Digital Health and Artificial Intelligence: The Registered Dietitian Nutritionist's Path to Success

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Abstract

Cardiometabolic digital health solutions, which address conditions like diabetes, are increasingly being integrated into clinical care. These solutions can provide personalized artificial intelligence (AI)-driven self-management support for individuals and treatment insights for clinicians. Understanding how to effectively integrate these technologies into an individual's daily experience and the clinician's workflow is essential. Successful implementation of these solutions can improve reach, access, and outcomes for health and operational efficiencies at the individual and population levels. This article discusses these solutions and shares real-world examples of strategies for integrating them into clinical practice.

Introduction

With the introduction of new cell phone technology, smartphones have become nearly ubiquitous worldwide. However, there can still be limited access to broadband in rural areas and limited access to smartphone technology due to its cost. Nevertheless, technology has done so much to put health in the hands of people of all ages and demographics, providing an avenue toward healthcare democratization for the first time.[1,2] This new use of technology presents a key challenge to Registered Dietitian Nutritionists (RDN) to find the best way(s) to engage with individuals who deal with the daily challenges of cardiometabolic management. Self-management training and support, medical treatment optimization, and psychosocial guidance are the cornerstones of effective cardiometabolic management. For each of these activities, technology exists to assist both the individual and provider to collaboratively manage medication titrations, lifestyle factors, and challenges related to psychosocial and social determinants of health (SDOH).

Healthcare technology has improved significantly in recent years, with advancements in both disease-specific technology, such as insulin pumps and continuous glucose monitors (CGM), and broadly applicable digital health software tools and services. As with any innovation, developing a taxonomy or framework can improve understanding of how to use and integrate a "new way" of doing things into the workflow. The Digital Care Horizon framework developed by clinicians at the Mayo Clinic is a framework for health care service delivery. It describes how digital technology can optimize health, reduce cost, and provide an experience that meets medical and social needs.[3] The framework includes telemedicine, digital tools, mobile health (mHealth), and health information technology (i.e., electronic health records or EHRs). The authors describe the application of these technologies in various care models, such as face-to-face visits, digital clinics, telemedicine, telemonitoring, facilitated self-care, and population health.[3] With each model, these technologies enable moving from the traditional one-to-one to a one-to-many or population health model. For each care model, the authors provide both a current and future view, indicating that while we have done much to integrate technology into care, there is much more that we can do.[3]

Artificial intelligence (AI) is the 'next new thing' in disease management and clinical workflow efficiency. In this issue, articles about how AI is used and may be used can help you better understand the domain. Much of the current emphasis is on Generative AI. However, other forms of AI (e.g., machine and deep learning) are already being used to evolve digital health solutions.[4,5] In this article, we present real-world examples of clinical integration of an AI-enabled digital health solution — Welldoc's BlueStar® platform.

A Real-World Solution

AI-driven self-management creates opportunities and challenges

for clinicians and people with diabetes (PWD). For the clinician, the opportunities include "just-in-time" data with a self-management care profile and whole-person care (SDOH, sleep, depression) insights. For the RDN, however, these opportunities may pose challenges regarding time constraints and increasing responsibilities in assessing and managing technology literacy. For PWD, the opportunities to have self-management support at their fingertips, information tailored to their disease and treatment, and the ability to use a device they already have has enhanced the adoption of these solutions. As with any self-management activity, staying engaged and persistent with the solution are challenges that can be enhanced through the appropriate use of AI-driven messaging.

Digital Solution

To illustrate the digital health experience for PWD and clinicians, we will describe experiences with the implementation of Welldoc's BlueStar® platform, an FDA-cleared digital health solution for type 1 diabetes (T1D) and type 2 diabetes (T2D) that enables individuals to self-manage their care and connect with their healthcare team using a digital app.[6] The app supports PWD by tracking person-generated health data (PGHD), delivering AI-driven education and coaching in the moment and over time, and facilitating communication with clinicians. The application provides personalized insights and support across multiple areas, including metabolic tracking, clinically based cardiometabolic education (e.g., the diabetes self-management education and support (DSMES) curriculum), medication management, and nutrition tools. The clinician portal presents providers and care teams a summary of PGHD and enables 2-way communication via email, text, and chat features. AI identifies patterns and trends in PGHD and develops insights based on national diabetes and cardiometabolic guidelines. See Figure 1.

