain personal CGMs due to being unable to receive insurance coverage and/or reporting inability to afford the cost. Less frequently, patients reported that they received professional CGM sensors from their doctor's office, although this was not explicitly tracked for our purposes; thus, the number of patients for whom this was the case is unknown.

Discussion

Many primary care patients with diabetes stand to benefit from use of CGMs in keeping with recommended standards of care, but many practices lack the resources, staff, or training to provide CGM initiation and interpretation on their own.^{7,31} A separately reported assessment of 51 characteristics of practices participating in this study showed that the only characteristic associated with selecting participating in virCIS was having a CDCES on staff; among practices without a CDCES, exactly half elected to participate in virCIS.³²

The results from this study demonstrate that implementation of a virtual CGM initiation service is feasible and can benefit patients whose diabetes is managed in primary care settings by increasing their use of CGMs. Engagement in the program was high, with 86% of practices participating in virCIS referring at least 1 patient and 53% of referred patients completing at least 1 visit. Most patients who enrolled in virCIS received at least 1 visit with the CDCES, increasing the reach of CGM use and diabetes education. At a minimum, the use of professional CGMs enabled virCIS to provide intermittent CGM use to patients who would have otherwise had to pay out-of-pocket for the technology.^{33,34} This may be a particularly practical strategy for primary care practices to offer CGMs to their patients because the small cash investment needed can be recaptured

and surpassed by billing for the provided CGM services. Although 42 of 75 patients received all available virCIS offerings, more were introduced to CGMs through use of professional CGMs (n = 75) and/or completion of at least 1 interpretation visit (n = 55).

Limitations of this study include that it only enrolled primary care practices in Colorado, which may not be representative of the broader US primary care population. Additionally, practices that participated in virCIS did so by self-selection, not by randomization, which should be considered when interpreting the results reported here.

An overarching lesson learned through this project was to individualize the approach to meet each patient's needs. The requisite technology (HIPAA compliant, 2-way video capability, and CGM smartphone apps) proved challenging for some patients, but the virCIS team was able to identify patients who struggled with technology during the warm-up visit and recommend that those patients enlist a support person for their subsequent visits. Between the virCIS team and the patient's support person, patients were able to successfully activate their CGM sensor, and many felt confident enough after that point to not need their support person for future visits. Likewise, just 16 of 41 patients (39%) who were offered a third initiation visit chose to attend one, suggesting that most patients' confidence in using CGMs improved over time through their participation in virCIS. However, there were also patients who did not feel confident enough using their CGM's smartphone app or who did not have a compatible smartphone; for such instances, the virCIS team maintained a supply of CGM reader/receivers that could be loaned to patients instead, which we would recommend to anyone considering offering such a service. Communicating back to the patient's PCP was also often a challenge; despite confirming contact information at the beginning of the project, several providers stated they had not seen the consult notes the virCIS team had sent

to them in the manner requested. The team implemented several strategies to rectify this: Contact information was rechecked and updated, the option for secure emails was added in addition to secure faxing, and the native electronic health record (EHR) platform was used when possible, although this was only rarely the case due to the disparate nature of practices spanning multiple health systems across the state and therefore multiple EHR platforms.

Another lesson learned was that authorization for personal CGMs is challenging and time-consuming and can impact patient engagement. The loss of engagement from patients while waiting for their insurance to process and authorize their personal CGM was noted early during the regular team review of patient data and prompted the team to identify a solution: Patients were provided with a professional CGM sensor in order to complete their first initiation and interpretation visit while waiting on their personal CGM, before their enthusiasm could wane.

The results of this study provide initial evidence that a CDCES-led, multidisciplinary, virtual CGM service can be successful in helping primary care practices increase CGM use among their patients with diabetes. Further research is needed to see if this model can be replicated in other settings and to assess its effectiveness to improve patients' clinical outcomes. ■

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REDCap Use

Study data were collected and managed using REDCap electronic data capture tools hosted at the University of Colorado. REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing (1) an intuitive interface for validated data entry, (2) audit trails for tracking data manipulation and export procedures, (3) automated export procedures for seamless data

downloads to common statistical packages, and (4) procedures for importing data from external sources.

See Harris et al. Research electronic data capture (REDCap) - a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform.* 2009;42(2):377-381.

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Empowering Diabetes Care

The Intersection of Cultural Competence and Health Literacy

CONSTANCE BROWN-RIGGS, MSED, RDN, CDCES, CDN, ALEXANDRA HINTZ, PHARM.D, BC-ADM, HAN-HUNG (FLOYD) HUANG, PH.D, PT, JOSE JIMENEZ-VEGA, MD, BC-ADM, CDCES, BETSY RODRIGUEZ, MSN, BSN, CDCES, FADCES, ESTHER ROY-IPKPAH, MS, RN-BC, CDCES, PAULINA N. DUKER, MPH, BSN, RN, CDCES

With over 38 million adults in the United States having diabetes and another 98 million adults at risk for developing the disease, diabetes management is more urgent now than ever before.¹ The chronic nature of diabetes underscores the importance of diabetes self-management education and support (DSMES), which equips individuals with the skills and information that is necessary to improve their quality of life (QOL). However, disparities in health literacy, cultural understanding, and access to health care resources often prevent individuals from receiving the care they need.

Diabetes care and education specialists (DCEs) know that the most effective care is tailored to the unique needs of each person with diabetes. Yet the ability to understand and apply health information is profoundly influenced by health literacy, numeracy skills, life experiences, and social support networks—factors shaped by social determinants of health (SDOH), such as cultural background, socioeconomic status, and access to care.^{2,3} This article addresses the existing gaps and mitigators in culturally sensitive care and health literacy by focusing on how these elements influence diabetes management and outcomes in diverse populations.

Health Literacy

As health literacy research and practice have advanced, we have gained new insights. We now recognize that the responsibility for health literacy does not just lie with individuals but also with the organizations and professionals who create and deliver health information and services. This understanding has led to the distinction between personal and organizational health literacy.⁴



Personal health literacy is “the degree to which individuals can find, understand, and use information and services to inform health-related decisions and actions for themselves and others.”⁵ Besides core literacy skills such as reading and writing, making well-informed health decisions requires information seeking, cultural understanding, communication, critical thinking, and problem-solving skills.⁶ Quantitative skill, or numeracy, is another element of health literacy. Evidence suggests it is independently associated with disease-related knowledge, health behaviors, outcomes, and self-efficacy in diabetes and other contexts.^{6,7}

Organizational health literacy, which extends the responsibility of addressing health literacy to organizations, is defined as “the degree to which organizations equitably enable individuals to find, understand, and use information and services to inform health-related decisions and actions for themselves and others.”⁵

Over one-third of English-speaking adults in the United States demonstrated basic or below basic health literacy proficiency, and only 12% demonstrated proficient skills. Proficient skills are defined as understanding medical terms.^{8,9} This means approximately 90 million adults in the United States cannot understand medical terms, a necessary skill to help navigate the health care system and make well-informed health care decisions. Low personal health literacy may negatively affect health status, life expectancy, chronic disease self-management, and QOL. It is more common among older adults, nonnative English speakers, individuals with limited education or limited income, and members of racial and ethnic minority groups.¹⁰⁻¹² Furthermore, low health literacy specifically impacts diabetes management and has been associated with limited diabetes self-management skills and confidence, ineffective glucose management, and increased incidences of retinopathy.^{13,14}

Research regarding organizational health literacy is less extensive than personal health literacy. However, recent organizational health literacy assessments have demonstrated that the

demands required from health care systems tend to exceed organizational capacity, indicating there is room for improvement in the organizations’ ability to address health literacy.^{15,16} Organizations are negatively impacted by the association between low health literacy and increased health care utilization and costs due to higher hospitalizations and emergency department visits.¹⁷

Inadequate personal and organizational health literacy has significant implications for diabetes self-management. Health literacy can affect the ability of people with diabetes (PWD) to manage diabetes in several ways:

- how PWD interpret glucose readings
- how PWD calculate carbohydrate intake or insulin doses
- how PWD administer insulin
- how PWD understand nutrition principles and make food choices
- how PWD manage other medications
- how PWD problem-solve unexpected situations in diabetes management
- how PWD keep up with necessary health checks.

All these implications can directly affect glucose stability and, over time, lead to diabetes-related complications.

Determinants of Health and Health Literacy

SDOH encompass a wide range of factors that collectively shape an individual’s ability to acquire, understand, and apply health information. Addressing these determinants is essential for improving health literacy and reducing health disparities.¹⁸ According to a 2024 systematic review, there are linkages between SDOH and health literacy.¹⁸ Individuals from lower socioeconomic backgrounds often have reduced access to quality education and health information, which negatively impacts their health literacy and can lead to poorer health outcomes. Attaining higher education generally correlates with better health literacy, which equips individuals with the skills they need to comprehend and use health information

effectively.¹⁸ Conversely, limited education may hinder some individuals with basic health tasks, such as understanding prescriptions. Cultural factors further influence health literacy because language barriers and differing norms can impede effective communication with health care professionals (HCPs). Access to health care resources is essential; populations with limited access often face disparities in health literacy that exacerbate health inequalities.¹⁸

Research indicates that even individuals with high health literacy may experience poor health outcomes if they experience unfavorable SDOH, such as poverty, lack of access to health care, or residence in resource-challenged areas.¹⁹ This underscores the importance of SDOH and highlights the urgency of addressing them.