Clinical Practice Integration

While many clinicians may want PWD in their care to have tools to help them ease the burden of managing their chronic condition(s), the tools themselves may necessitate changes in roles and RDN workflow to derive maximum benefit. Some patients can integrate a digital app into their daily care with little-to-no additional training, while others may require substantial training and support. The ICC framework, described in the subsequent section, guides clinicians through the process of introducing tools to PWD in their care.

Identify-Configure-Collaborate (ICC) Framework

The Association of Diabetes Care & Education Specialists (ADCES) has led several technology conferences on best practices for clinicians in diabetes care. An output of these efforts was the creation of the Identify-Configure-Collaborate (ICC) framework for integrating technology-enabled solutions into practice to achieve optimal patient engagement and clinical and behavioral outcomes.[7] These steps can guide the implementation of digital health solutions in the health care setting and are described below.

1. Identify:
Allowing the individual to have the opportunity to decide whether to use a digital app as a tool in their healthcare is recommended.

Figure 1. Welldoc Platform

The Welldoc® App includes Welldoc Diabetes and Welldoc Diabetes Rx, which is Software as a Medical Device (SaMD) intended to be used by healthcare providers (HCPs) and their patients – aged 18 years and older – who have type 1 or type 2 diabetes. Welldoc Diabetes and Welldoc Diabetes Rx is intended to assist patients in managing their diabetes with guidance from their providers. Welldoc Diabetes Rx requires a prescription. Welldoc Diabetes and Welldoc Diabetes Rx should not be used by patients with gestational diabetes or patients using an insulin pump. Improper use of Welldoc Diabetes and Welldoc Diabetes Rx may result in unsafe recommendations that could result in hyperglycemia or hypoglycemia. Visit www.welldoc.com for full labeling information.

Individual: The clinician can ask two questions: "Do you have a smartphone?" and "Do you use apps today?" If appropriate, next ask: "Are you interested in using a digital app to support your care?"

Population: Population-level lists can use mailings or text messaging to invite people to use the digital application using a self-identified technology assessment. Group classes are another opportunity to introduce digital health at the population level.

AI Support: Organizational AI-supported activities can facilitate the identification of individuals and populations with cardiometabolic conditions. These activity lists can also guide the manual or automated processes for identification, invitation, and scheduling of program activities (e.g., class, virtual visit, etc).

Once the patient's interest and willingness to engage with an app have been determined, the next step is to determine how these activities will be integrated into routine practice in a fluid manner.

2. Configure:
Configuration involves identifying the in-app tools that can support the goals created through shared decision-making, which can be done with the clinician or through a guided experience driven by the app.

Individual: Start the conversation by introducing one in-app tool based on the PWD's own health goals. For example, configuration for an individual newly diagnosed with T2D might entail connecting the blood glucose (BG) meter to the digital app or showing the individual how to enter readings manually. PWD can explore other app features themselves to increase engagement in future visits. At the next visit, configuration will occur again.

Population: At the population level, clinicians can generate population-level goals and focus program-driven configuration on goals such as blood pressure (BP), weight management, or improved time in range (TIR). Technology features such as in-app messages, chat, or email can generate population-level messages that can be received in the app with a push notification or email.

AI support: At the individual level, AI-driven messages use PGHD, type of diabetes, and medication profile to provide tailored messages to optimize understanding. Population data can be compared against national guidelines to identify programmatic areas of concern (e.g., exams overdue, hemoglobin A1c (A1c) above target).

3. Collaborate:
Collaboration between care providers and the individual involves meeting (in-person or virtually) and using in-app data and insights (including biometric and self-management behaviors) to discuss the individual's experience and biometric data.

Individual: The app can present AI-driven patterns and trends in weekly and monthly reports to help people monitor their progress, understand their data, and share data with their clinicians. In-app messages concerning high or low BG or TIR trends can encourage the individual to seek care from their clinician.

Population: Individual PGHD is available to provide action lists for clinician interventions regarding BG and medication management, including insulin dosing and metabolic tracking. The population-level PGHD can also be used to guide program-level activities such as broadcast emails for eye exams, vaccines, and other standards of care, as well as general engagement education and activities.

AI Support: PGHD drives tailored, personalized health reports to support clinical decision-making and population data for the identification and ongoing assessment of program initiatives.[9]

No matter a participant's technical competency during the ICC process, technical skills should not be the limiting factor for using digital health as a tool in chronic condition management. For the PWD with high-tech proficiency, making the solution available and providing answers to their questions may be all that is needed, allowing the clinician to primarily focus on treatment plan shared decision-making. Conversely, for the PWD with only basic tech proficiency, additional coaching from the RDN or technology vendor customer support may be needed to ensure successful integration of the app into their treatment plan. See Table 1 for the application of ICC to each user group.[10]

Real World Examples

Individual: Having worked as an RDN for over 20 years, if asked about what is challenging in my role, I picture myself sitting next to an individual that I know little about who comments that each day is so different it's hard to imagine where to begin. Assessment includes reviewing biometric readings and self-management behaviors despite lacking data. Using digital apps can provide data by sharing PGHD through an app-based health report, a clinician portal, or integration into the EHR.

Case Study

In a example that shares the ICC framework, Francis is a 58-year-old woman living with T2D for five years. Francis was previously provided with a BG meter, which she did not have at the office today. This prompted the RDN to share the customer care number for the digital app and written instructions on how to link the BG meter. In discussions with the RDN, a meal plan was provided, and the goal was created to count carbs at dinner. Once Francis agrees to start using a mobile app, the next step is configuring the app to support the goals created. Francis was introduced to the food photo feature and asked to photograph 3 dinner meals each week until the next visit; the AI-driven photo feature obtains the carb count. At follow-up visits, a collaborative discussion should start with a positive tone and recognition of the patient's efforts in monitoring health data, and the RDN should work closely with the individual and identify meaningful observations and future actions from the PGHD. For example, "the meal with salmon and asparagus had little impact on your BG level. If your pre-meal dinner BG was above range, this is a good meal to have."

Population: Two examples of a successful real-world population approach that integrates the digital health app into existing programs for a health system and a health plan are presented here. The health system-based Diabetes Self-Management Education (DSME) program at Allina Health in Minneapolis, Minnesota, provides newly diagnosed individuals a three-part virtual class. During the first virtual meeting, participants are introduced to the BlueStar® app and invited to use it via email. Self-identification of app utilization occurs; the app is not a requirement for the program. Referrals to Welldoc Customer Care are made for individuals with basic tech literacy. In this approach, the activation rate is 51%, with 55% of the users over 55 years old and 36% connecting devices such as weight scales, BG meters, and exercise apps. This demonstrates that a population approach can be as successful, if not more so, than that associated with the one-to-one approach.[11] These observations highlight that PWD's technology self-identification is equally or if not more important than the clinician's assessment of the PWD's ability to use apps. At the second virtual class a week later, the RDNs further encouraged individual configuration by discussing app features tailored to each class topic. For example, when discussing CGM, app features include how to connect the CGM to the app and in-app CGM curriculum. Again, referrals to customer care are provided to those who need additional technical support. The group class approach allows participants to share their experiences with the app and potentially influence or encourage their peers to participate. The program ends with a third virtual session where the app is discussed again in parallel with the class topics. Participants are encouraged to continue using the digital app post-program for DSME support. Moving from configuration to collaboration, the population health data helps identify unique approaches to reach PWD that would benefit most from RDN-related interventions. The population health report for the DSME program participants provides demographic, app engagement, and clinical measures for program reporting and continuous quality improvement efforts. For example, when the health system noted that A1c levels were not obtained on time, an in-app A1c message was delivered to hundreds of participants.