Cultural Influence

Cultural sensitivity is as critical as health literacy and numeracy sensitivity. It is more than a finite knowledge of cultural values, beliefs, customs, languages, thoughts, and actions. To gain relevant cultural insights, it is necessary to develop cultural humility.²⁰ This reflective process involves understanding one's biases and privileges, managing power imbalances, and maintaining a stance that is open to others in relation to aspects of their cultural identity that are most important to them. Cultural humility can help develop a mutually respectful and positive relationship among individuals (with diabetes) and HCPs.

Recent estimates show that more than 38.4 million people living in the United States have diabetes (11.6% of the US population). Additionally, 97.6 million adults, or 38% of the US adult population, have prediabetes.²¹ This public health epidemic has occurred in tandem with a shift in the American demographic landscape toward a high minority population.²² According to census data population projections, by 2045, White people will comprise 49.7% of the population, Hispanic people 24.6%, Black people 13.1%, Asian people 7.9%, and multiracial populations 3.8%.²² In comparison, the Centers for Disease Control and Prevention reports that the percentage of US

adults with diabetes is 15.1% American Indian, 8% Asian, 12.1% Hispanic, 12.7% Black, and 7.4% White, non-Hispanic.²¹ Minority groups are affected by diabetes at significantly higher rates compared to non-Hispanic White adults for multidimensional reasons.

Careful attention to cultural influences on self-efficacy and motivation is critical for fostering behavior changes among minority groups affected most by diabetes. These behavior changes facilitate improved clinical outcomes, health status, and QOL.² In 2015, 22% of the deaths attributed to diabetes were in the Hispanic population. By 2030, the percentage is expected to increase to 25%.²³ This underscores the need for cultural preparedness in the DCES of today and tomorrow in the areas of ethnicity, racial, and cultural sensitivity.

Impact of Low Health Literacy on Diabetes

In type 2 diabetes (T2D), observational studies suggest that individuals with low health literacy have less knowledge of diabetes and limited glucose management skills than individuals with higher health literacy.²⁴⁻²⁷ Moreover, adults with T2D and low health literacy are more likely to have a family or friend supporter also with low health literacy.²⁸

Additionally, a systematic review by Al Sayah et al²⁹ found consistent evidence of a positive association between health literacy and diabetes knowledge. Similarly, lower numeracy is associated with lower perceived self-efficacy and modestly higher A1C.^{24,30} The impact of low health literacy can be seen in individuals under the supervision or care of another individual with low literacy, such as children with type 1 diabetes (T1D). A study looking at 200 caregivers of children with T1D found that having a low health-literate caregiver as assessed by the Newest Vital Sign (a valid and reliable screening tool available in English and Spanish that identifies people at risk for low health literacy) resulted in significantly higher A1C.³¹

A systematic review of 15 randomized controlled trials suggests that health literacy-

driven interventions have a positive impact on glucose levels and self-management outcomes in individuals with T2D.³² In another randomized controlled trial, participants in an intensive diabetes disease management program that included literacy-sensitive elements had better glycemic outcomes than those who received usual care.^{24,30} In another trial, adding literacy- and numeracy-appropriate components to a diabetes education program resulted in greater improvement in A1C after 3 months compared with training that did not include those components. The difference between groups was no longer statistically significant after 6 months, which suggests that a longer literacy intervention period or ongoing support may be necessary to maintain its benefits.^{33,34} Trials of literacy and culture-sensitive interventions in ethnic minority groups such as Latinos have also demonstrated benefits.²³ A study by Schillinger et al³⁵ looking at 408 people with T2D found that individuals with low health literacy were 2 times more likely to have limited glucose improvement, with an A1C of 9.5% or greater. Additionally, these individuals were 2 times more likely to have retinopathy and almost 3 times more likely to have cerebrovascular disease. Although not statistically significant, there was also a positive association between having low health literacy and a higher risk of nephropathy, lower extremity amputation, and cerebrovascular disease.

From a cultural perspective, ethnic minority groups have lower insulin usage rates than White individuals.^{36,37} Beliefs and myths ranging from insulin implying failure or leading to more complications to lack of family support or religious obligations can all interfere with insulin usage rates.

Assessing Functional Health Literacy and Numeracy Skills

Assessing health literacy can be challenging because a person with low health literacy learns ways to adapt or compensate. It is incumbent on DCEs to assess a person's diabetes functional health literacy and numeracy skills because

these are essential skills to understand health information and implement successful diabetes self-management.

It has been shown that health literacy is a critical component of self-management and clinical outcomes.³⁸ Health literacy skills include functional, interactive, critical thinking, and numeracy.³⁹ A person with diabetes encounters many health-related daily activities requiring these skills, including understanding blood glucose levels, medication administration, and food choices.

Both informal and formal methods can be used to assess an individual's functional literacy and numeracy skills. An informal assessment may identify signs that a person has difficulty with reading and math. When asked to read or fill out forms, common responses from individuals with low literacy skills may include "I forgot my eyeglasses" or a request that an HCP review the material.

The expansion of e-health alternatives has broadened the information provided to and sought by PWD.³⁹ Health literacy extends beyond the basic skills of reading, writing, and numeracy to social and communication skills that enable the application of health information and empower the person to participate in their care.^{40,41}

Many rapid screening tests are available to formally assess health literacy. When selecting the tool to assess health literacy, the specialist needs to consider not only the properties of the test but also if it is disease-specific (diabetes) and how it will be administered (self-administered or interview). The specialist must also consider if it is appropriate for the person being assessed.³⁸ Research indicates that it is more beneficial when assessing health literacy to use a context, disease-specific tool, particularly in the case of diabetes.⁴² Examples of diabetes health literacy tools include the Rapid Estimate of Adult Literacy in Medicine short form⁴³ and Brief Health Literacy and Brief Print Literacy Screen,^{39,44} all of which can be administered in 5 minutes or less.

Although research indicates these tools are effective for assessing health literacy, they have

limitations. One key limitation is that these tools may inadvertently stigmatize individuals, particularly those who may already feel uncomfortable or embarrassed about their literacy levels.^{42,45} The potential for such stigmatization can create barriers, leading some individuals to withdraw or become resistant to participating in self-care education. To address this limitation, it is essential to approach using these tools with sensitivity and a person-centered mindset.⁴⁵ Ensuring confidentiality, using nonjudgmental language, and integrating literacy assessments into routine care can help alleviate discomfort. Specialists should be transparent about the purpose of these assessments, framing them as an opportunity for empowerment rather than a test or judgment. Offering tools that are culturally and linguistically appropriate for the individual can also increase comfort and engagement during the assessment process.

Diabetes numeracy is defined as a person's ability to understand and apply numbers in the context of acts of daily living and disease management. Understanding numeracy is a common challenge for PWD. It can go unidentified if it is not a part of the usual assessment. In diabetes management, numeracy is associated with a variety of daily self-care actions, including interpreting glucose monitoring results (self-monitoring and continuous glucose monitoring), medication administration, and dietary adjustments (carbohydrate and label reading). There can be difficulty with accurately calculating the carbohydrate content of a packaged snack, identifying glucose levels within range, and calculating an insulin dose based on blood glucose and carbohydrate content.⁴⁶

The Diabetes Numeracy Test (DNT) is designed to assess diabetes-related numeracy skills, helping measure a person's ability to manage daily diabetes care tasks such as calculating insulin doses and interpreting blood glucose readings. The DNT is available in a short format (5 items) and a long format (15 items), with higher scores reflecting stronger numeracy skills. In comparison,

those who received care at a diabetes center and/or from a DCEs were more effective at using numeracy skills in making medication adjustments according to their glucose readings than those under the care of a primary care professional.⁴⁶

Despite its value in assessing these essential skills, relying on numbers and calculations can cause anxiety or frustration, particularly for individuals with low numeracy abilities. This could lead to feelings of inadequacy that may affect their confidence in managing their diabetes.⁴⁷ To mitigate these concerns, DCEs must offer reassurance and emphasize that numeracy challenges are common and can be addressed through education and support.⁴⁶ For individuals who struggle, personalized educational interventions can help improve both their numeracy skills and their overall diabetes management outcomes.

Improving health literacy and numeracy is associated with improved self-care and self-efficacy, empowering improved clinical outcomes.^{24,29} However, improving self-efficacy is directly related to improved metabolic outcomes, including A1C.⁴¹ Attempts to address health literacy may be more effective as part of a collaborative, person-centered, evidence-based treatment approach—components of which may include shared goal setting, empowerment, focusing on problem-solving, and improving self-efficacy.^{41,47} Compared with a more traditional didactic model of diabetes education, these approaches emphasize interactive communication between individuals with diabetes and DCEs to develop a plan of care. Accordingly, they may be especially appropriate and effective in low health literacy populations because they encourage and empower people toward improved understanding of their disease and more active participation in their self-care.

Plain Language to Improve Health Literacy

Clear communication is essential in diabetes care and research, especially when managing complex conditions. Plain language is an established approach that reduces the complexity

of medical information,^{3,48} helping to bridge the understanding gap between DCEs and PWD. Studies show that low health literacy is linked to lower participation in medication-taking,⁴⁹ higher risks of rehospitalization,⁵⁰ and poorer patient outcomes.⁵¹

culturally appropriate manner, respecting the racial, ethnic, and generational differences that may affect how health information is interpreted.⁵⁴ This includes engaging the services of an interpreter for those not fluent in English.

The Language of Diabetes

In 2015, a task force was formed to discuss effective messages about diabetes and people with diabetes.⁵² The task force published recommendations highlighting 5 key principles for person-centered communication:

1. **Neutral and factual language:** Use language that is factual, focusing on actions, physiology, or biology without judgment.
2. **Stigma-free language:** Avoid language that carries stigma and ensure communication is respectful and supportive.
3. **Strengths-based language:** Emphasize the strengths and capabilities of individuals rather than their limitations. This approach promotes respect and hope.
4. **Collaborative language:** Foster collaboration between individuals and health care professionals through open and supportive dialogue.
5. **Person-centered language:** Use person-first language that prioritizes the individual over the disease, reinforcing their identity beyond diabetes.

It is important to recognize that certain words or phrases can convey bias—whether intentional or not. By consciously employing person-centered and strengths-based messages, diabetes care and education specialists can enhance communication and, ultimately, help people with diabetes achieve better health outcomes.

Using plain language simplifies communication, making educational materials easier to understand, which leads to more effective diabetes management and improved health outcomes.³ This is especially important given that 79% of US adults experience low health literacy.^{51,53} By using specific, clear, and accurate language, HCPs can enhance an individual's comprehension of the science and medicine behind diabetes care, fostering better self-management and overall health.⁵³ Key factors in assessing the effectiveness of plain language include clarity, design, and readability.

The following tips are recommended strategies for clear oral and written communication:

- Present the most important points first.
- Keep sentences short.
- Use headings and bullets to break up text and make the information less imposing.
- Incorporate images to clarify meaning for individuals with limited reading skills.

DCEs should strive to communicate in a

Teach-Back Method

Studies show that people with diabetes often retain only about half of the information shared during clinical encounters. However, retention and comprehension significantly improve with the teach-back method, where individuals are asked to restate in their own words the information provided.^{55,56} This evidence-based health literacy intervention promotes individual engagement in diabetes management, safety, and overall care quality.⁵⁵

By asking individuals to explain what they have been told, HCPs can assess understanding and correct any misunderstandings immediately, making this especially valuable when working with low-literacy groups.⁴⁷ Although effective, integrating the teach-back method into busy clinical settings presents challenges, including time constraints, lack of training, and potential discomfort for patients and staff.

To overcome these barriers, clinics can implement the following strategies:

- **Integrate teach-back into routine practice:** Make it a natural part of every patient interaction to streamline its use.
- **Provide focused training:** Equip staff with efficient techniques for using the teach-back method and create a supportive environment to ease discomfort.
- **Use written and visual aids:** Reinforce verbal communication with well-designed materials to support individual learning.

Addressing these challenges can make the teach-back method a more practical and effective tool in improving an individual's understanding and participation in care plans.

Cultural Competence, Sensitivity, and Humility

When health-related communication is both accessible and culturally sensitive, individuals are better equipped to manage their diabetes, leading to improved outcomes.⁵⁴ The growth of diverse populations has become a central focus in health care, prompting the expansion of the Campinha-Bacote model of care for cultural competence to include cultural sensitivity, competence, and humility.^{48,57} These 3 components are essential for creating tailored education and treatment plans that address individual needs. It is crucial to understand the differences between these terms because they are often used interchangeably but have distinct meanings (Table 1). By integrating all 3 attributes, HCPs can more effectively support diverse populations.

Competence refers to knowledge, humility is interpersonal behavior and openness to another person's culture, and sensitivity refers to the

dissemination of information based on factors unique to the specific person. Based on the QIAN curriculum, cultural humility emphasizes the importance of self-questioning, cultural immersion, active listening, and negotiation skills.⁶² The increased diversity in health care has led to a need to clarify the meaning of cultural humility and its importance in providing inclusive and optimal care.⁵⁷

In addition, culture, individual beliefs, knowledge, customs, and habits influence not only a person's behavior but also how they communicate. A person's culture is interconnected with how they communicate and interpret health information. It is important to adapt skills that can improve cross-cultural communication, which is defined as communication between those who have differing traits, such as age, nationality, race, gender, and sexual orientation.⁶³ It encompasses cultural variance in language, gestures, and body language. It is understanding how different cultures communicate and goes beyond speaking the language and knowing the meaning of the words; it is expanded to include situational contexts.⁶⁴ The following 5 cultural attributes can influence communication:

1. language
2. cultural norms and values
3. stereotypes (unconscious biases)
4. cultural beliefs
5. cultural body language, eye contact, and gestures.

Some ways to overcome these barriers are to attempt to use similar language and gestures, learn about the culture and their norms, and ask questions such as, "What do you know?"; "How do you feel about ___?"; or "What do you call the problem?" Considering cultural characteristics, including a person's beliefs, rituals, customs, values, and family structure, is important for developing and providing culturally specific and sensitive health care.⁶⁴ The ability to communicate cross-culturally is essential to providing education to diverse populations because it enables using proper verbal and nonverbal communication

Table 1 Cultural Terminology⁵⁸⁻⁶²

Term	Definition
Cultural sensitivity	The delivery of health information based on ethnic/cultural norms, values, beliefs, and social, environmental, and historical factors unique to specific populations.
Cultural competence	Knowledge and ability to work with a culturally diverse population irrespective of language, customs, beliefs, values, communications, and actions of people according to race and ethnicity.
Cultural humility	Ability to maintain an interpersonal stance that is other-oriented (or open to the other) in relation to aspects of cultural identity that are most important to the person.

styles across cultures. The American Diabetes Association defines person-centered care as “care that considers an individual’s comorbidities and prognoses; is respectful of and responsive to individual preferences, needs, and values and ensures the individual’s values guide all clinical decisions.”⁶⁵

The Association of Diabetes Care & Education Specialists (ADCES) has several resources to guide DCEs and other health professionals in navigating these topics so they are better equipped to provide culturally sensitive care. These resources include ongoing webinars; ADCES publications, including *The Art and Science of Diabetes Care and Education*; and an annual conference that regularly features diverse presentations on providing culturally sensitive care. DCEs may face challenges and barriers when attempting to provide culturally sensitive care. One major barrier could be language when communicating. For example, when attempting to provide education or have a conversation in an individual’s preferred language and being limited by the availability of a certified interpreter in that language (eg, even if using a translation service, there may not always be interpreters available in that specific language or dialect), DCEs may be limited in their ability to provide culturally sensitive care.

Despite challenges or barriers that may hinder providing culturally sensitive care, the importance of continuous professional development in cultural competence for HCPs cannot be overemphasized. Providing cultural competence training for HCPs can potentially help decrease some of the inequities found in health care.⁶⁶

eHealth Literacy Considerations

The availability of diabetes technology (eg, portals, smartphones, and mobile apps) offers growing opportunities to expand the reach of and follow-up health care for people with diabetes and related chronic conditions.⁶⁵⁻⁶⁷ This necessitates the need to evaluate SDOH and design various modes of technology for health literacy sensitivity. Literacy in health information technology is termed “eHealth literacy.”

eHealth is defined as the ability of people to use emerging information and communications technologies to improve or enable health and health care.^{68,69} Digital health literacy, or the ability to seek health information using digital technology, must be considered an important concept related to eHealth. In a study by Neter et al,⁶⁸ individuals who categorized themselves as chronically ill had significantly lower eHealth literacy scores. Other SDOH studies have shown an association between lower digital health literacy with older age, lower income, education, and employment status.⁷⁰ Not surprisingly, individuals with higher eHealth literacy reported having an increased understanding of their health status, symptoms, self-management principles, and self-care behaviors. Mackert et al⁷¹ surveyed 4974 adults, with an average age of 43.5 years, to determine the relationship between health literacy (assessed using the Newest Vital Sign) and the use of health information technology. The study concluded participants with low health literacy were less likely to use these tools, and those with greater health literacy had increased perceptions of ease of use and the usefulness of the tools. Study results indicated that health literacy is often not considered when designing technological resources and should be a focus to increase the benefit for all users.⁷¹ One study by Garner et al⁷² focused on the effectiveness of a culturally responsive mobile health (mHealth) educational application designed to improve diabetes health literacy. Results indicated that culturally responsive content improved T2D mHealth literacy.

Although eHealth literacy offers significant opportunities, there are considerable barriers that vary across demographic groups, including socioeconomic factors, age, education level, and cultural and linguistic challenges.⁷² Individuals from lower income backgrounds often lack access to technology, older adults struggle with digital interfaces,⁷³ and those with lower educational attainment may find it difficult to seek and interpret online health information. Additionally, many digital health resources are not culturally

tailored, which can alienate certain populations and create language barriers.