A second example of a real-world population health approach to collaboration is an RDN-led health plan program. In this approach, all PWD are invited to use the digital app. Health plan program benefits enable the RDN to meet with participants one-to-one to create a meal plan and collaboratively set goals for monitoring BG, food log, and weight. The RDN enters the monitoring plan into the clinician portal. The app's home screen prompts the participant with daily actions to support goal achievement. Additionally, the RDN utilizes a population health approach to identify individuals who would benefit from further collaboration with the RDN. Population data analyzed with diabetes care guidelines supports a timely, proactive approach for the RDN to address areas of concern before they become major issues. Technology features such as an action list based on monitoring

Table 1. Technology Competency and the ICC Framework

ICC Framework	Basic Tech Literacy	Proficient Tech Literacy
IDENTIFY Consider all individuals, regardless of age or social determinants of health (SDOH), to be potential users. Incorporate a discussion of digital health apps into your routine workflow or communicate through a program (population) approach. Select digital solutions that meet the individual and treatment objectives using ones that address privacy, security, and quality standards.	Start the conversation on digital apps: 1) Do you have a smartphone? 2) Would you be interested in using a digital app to support diabetes self-management? If yes to both, assist the individual with downloading the app and account creation or refer to Customer Care.	Start the conversation on digital apps: 1) Do you have a smartphone? 2) Would you be interested in using a digital app to support diabetes self-management? If yes to both, provide the individual with account creation details and the Customer Care number for any technical questions.
CONFIGURE Based on the assessment of an individual's self-management needs at the individual level or population program objectives at the population level, determine which app features to integrate into the treatment plan. Integrate these features into the 1:1 session or determine the virtual communication method for the population approach to continue the RDN connection.	The RDN orients the individual to the app layout and features. Use shared decision-making to identify self–management goal(s) and the app feature(s) that supports the goal(s). Configure (personalize) the app to support goal(s) (e.g. connect to smart devices, enter medication profile). Depending on the individual, it may be best to focus on one goal at a time. Demonstrate how to use the feature and allow the individual to practice using the feature with RDN support. Determine the plan for sharing person-generated health data (PGHD) with the RDN.	The PWD will complete the app setup on their own. They can self-identify app features that support their self-management needs or follow the in-app journey to goal setting. In-app messaging and education (guided by AI) supports ongoing learning and self-management modification. Develop a communication plan (method and frequency) and visit plan (virtual vs. in-person) for sharing PGHD with RDN.
COLLABORATE The RDN should use the PGHD in partnership with individuals and the population to determine any barriers to app use and issues with following the treatment plan. This may highlight issues of emotional distress, SDOH, and medication and metabolic issues. **NOTE:** The RDN continues the cycle of configuration and collaboration at each interaction.	Start the conversation with "How did it go?" and "What did you learn?" Review PGHD to determine how the individual has been using the app. Discuss PGHD. Highlight unique insights and meaningful observations from the information shared and determine which features should be explored next. If PGHD is limited, explore app use, engagement challenges, and determine if there are any technical issues or self-management challenges. If there are technical issues, refer to customer care. For self-management issues, use RDN skills.	Start the conversation with "How did it go?" and "What did you learn?" Review PGHD and highlight unique insights and meaningful observations from the information shared. (AI supports data visualization and insights from comparison with national guidelines.) Update the care plan as needed for continued in-app support.

patterns can identify individuals for potential RDN intervention. Based on the action item, a protocol guides RDN interventions using digital health features including, but not limited to, HIPAA-compliant in-app chat or in-app virtual appointments leading to positive outcomes.

Conclusion

New digital health solutions are impacting care delivery models, patient self-management, and clinician workflow, challenging traditional approaches.[12] In many ways, we are just beginning to unlock the potential of technology to improve and extend diabetes care and outcomes. The RDN can expand their practice using diabetes-related technologies to reach, educate, and support diverse populations with cardiometabolic conditions. We recommend RDNs who are less familiar with diabetes-related technologies initially try an AI-driven cardiometabolic digital health solution with five patients and learn from their outcomes and feedback. The growing use of cardiometabolic digital health solutions can help RDNs expand their practice from a one-to-one to a one-to-many approach, improving their reach, efficiency, and effectiveness.

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