To address these challenges, strategies include developing culturally responsive eHealth resources, training HCPs in clear communication, enhancing accessibility features for users with disabilities, and engaging community members in resource development.⁷⁴ Continuous evaluation and feedback are essential for improving the effectiveness of eHealth literacy initiatives.

Addressing these barriers is crucial for enhancing health outcomes in chronic disease management, particularly diabetes. A person-centered, culturally sensitive approach is vital, including considerations for individuals with comorbidities and ensuring materials are accessible to those with low vision or hearing difficulties.⁷⁵ By using plain language and consistent messaging, we can empower individuals to take control of their health through the effective use of technology.⁷⁵

Conclusion

Many PWD encounter significant challenges related to low health literacy, which limits their ability to understand and apply the essential self-care behaviors necessary for maintaining target glucose levels and improving overall health. DCEs must address these limitations while adopting cultural humility by using clear and empowering communication strategies that enhance the understanding of health information and ultimately improve health outcomes. Effective approaches include using plain language, the teach-back method, and collaborative, evidence-based treatment strategies that actively engage individuals in their care. The recommended tools for implementing these strategies are listed under “Practical Resources.”

Call to Action

DCEs must prioritize health literacy and cultural sensitivity in diabetes management by actively integrating these communication strategies into daily practice. Developing ongoing training and resources to support this initiative is imperative to ensure health care teams are equipped to

deliver clear, person-centered care. By doing so, DCEs can empower people with diabetes to better navigate their health journeys and achieve optimal disease management.

Future Research Directions

There is a pressing need for further studies to evaluate the long-term impact of these communication strategies on health outcomes. Additionally, research should explore innovative tools and methods to enhance health literacy among diverse patient populations. Advancing these efforts can contribute to a health care landscape that promotes understanding and supports sustained self-management and improved QOL for people with diabetes.

Practical Resources

Association of Diabetes Care & Education

Specialists (ADCES): ADCES offers online courses and webinars that help health care professionals enhance their cultural competency. ADCES publishes professional diabetes publications, including **The Art and Science of Diabetes Care and Education, ADCES Diabetes Care and Education Curriculum, Review Guide for the Certified Diabetes Care and Education Specialist Exam, and Quick Guide to Medications.** Each year, the ADCES Annual Conference welcomes health professionals from around the world to share ideas and participate in multiple sessions dedicated to this important topic. Visit: adces.org/practice/tools---resources.

Vanderbilt University Center for Diabetes

Translation Research: Resources include the Diabetes Literacy and Numeracy Education Toolkit (DLNET), a comprehensive diabetes education guide designed for use with low health literacy. The DLNET includes 24 distinct modules covering different facets of diabetes self-management education, any of which can be used independently to support the learning needs of individuals. Visit: labnodes.vanderbilt.edu/resource/view/id/10654/communityid/1136.

Agency for Healthcare Research and Quality

(AHRQ): Provides a systematic review examining the effects of literacy on health outcomes. It

includes examples of interventions that have been tried to improve those outcomes. AHRQ also publishes the Health Literacy Universal Precautions Toolkit. Visit: www.ahrq.gov/health-literacy/improve/precautions/index.html.

Centers for Medicare and Medicaid Services—

Training & Education: Find toolkits, training materials, and guidelines/tutorials on how to create written documents suitable for low-literacy audiences. Visit: cms.gov/training-education/learn/find-tools-to-help-you-help-others.

National Network of Libraries of Medicine:

A listing of resources about the prevalence of health literacy-related problems and their impact on health and economic outcomes. Includes links to a variety of resources for addressing health literacy-related problems. Visit: nnlm.gov/initiatives/topics/health-literacy.

ADCES's Speaking the Language of Diabetes:

Language guidance for diabetes-related conversations, research, education, and publications. Visit: www.adces.org/docs/default-source/handouts/culturalcompetency/handout_hcp_cc_diabeteslanguage.pdf?sfvrsn=4a3a6359_25.

Diabetes self-management education and support (DSMES) toolkit: Comprehensive resources DCESs can use to enhance their delivery of DSMES. The toolkit offers multiple resources, visuals, and reminders for delivering DSMES to populations and individuals with different levels of health literacy and English-language proficiency. Visit: cdc.gov/diabetes-toolkit/php/patient-referral-process/index.html.

DSMES Promotion Playbook: Provides a cohesive and recognizable way of addressing DSMES. The DSMES Promotion Playbook consists of plain language descriptions of resources; a library of 150 images; templates for flyers, postcards, posters, and digital advertisements; and ideas for recruitment support and outreach. Visit: cdc.gov/diabetes-toolkit/php/marketing-resources/promotion-playbook-overview.html.

National Diabetes Prevention Program (DPP):

Provides an overview of the National DPP lifestyle change program for individuals at risk of type 2

diabetes. Visit: cdc.gov/diabetes-prevention/index.html.

Path 2 Prevention: An interactive resource for individuals at risk for type 2 diabetes. Interactive activities include videos, games, and personalized information to reduce the risks of type 2 diabetes. Visit: diabetesp2prevention.cdc.gov/.

Diabetes Kickstart video series: Short, animated videos focusing on the ADCES7 Self-Care Behaviors for optimal diabetes management. Visit: cdc.gov/diabetes/diabetes-tv/diabetes-kickstart.html. ■

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It Takes a Team

JANICE MACLEOD , MA, RD, CDCES, FADCES

My career in diabetes began in my first postinternship job. Just out of training, I was offered a job as a diabetes dietitian at a large teaching hospital in rural southwest Virginia. While at the time I did not think I wanted to specialize in diabetes, I decided to take the job because there were numerous dietitians employed at the hospital in various specialized roles, so I knew in time I would be able to move into other roles as positions became available.

What I did not count on is that being a dietitian focused on diabetes would become much more than a job. It became a career, and at some point, not too many years in, I realized it had become a calling. One year after I began my “job,” the CDE exam was offered for the first time. I had to wait 1 more year to accumulate enough practice hours to be eligible before becoming a certified diabetes educator in 1987. All these years later, I remain in diabetes care now as a certified diabetes care and education specialist. From the newly diagnosed families to an elderly man sitting by himself in his hospital room repeating over and over again that diabetes made no sense, I found that being there to help people navigate the difficult challenge of living with diabetes was tremendously rewarding.

Diabetes care and education specialists bring their expertise and experience, their knowledge of the evidence and the standards of care, but they also recognize there is another expert in the room. That is the person with diabetes who is the expert in living their life with diabetes. It is where these areas of expertise overlap that we find our answers and solve our problems—together. That is called “shared decision-making,” and it is how we learn to dance together. Helping people with all kinds of backgrounds and experiences and educational levels to discover the answers within themselves is an energizing experience.

I have also so appreciated the opportunity to function as a valued member of a multidiscipline team. In that first “job” as an entry-level dietitian, the endocrinologist, nurses, exercise specialists, psychologist, and the dietitian (me!) met weekly to try to figure out together the best treatment approach for the people with diabetes we were serving. In so doing, a solid foundation of diabetes knowledge and expertise was built that has served me well over the years. We learned together about new therapies and new technologies and benefited from each other’s areas of expertise and experience. I spent countless hours in the medical library in those early days trying to learn all that I could to best help people with diabetes be successful self-managers—and to keep up with the team! Becoming a member of ADCES and frequently attending annual meetings also helped me develop my skills, and the organization became a strong support network. The first annual meeting that I attended was held in Dallas back in the late ‘80s or early ‘90s. A whole new world opened for me and the nurse educator I attended with. We returned to our diabetes clinic overflowing with ideas and enthusiasm.

I have had an amazing career pathway from direct person care to various roles in diabetes-related industry to forging new pathways in digital health and in smart insulin delivery and now as a consultant in the broader cardiometabolic health space. I have had the joy and privilege of working with and learning from internationally renowned diabetes care, education, and research experts. By far though, the best teacher is learning to listen, truly listen to those living with and affected by diabetes and related conditions. I would never have predicted back in 1985 when I started my first job that diabetes would become my life’s calling. It has been an amazing journey! ■

Janice MacLeod, MA, RD, CDCES, FADCES, is with Janice MacLeod Consulting in Glen Burnie, MD.

Janice MacLeod  <https://orcid.org/0000-0001-8689-4938>

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From Self-Help to High-Touch

ANGELA F. FORD, PHD, MSW

When Byllye Avery founded the National Black Women's Health Project (dba Black Women's Health Imperative [BWHI]) over 40 years ago, she believed "Black women want to feel a sense of community" to address personal, emotional, and health-related issues. Ms Avery created that sense of community, bringing Black women together in "Self-Help" groups that incorporated and promoted the concept that health and well-being include physical, psychological, social, emotional, and spiritual components. They represented a strategy for Black women to empower themselves by acknowledging lived experience, actively pursuing wellness, supporting each other in addressing health issues, and helping each other make healthy decisions. Women told their stories in groups enriched by a vision of self-healing and self-empowerment, with expression of feelings encouraged. BWHI's High-Touch Coaching adapts self-help values guiding and defining our direct service programs. To provide personalized support, lifestyle coaches learn important things about each participant and what challenges exist for them, including perceived support, self-efficacy, and the woman's ability to actually make the changes they seek.

As described in the *Journal of Women's Health*,¹ Ms Avery's belief was illuminated during

the first year of our Centers for Disease Control and Prevention (CDC) partnership. Women were not meeting the 5% weight loss goal, and maintaining fidelity to the CDC curriculum didn't allow delving into issues that were directly and greatly impacting not only their weight but also their health in general. We created supplemental sessions to address those unique issues. During coach-facilitated sessions, women organically created a sense of community based on a common lived experience that allowed them to support each other not only during the scheduled sessions but also between sessions and after the yearlong program ended. Expressions of personal transformation during those sessions were the motivation for adapting and culturally tailoring diabetes programs appealing to Black women and for creating the first CDC-approved curriculum culturally tailored for Black women.¹ Upon further exploration, we learned that Black women had the poorest outcomes in the original Diabetes Prevention Program research study.² As documented in numerous studies, Black women are more overweight and have greater difficulty maintaining weight loss than do White women. University of Connecticut identified not addressing their unique needs as a reason many programs are not successful for Black women.³

BWHI has learned a great deal from Black women over the past 40 plus years. Program interventions must be culturally relevant. As confirmed in the recent PICORI study, Black women are more successful with culturally tailored weight loss programs.⁴ Coaches must first create a safe space within the group, helping women develop a sense of connectedness, belonging, and well-being. Black women can thrive in groups where there is trust; they can be themselves, be vulnerable, know that both the coach and other participants “get them,” and they don’t have to explain themselves, their culturally related food preferences, or their religious, spiritual, or health beliefs. Our coaching model expands the general concept of lifestyle coaching, making it more relational and applicable to Black women. What also empowers them and increases self-efficacy is placing equal—and often greater—value on nonscale victories and their emotional wellness. Black women need to understand how their higher levels of cortisol result in chronic stress, greatly impacting their weight and their overall health.⁵ The group experience helps many women realize they have more authority over their lives than they thought. For some, that means recognizing the need for therapy or other medical intervention. This is a theme often addressed during one-on-one sessions with the coach. Many women indicate that the program is life-saving and that they will be friends with the other women in their groups for life.

As a CDC-designated national training entity for the National Diabetes Prevention Program, BWHI trains lifestyle coaches in our High-Touch model. This is a resource that diabetes care and education specialists affiliated with CDC-recognized organizations can take advantage of

to add to their portfolio of care when working with all patients and more specifically with Black women, who may respond more positively when the care is personalized, culturally tailored, and responsive to their unique needs. For more information on High-Touch Coaching and opportunities for training, individuals are encouraged to visit our website: coachtraining.bwhi.org. They can also email our training team at changeagency@bwhi.org with questions regarding future training opportunities.■

Angela F. Ford, PhD, MSW is the Executive Vice President, Chronic Disease at the Black Women’s Health Imperative in Atlanta, Georgia.

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How an EHR Dashboard Transformed DSMES Data Collection—Experience, Insights, and Advice From an ADCES-Accredited Program



Data collection for annual status reports (ASRs) can be challenging for accredited and recognized diabetes self-management education and support (DSMES) services. Joycelyn Ashby Cornthwaite, MBA, MS, RD, LD, CDCES, is the DEAP quality coordinator in the Department of Obstetrics, Gynecology, and Reproductive Sciences at UTHealth Houston and manager for the UT Physicians-Women's Center Diabetes Program. She and her team have successfully built an electronic health record (EHR) dashboard. She shares her experience, insights, and advice.

1. What led up to the decision to pursue a dashboard?

With the growth of our program, the decision was made to move from purely

manual data collection to working with IT to request reports. The project champions for the team were Chery Hughes, RD, LD, CDCES, and Gladys Ortiz, MS, RD, LD, CDCES. We initially focused on structuring clinical notes in EPIC to ensure that data were captured in a standardized format. However, we quickly realized that free-text documentation, although flexible for clinicians, could not be automated. This meant that data extraction for accreditation reports was still highly manual, requiring IT intervention and substantial time investment.

Once we realized that using free-text notes had limitations, we switched to using specific data fields instead, which allowed

automation while preserving personalization options where needed. With structured data in place, we began requesting manual reports from IT, thinking this would be a sustainable approach. However, it became clear that each report had to be requested individually every year, making it an inefficient and reactive process.

At this stage, our EPIC Business Intelligence Technical Specialist proposed a dashboard as a more permanent, self-service solution.

2. Can you describe the dashboard that was created and the information it captures?

The Diabetes Education Accreditation Dashboard, developed within EPIC, was designed to streamline DSMES accreditation reporting and reduce the burden of manual data collection. It is a report summary screen that provides real-time tracking of patient engagement, clinical outcomes, and accreditation compliance, allowing DSMES managers to monitor program performance, track A1C trends, and identify opportunities for quality improvement.

Unlike our previous manual reporting process, this dashboard enables DSMES managers to select date ranges, generate reports on demand, and monitor program trends in real time. The ability to access data instantly, rather than waiting for IT-generated annual reports, has transformed the way we manage and optimize DSMES programs.

3. How do you use the data that your dashboard provides?

Initially, the dashboard was created to automate ASR reporting, but its impact has extended far beyond that. It now helps us monitor program performance, optimize staffing, and drive quality improvement initiatives.

With real-time access to population

health data, we can proactively identify resource needs and tailor interventions accordingly. The ability to track patient engagement trends has improved resource allocation, allowing us to deploy staff more effectively or verify the need for additional staffing. Instead of just collecting data for accreditation, we now use it to enhance programming and improve patient outcomes.

4. Whose support did you need to pursue the creation of the dashboard?

The project required collaboration from multiple internal teams:

- a. EPIC business intelligence application specialist (liaison role): Acted as the bridge between DSMES staff and IT, ensuring clinical needs and DSMES workflow needs were effectively translated into technical requirements.
- b. EPIC business intelligence technical specialist: Led data extraction, dashboard architecture, and automation processes to ensure real-time functionality.
- c. DSMES program clinicians and manager: Defined accreditation and reporting requirements, ensuring compliance and usability.
- d. Leadership and IT leadership: Provided resource allocation and institutional approval to support dashboard development.

5. What did the process of building the dashboard look like?

It took a total of 9 months to build the dashboard. The process consisted of 2 phases and involved the EPIC business intelligence application specialist (liaison), the EPIC business intelligence technical specialist, and the DSMES manager/quality coordinator. To guide phases 1 and 2, the technical team utilized a business requirements document process. The

purpose of this process was to understand the needs of the DSMES program and translate those needs to development. This process allowed for back and forth between the DSMES team and the technical team to refine requirements, answer questions, and gather feedback.

Phase 1 focused on curating the reports needed to capture all of the necessary clinical and DSMES reporting data. This phase spanned over 8 months and required monthly meetings with the team.

Phase 2 focused on compiling each report from phase 1 into the dashboard so that the data would be in one place. This phase spanned the course of 4 weeks, and during this time, the team met weekly and did multiple rounds of testing to ensure that the correct information was being captured. There was also consistent email communication between team members throughout this time, which was critical in allowing the work to continue and be completed quickly.

Ultimately, we were able to develop an embedded dashboard in EPIC that provides real-time, on-demand reporting capabilities, which eliminated the need for manual report requests.

6. What were the biggest challenges you encountered?

These challenges were not hindrances but moments of recognition that led to quick solutions due to the team's complementary expertise and commitment to improvement:

- Recognizing that free-text data could not be automated: Once we realized free-text fields could not be systematically extracted, we transitioned to discrete data fields, requiring retraining staff and updating documentation templates.
- Ensuring that IT could extract the correct data fields: The application specialist played a key role in translating clinical

needs into technical specifications that the technical specialist could implement.

7. Based on your experience building the dashboard, what were the key learnings?

One of our biggest lessons was recognizing that the dashboard should have been a design goal from the start. Had we anticipated its impact, we would have structured our clinical notes around the data needs of the dashboard rather than retrofitting them later. Using discrete data fields early on is essential.

Another key takeaway was the importance of having a dedicated liaison role. The EPIC business intelligence application specialist ensured seamless communication between IT and DSMES teams, preventing misunderstandings and ensuring that both groups remained aligned.

Securing leadership buy-in took less time than expected. Because accreditation already consumed excessive time, leadership immediately saw the efficiency gains and supported the initiative.

Lastly, we learned that recognition is the first step to resolution. Because our team was curious and committed, once we identified a challenge, solutions were often found quickly.

8. What advice do you have for other quality coordinators that may want to pursue building their own dashboard?

- Start with the right data structure—free-text data is a barrier to automation. Use discrete data fields to ensure seamless reporting.
- Engage IT early and establish a liaison role to bridge the gap between clinical workflows and technical requirements. This will help prevent miscommunication and accelerate development.
- Rather than trying to build everything at once, take an iterative approach—start

with key ASR outputs, test the system, and refine functionality based on feedback.

- Position the dashboard as more than just an accreditation tool. Leadership buy-in is much easier when framed as a solution that reduces workload, improves efficiency, and enhances care.

9. How can a DSMES program get started with replicating or adapting a dashboard?

Engage IT early and identify a dedicated liaison—such as our business intelligence

application specialist. Begin with manual reports before transitioning to a dashboard. Structure documentation with discrete fields from the start to enable automation and scalability.

I would like to acknowledge two early champions of this initiative: Cheryl Hughes, RD, LD, CDCES, and Gladys Ortiz, MS, RD, LD, CDCES, whose contributions played a key role in laying the foundation for this work. ■

If you would like to learn more about becoming an accredited DSMES program, contact deap@adces.org.

FROM

Educators TO Innovators

Part 1: The Case for Diabetes Care and Education Specialists in Clinical Inquiry

JORDEN RIEKE , BSN, RN, CCRN, MEGAN VISSER, PHD, REBECCA BARBER , PHD, RN, CPN, CDCES,
JENNIFER L. ROSSELLI, PHARM.D, BCACP, BC-ADM, CDCES, LISA LETOURNEAU-FREIBERG, MPH, RD, LDN,
MICHELLE F. MAGEE, MD, AND NANCY A. ALLEN, PHD, ANP-BC, FADCES, FAAN

Ideally, every clinical interaction is a steppingstone toward discoveries that could improve or transform our work as diabetes care and education specialists (DCEs). Clinical inquiry, or the systematic process of asking questions, investigating, and analyzing information, begins with our practice and with the lessons in diabetes self-management we learn every day from people living with diabetes.^{1,2} Although this might bring to mind an image of spending hours alone, poring over cumbersome spreadsheets of data, the reality is that clinical inquiry is as much of a team activity as our care and education.

In the first article in a 3-part series, we explore the concept of clinical inquiry and the benefits and opportunities it can provide DCEs. We also provide a practical overview of benefits and opportunities for the DCE to engage in clinical inquiry. The second and third articles in this series will provide more detailed information and examples of practical ways to get involved specifically in evidence-based quality improvement (EBQI) and research, respectively.

Clinical Inquiry and Its Importance in Diabetes Care and Education

The purpose of clinical inquiry in diabetes care and education is to improve practice and improve health outcomes. To answer clinical and practice-related questions with clinical inquiry, you can engage in 2 different approaches—EBQI or research.³ To determine if you should use an EBQI or research approach, you first need to explore what is currently known about your question.⁴ You do not have to take this step alone! Clinicians, health science librarians, and mentors with expertise in EBQI and/or research can help guide you in knowing whether EBQI or research is the right approach to answer your important clinical and practice-related questions. EBQI combines principles of evidence-based practice and quality improvement in one systematic and coordinated process to improve your practice or the delivery of care in your institution. The process of EBQI includes identifying clinical or practice problems, systematically using evidence and data, designing and selecting solutions using methods and tools,



and measuring practice changes over time.⁵⁻⁷ You might choose to conduct EBQI if there is sufficient evidence from the literature and from internal data within your institution to answer your clinical or practice-related question. In the second article in this clinical inquiry series, we will provide several key models of the EBQI process.

Research involves carrying out carefully planned and organized studies to discover new knowledge that can apply to a wider group of people beyond the individuals being studied.^{8,9} You might choose to conduct research if there is insufficient evidence to answer your clinical or practice-related question.¹⁰ Although other broad types of research exist, the DCES usually focuses on studies involving people, which is considered human subjects research.¹¹ In the third article in this clinical inquiry series, we will explain the key types of research that are most relevant to the DCES.

Table 1 summarizes some of the important features of clinical inquiry, distinguishing between EBQI and research and providing some examples relevant to the DCES. Keep in mind that after determining the appropriate approach, it is

important to work with the institutional review board at your institution to determine regulatory requirements before moving to the next steps.

The Role and Benefits of the DCES in Clinical Inquiry

A large body of evidence generated by EBQI and research initiatives emphasizes the value of diabetes self-management education and support (DSMES).¹² This evidence serves as the foundation for the National Standards for DSMES¹³ and for best practices used by the DCES across the spectrum of diabetes care and education delivery settings to improve health outcomes.

The DCES is well positioned to engage in clinical inquiry. If you are a DCES, you are already translating evidence into practice. Evidence that has resulted from previous EBQI and research are used as you deliver care and education in inpatient, outpatient, and community settings. However, you may discover that you have clinical or practice-related questions that have not yet been answered with EBQI or research. This is the time to raise your questions in your practice

Table 1. Clinical Inquiry Definitions and Information.^a

	Research	Evidence-Based Process	Quality Improvement	EBQI
Definition and purpose approach	A systematic scientific investigation designed to develop or contribute to generalizable knowledge using rigorous methodology. Generalizable knowledge applies beyond the specific individuals being studied.	Using the best available research/evidence, clinical expertise, and patient values to enhance health care quality, improve patient outcomes, and reduce costs	A systematic approach using internal data-driven evidence to standardize processes and structures to achieve predictable results and lead to measurable improvement in health care services and the health status of targeted populations within a specific health care system or organization	Differs from QI in that EBQI uses internal data-driven evidence and involves a systematic literature search for and critical appraisal of evidence. Aims to systematically integrate research evidence and methods along with internal evidence into the QI process.
Literature review required	Extensive	Extensive If no evidence exists, no practice change is needed.	No, use internal data-driven evidence.	Yes, use external data and internal data-driven evidence.
Institutional review board approval	Yes	No, use a health care improvement self-assessment process.	Not typically, but consult your institution's policies for determining the level of approval needed.	Not typically, but consult your institution's policies for determining the level of approval needed.
Implications for practice	Understanding change Provide evidence to support clinical practice, which ultimately affects the care of patients, individuals, and populations.	Practice change Change practice by integrating findings from research.	Process change/improvement Improve patient care processes in a specific unit or organization or cost-effectiveness.	
Example	Research study: What is the best thing to do? Research question: Does a CGM improve diabetes outcomes in insulin-requiring older adults compared to standard diabetes education?	EBP project: Are we doing the best thing? Clinical practice question: For low-literacy patients with diabetes, what is the best practice for teaching them about healthy eating?	QI initiative: Are we doing the best thing at the right time in the right way? Clinical question/problem: A sharp increase in people getting COVID, flu, and pneumonia was identified in our practice. Does our practice comply with EBP immunization recommendations for people with diabetes?	
Outcomes	Outcome: A randomized controlled trial was used to test the effects of the intervention. The CGM with data-sharing intervention improved time in range.	Outcome: After synthesis of the literature and research, it was identified that best practices include: (1) using the healthy plate method, (2) including pictures that reflect cultural preferences, (3) using simple words, (4) using the teach-back method to check understanding.	Outcome: Practice procedures, protocols, policies, immunization rates, and provider and DCES recommendations were evaluated. The immunization procedures, protocols, and policies were followed only 24% of the time, and provider and DCES education resulted in 87% of people in the practice receiving EBP recommended immunizations.	

Abbreviations: CGM, continuous glucose monitor; DCES, diabetes care and education specialist; EBP, evidence-based practice; EBQI, evidence-based quality improvement; QI, quality improvement. The Role and Benefits of the DCES in Clinical Inquiry

setting and consider whether your questions can be answered with EBQI or research!

Getting involved in clinical inquiry is beneficial for the discipline of diabetes care and education. When the DCES engages in EBQI or research, they can reflect on ways to improve their practice and the care of people living with diabetes. Another benefit is enhancing teamwork through interdisciplinary collaboration among health care professionals and other stakeholders. Getting involved in clinical inquiry can also fuel DCES job satisfaction by creating a sense of connection and purpose to care, and it can enhance respect for the discipline and for the work of individual DCES.

Practical Ways to Engage in Clinical Inquiry as a DCES

Several opportunities are available to get involved with clinical inquiry! A few common options for involvement are the following:

- **Documenting what you are already doing in clinical practice.** There may be general areas of clinical practice that you would like to share with the broader DCES community. For example, perhaps you have learned a new strategy or technique to improve engagement in diabetes care and education or to make technology more accessible for vulnerable people living with diabetes. These are likely areas that other clinicians would be interested in as well. Consider ways you can share this knowledge informally, such as posting your experience on an [ADCES Community of Interest platform](#) or formally by publishing an article in a journal like *ADCES in Practice*.
- **Submitting your own educational or research session abstract to the annual ADCES conference.** The [ADCES annual conference](#) and other diabetes-focused conferences are a great place to learn about diabetes EBQI projects and research studies. Educational and research session ideas are accepted for the ADCES annual conference, as are original educational abstract and research abstract submissions. Either option

is a great choice for showcasing your own research and knowledge! Research and educational session proposals typically close in January. If you would like the opportunity to present at the annual ADCES conference, you can submit a brief abstract outlining what you would like to present. Research and educational abstract submissions typically close in July. Abstracts may be selected for poster or oral presentations. Visit the [conference website](#) for information about submitting your work to be presented! By maintaining active ADCES membership, you can update your communication preferences for regular communications about upcoming events and opportunities to engage.

- **Participating in an EBQI project or research study related to a topic of interest to you.** This is the time to consider your clinical or practice-related questions and start talking with others about their interest in pursuing answers to these questions using EBQI or research. In the second and third articles in this clinical inquiry series, we will describe how to make getting involved in EBQI projects or research studies more approachable.

Conclusion

Clinical inquiry is a valuable avenue for the DCES to enhance their practice and contribute to the science of diabetes care and education. Through 2 clinical inquiry approaches—EBQI and research—the DCES can address unanswered questions, collaborate across disciplines, deepen their sense of purpose in their care, and strengthen respect for their discipline. Join us in the next 2 articles in this clinical inquiry series of *ADCES in Practice* as we explore practical information that can support you in getting involved in either EBQI or research and making a lasting impact! ■

Jorden Rieke, BSN, RN, CCRN, is a predoctoral fellow at the Frances Payne Bolton School of Nursing, Case Western Reserve University in Cleveland, OH; Megan Visser is a postdoctoral fellow at the Children's Hospital Los Angeles in Los Angeles,

CA; Rebecca Barber is a research nurse scientist for the Institute for Nursing and Interprofessional Research at the Children's Hospital Los Angeles in Los Angeles, CA; Jennifer Rosselli is a clinical professor at the Southern Illinois University Edwardsville School of Pharmacy in Edwardsville, IL; Lisa Letourneau-Freiberg is employed at the University of Chicago in Chicago, IL; Michelle Magee is the director of the Medstar Diabetes Institute in Washington, DC; Nancy Allen is an associate professor at the University of Utah College of Nursing in Salt Lake City, UT.

Declaration of Conflicting Interests

Jennifer Rosselli-Lynch serves on the Diabetes Care and Education Specialists Advisory Council for Medtronic, Inc.

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Jorden Rieke  <https://orcid.org/0000-0001-6813-9699>

Rebecca Barber  <https://orcid.org/0000-0001-6084-3657>

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Bridging the GAP

Effective Diabetes Management in Rural Areas

TAMMIE PAYNE, CRNP, MSN, RN, BC-ADM, CDCES, CPT, FNP-C

Editor's Note: The [ADCES Awards Program](#) annually recognizes excellence in diabetes care and education and honors members' service to the Association and the larger diabetes community. Each recipient has a story to tell and practical advice to share.

Being nominated for the 2024 Donna Tomky Excellence in Clinical Practice award was an honor, but being selected was a privilege. Donna was a nurse practitioner whom many of us in the diabetes space admired. I have a passion for diabetes management and offering the latest advancements in diabetes technology to rural Pennsylvania. Being recognized for my work through this award was truly humbling.

I was asked to write about the experience and challenges of being a "one-woman show" in a rural community. I started my career as a registered nurse in numerous capacities at my local rural hospital, where I was asked one day if I would be willing to take over the monthly DSME group classes. That started my career toward advancing my diabetes knowledge by becoming a certified pump trainer and traveling up to 4 hours round trip to attend ADCES PA WPLNG (Western Pennsylvania Local Networking Group) meetings

to gain connections with fellow DCEs and industry sponsors.

The fire was lit. My passion for the diabetes space continued to grow, and in 2014, I assisted in setting up a telemedicine service to obtain access to endocrinology for the rural community. The service started as 2 hours a month and expanded to 3 four-hour days a month. With limited resources and transportation issues, I convinced my hospital to expand my reach of DSMES to the community by providing a day per month at 5 primary care professional (PCP) offices (2 of them 25 miles from the hospital) to improve access to diabetes education.

Feeling limited in my ability to help individuals manage their diabetes completely, I returned to school to become a family nurse practitioner. Upon graduation, I convinced my health system to allow me to enhance access to diabetes care from a primary care office. Fast-forward 5

years, I obtained my BC-ADM to practice as a diabetologist, improving glycemic management in a small rural area.

With the limited availability of endocrinology services in rural areas, I focus on self-care management during every visit and integrate education. The incorporation of the [ADCES7 Self-Care Behaviors®](#) is discussed at each visit, and shared decision-making tools are established with each person. The individual determines which self-care behavior they want to work on until the next office visit.

I optimize clinical management and technology with every person to determine the best treatment options for optimal glycemic management. My office uses a person-centered approach that meets each person's needs and desires. Not everyone is receptive to enhanced diabetes technology and should be respected in their decisions. I can allow patients to trial continuous glucose monitoring therapies and insulin delivery devices to determine if they can manage the device before paying for a product they do not like.

Challenges I have faced include figuring out how to address a lack of resources and access to care. I am also sometimes challenged by other practitioners not recognizing me as a specialist in diabetes because I am not an endocrinologist. The controversy from practitioners led me to obtain the BC-ADM certification for the credibility of being board-certified. Providing diabetes management support through the latest technology options is just as crucial for those in rural areas as those in urban areas with access to endocrinology. It is rewarding and satisfying to provide the latest technology options to my patients while optimizing time in range.

Practicing in a rural area, you learn to be creative with care and more open to exploring different ways to meet with patients. Food deserts, limited resources, and a lack of transportation can be barriers that sometimes make for unique patient visits. I perform home visits to those having trouble coming to a physical office. These

are some of my favorite visits because you can see a person in their environment, what food sources they have in the home, and if additional resources are needed.

I care for a 35-year-old female who suffered a stroke that left her with cognitive deficits and mobility issues. She was discharged from rehab on a basal/bolus regime, but memory issues would sometimes cause her to forget if she gave her insulin doses, and sometimes, she would omit doses. She was also having difficulty with using a glucometer. At the first visit, we discussed easier delivery methods of insulin and ways to monitor glucose. Libre Pro was applied to obtain trends. Upon download, it was noted that she was having several episodes of hypoglycemia. At that visit, a v-go was applied along with Libre 2. In 1 week, she was experiencing minimal hypoglycemia events and was better able to follow an insulin regime due to ease of v-go use and continuous blood glucose viewing. This was 3 years ago, and she remains consistent with her regime and has maintained excellent glycemic management ever since.

Another patient I care for is a middle-aged gentleman who works as a preacher. When I first started seeing him, his glucose levels were often over 400 on Sundays prior to performing 3 church services, but he would experience hypoglycemia between services. He was not administering insulin as prescribed by his PCP due to labile blood sugars. On the first visit, we discussed and worked on consistency with insulin dosing, but after continuing to notice issues with insulin dosing due to the patient's fear of hypoglycemia, he agreed to try out an AID pump. Starting the pump assisted with less hypoglycemia, and we utilized activity mode and decrease in carbohydrates for the days he would be preaching or doing physical therapy. His A1C went from 8.5 to 6.4 with minimal fluctuations in glycemic management, and he now has more trust in diabetes devices and still uses the pump to this day.

Living in the community where I practice is a significant plus for me. Going to the grocery

store or the local Walmart or eating with my family usually entails meeting a few patients. A small community life is the best for making people feel comfortable to share their issues and concerns with you. Many say they feel heard and not just like a number. Rural health care is not for everyone, but I would not practice elsewhere. Living, practicing, and making a difference in the community in which you live is a fantastic feeling.

Key Takeaways

- Use a person-centered approach and understand the community you are working in—this is especially important in rural areas where resources may be limited.
- Where possible, at-home visits can give you a better idea of the environment in which

your client lives, which can potentially help better inform their care.

- Incorporate the ADCEs7 Self-Care Behaviors® into every visit! ■

Tammie Payne, CRNP, MSN, RN, BC-ADM, CDCES, CPT, FNP-C, is employed at UPMC Everett Primary Care Group, in Everett, PA.

Declaration of Conflicting Interests

Tammie Payne is on the speaker's bureau for Sanofi and is a certified pump trainer for Beta Bionics, Omnipod, Tandem, and Medtronic.

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The most important aspect of care for people with diabetes is to **listen and individualize their needs**. Hence practicing listening skills is very important. Try to work or volunteer in different areas of health care to understand the depths of this disease and to be able to help different clientele.

3 important things to know when you start out:

- **Be patient** and listen to what the person with diabetes has to tell you.
- **Be nonjudgmental**.
- **Know your community** and its resources in order to help facilitate all aspects of care for people with diabetes.

The best advice I have for the DCES early in your career is: remember to **research regularly**. Diabetes is ever-changing, and you will need to be well read and progressive. You will have to bring new innovation to your workplace, providers, and patients. Give yourself grace because there is only one of you and you can only do one thing at a time. Do not ever forget to meet the people you see where they are and stay patient centered. Always remember the person in front of you is made up of many things, more than just a blood glucose or A1C. 😊

Attend professional conferences in person, if possible; sit in the front row and ask questions.

Consider additional credentials within your discipline—I've found this extremely valuable—it adds a lot of depth to understanding complex situations.

Have fun by using props, music, and art in your teaching and presentations versus slides.

Get to know colleagues in other areas of health care professions such as respiratory therapists, podiatrists, occupational therapists, social workers, physical therapists, etc. I've learned so much from them.

Volunteer at schools, food banks, and conferences.

Be sure to **address all cultures and ethnicities** in your communities! Learn about culturally appropriate guidelines and recommendations and incorporate them into your education recommendations.

What's Your Advice?

We are starting a new column focused on sharing advice and ideas with one another. We will be posting questions in our monthly member newsletter and on our ADCES social media channels, such as Instagram and LinkedIn. When you see our questions, we hope you take a moment to share your advice!

Here's our first one: **What's your advice to the diabetes care and education specialist (DCES) who is early in their career?**

Thanks to everyone who sent their answers via email and social media!

Be sure to **stay updated on technology**. Visit danatech.org often to become more familiar with CGMs, AIDs, and how their algorithms work.

It is okay if you feel the imposter syndrome. You will learn and grow. Be the best you can be right now at this moment. **Don't be afraid to admit what you don't know**—it'll save you time and energy in the long run. Instead, offer to find the answer.

"Comparison is the thief of joy." I'm not sure who said it first, but it holds true. **Try not to compare yourself to other professionals** in the field. We're all running our own race—together!

Understanding diabetes and its related conditions is essential from a medical perspective. However, it is equally important to better **understand human behavior**. Spend less time on telling people what they should do and more time on asking curious questions, listening until it hurts, and finding out what is important to your patients—because that will lead to solving problems and setting goals that mean something to them. Address the psychosocial aspects of diabetes along with the clinical. You can do it with an open heart, understanding of behavioral psychology, and practice.

Get involved! I know it sounds cliché—but seriously, it's a game-changer. Surrounding yourself with people who are willing to mentor you, share their experience, and give you room to grow has been the most impactful part of my career so far. Don't be afraid to network, reach out, ask questions, and say yes to opportunities (even the scary ones). You don't have to know everything—just be open to learning and connecting. That's what makes all the difference.

Find mentors and other professionals that fully support your growth and can be cheerleaders for your professional growth. **Network and create opportunities for yourself** by just asking! Some of the professional experiences I enjoyed the most were opportunities that occurred because I pitched an idea and connected with the right individuals that could support me in making the idea come to fruition. Keep learning; there is never a day I don't learn something new.

Be patient. Patient with yourself, patient with the people you work with. **Find a mentor or peer to bounce** ideas, learnings, questions around with. Know even the smallest movement in understanding or change is progress!



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Test YOUR KNOWLEDGE

Note: Adapted from *Review Guide for the Certified Diabetes Care and Education Specialist Exam*, 6th Edition, (c) 2023. Association of Diabetes Care & Education Specialists. Reprinted with permission.

Answers appear on page 78.

- 1** Which of the following statements is true of insulin requirements during pregnancy?
 - A. Insulin requirements are lower in women at >150% of desirable body weight.
 - B. Insulin requirements increase dramatically after delivery.
 - C. Insulin requirements increase progressively throughout gestation.
 - D. Insulin requirements are increased during the first trimester of pregnancy.
- 2** Which of the following best describes the documentation of diabetes self-management education and support (DSMES)?
 - A. The DSMES plan, topic covered at each session, and the outcomes of the intervention are documented for each person.
 - B. Documentation should only occur upon completion of DSMES. It is a 1-time event.
 - C. It should capture immediate but not long-term outcomes.
 - D. As an education intervention, DSMES documentation is not protected by HIPAA.
- 3** A 63-year-old man with coronary artery disease, type 2 diabetes, and hypertension presents to the clinic. Which of the following would be the most appropriate antiplatelet recommendation to reduce the risk of macrovascular complications?
 - A. Aspirin 81 mg daily
 - B. Aspirin 325 mg daily
 - C. Clopidogrel 75 mg daily
 - D. Warfarin 5 mg daily
- 4** A 40-year-old man with type 2 diabetes for 3 years presents on his lunch break for diabetes education. Which of the following is most important for the diabetes care and education specialist to review with the man at this initial visit?
 - A. The economic impact of diabetes on the health care system
 - B. His family history of diabetes
 - C. His expectations and personal education goals
 - D. The pathophysiology of diabetes and its complications

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Test Your Knowledge Answers

Questions appear on page 76.

- 1. D:** Insulin resistance is lowest during the first trimester and increases throughout gestation, leading to increased insulin requirements. Insulin requirements drop dramatically following delivery.
- 2. A:** Standard 5 of the National Standards for DSMES states DSMES plan, topics covered at each session, and the outcomes of the intervention are to be documented in the DSMES record for each person. This documentation provides evidence of person-centered DSMES and communication among other members of the person's health care team. Documentation must occur at every step in the DSME process. (B). Documentation should capture immediate, intermediate, postintermediate, and long-term outcomes (C). DSMES documentation is protected by HIPAA (D).
- 3. A:** Aspirin 81 mg daily is correct. This man with coronary artery disease and diabetes is at high risk of future coronary events and would benefit from aspirin therapy. Inhibition of platelet aggregation requires only small doses of aspirin, 75 to 160 mg daily; higher aspirin doses inhibit prostaglandins and relieve pain (B). Clopidogrel is useful in those individuals who do not tolerate aspirin but is considered second line (C). Warfarin inhibits vitamin K-dependent clotting factors but is not useful in prevention of coronary artery disease (D).
- 4. C:** Assessment is the first step in the process of providing diabetes education. By understanding what concerns, needs, and priorities of the person with diabetes are, he and the diabetes care and education specialist can collaboratively establish a DSMES plan that will assist the individual to meet desired outcomes. Health care system issues are not germane to this visit (A). Both B and D may be important issues to cover but do not need to be addressed in the first visit.

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Corrigendum to “Empowering Diabetes Care: The Intersection of Cultural Competence and Health Literacy”

Brown-Riggs C, Hintz A, Huang H-H (Floyd), Jimenez-Vega J, Rodriguez B, Rov-Ikpah E, Duker P. Empowering Diabetes Care: The Intersection of Cultural Competence and Health Literacy. *ADCES in Practice*. 2025.
doi:10.1177/2633559X251321793

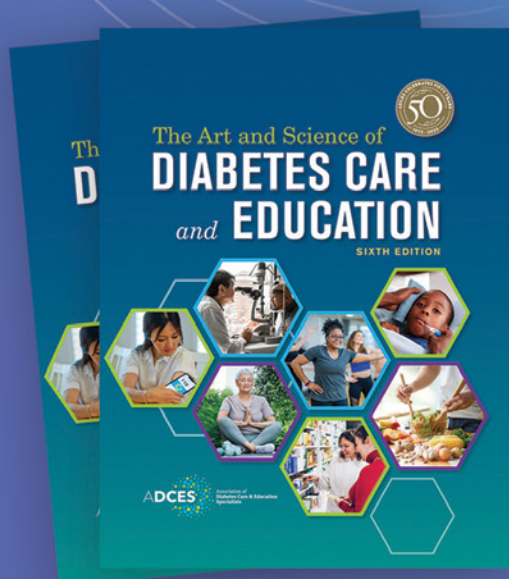
In the published version of the article, the author “Paulina Duker” was inadvertently omitted. The correct list of authors is:

[Constance Brown-Riggs](#)
[Alexandra Hintz](#)
[Han-Hung \(Floyd\) Huang](#)
[Jose Jimenez-Vega](#)
[Betsy Rodriguez](#)
[Esther Rov-Ikpah](#)
[Paulina Duker](#)

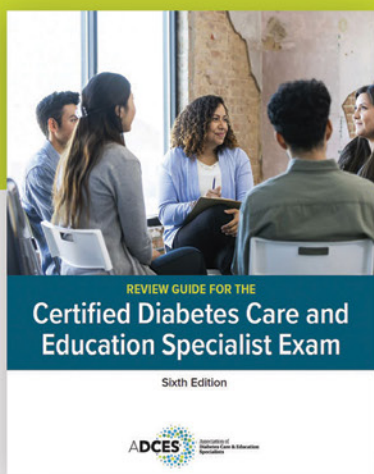
The article has been updated online to reflect this change.

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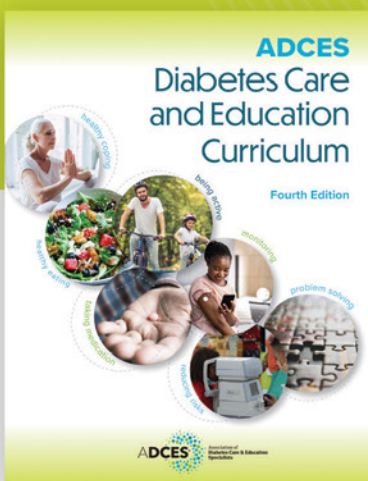
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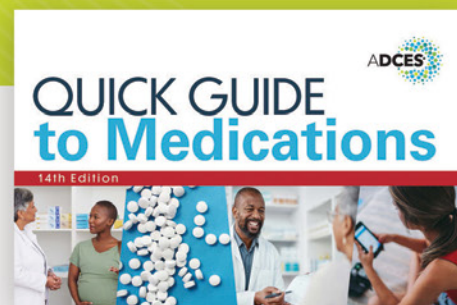
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