

Digital Diabetes Management Solutions

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Over the past 15 years, dozens of companies have emerged to provide digital diabetes management solutions. These solutions typically use smartphone-based apps combined with a noncontinuous connected glucometer to help patients better manage their diabetes between physician visits. The programs offer real-time coaching and feedback to help patients adjust what they eat, what exercises they do, and which medications to take.

Digital diabetes management solutions are one of several recent innovations in diabetes care; others include continuous glucose monitors, insulin pumps, and novel drugs like GLP-1 receptor antagonists. We focused on digital diabetes management solutions using noncontinuous blood glucometers because 1) it is the most common method of monitoring for patients with type 2 diabetes in the United States¹ and 2) there has been rapid growth of these types of solutions over the past decade.

At the Peterson Health Technology Institute (PHTI), we evaluated these solutions to understand their clinical effectiveness and budget impact. PHTI is a nonprofit focused on making better, more-affordable healthcare a reality for all Americans. PHTI did not look at solutions that work with continuous blood glucose monitors or insulin pumps.

How the Solutions Work

The goal of these solutions is to enhance — not replace — physician-patient encounters. Typically, these solutions use a smartphone-based app that connects a patient to a virtual coach or care team. In most cases, blood glucose levels are automatically transmitted from the glucometer to the app. Patients can also ask the virtual coach or care team about diet, exercise, and medication. In some instances, you — as the patient's physician — would have access to the data collected from these solutions for remote monitoring.

Types of Solutions Evaluated

PHTI conducted a systematic literature review and spoke with physicians, patients, digital health experts, and the companies that provide three types of solutions:

- 1 Remote patient monitoring** solutions use a glucometer with wireless or Bluetooth connectivity to enable coaches or care teams to remotely monitor glycemic control and deliver feedback to patients.
- 2 Behavior and lifestyle modification** solutions include coaching and nutritional advice, in addition to glycemic feedback. Typically, the feedback is provided by algorithms or clinical staff/coaches affiliated with solution.
- 3 Nutritional ketosis** solutions have specific focus on inducing a state of ketosis in patients through intensive dietary guidance (carbohydrate restriction) and monitoring of the patient's glycemic and ketone levels; this can result in diabetic remission.

¹ Perez-Nieves, Magaly, Rattan Juneja, Ludi Fan et al., "Trends in U.S. Insulin Use and Glucose Monitoring for People with Diabetes: 2009–2018," *Journal of Diabetes Science and Technology* 16, no. 6 (November 2022): 1428–1435.
<https://doi.org/10.1177/19322968211028268>

What We Found

- 1 Most patients with type 2 diabetes will gain limited HbA1c benefit from digital diabetes management solutions.** The median improvement in HbA1c levels for comparative studies with sufficient sample size was 0.3 percentage points more than usual care. In comparison, common diabetes drugs — such as metformin, sulfonylureas, or GLP-1 receptor antagonists — can produce median HbA1c improvements of 1.0 percentage points or greater.*
- 2 There is evidence that in certain situations, these solutions may help.** Specifically, for patients with high HbA1C (>9%) who are initiating insulin for the first time and want additional feedback and support.
- 3 If you and your patient are aligned on achieving diabetic remission as a goal, there are promising options.** One nutritional ketosis solution, offered by Virta, demonstrated a 1.3 percentage point improvement in HbA1c compared with usual care over a one-year period. The challenge with this program is that it requires an intensive ketogenic diet, which can be hard for patients to achieve and sustain.
- 4 Financial modeling suggests these programs are generally cost-additive, given the incremental cost of the solution prices coupled with the limited clinical improvement.** For remote patient monitoring and behavior and lifestyle modification solutions, modeling indicates that these solutions add to total health spending. For nutritional ketosis, long-term savings potential may exist for the subset of patients able to achieve and maintain diabetes remission.

Potential Risks

There were limited data on adverse events from the published studies. Even without evidence of harm, there is the potential risk that may arise from incorrectly used glucometers, misinterpretation of results, or suboptimal clinical support. That said, because these diabetes management solutions augment standard in-person care or provide clinical oversight, these potential risks may be addressed in treatment.

These findings are based on the criteria set forth in the Assessment Framework and the currently available evidence. Please see the full PHTI report for complete assessment, methods, and recommendations.

What It Means for Your Patients

Based on PHTI's review of clinical evidence, digital management solutions consistently demonstrate that they help patients achieve small reductions in HbA1c beyond what they would achieve with usual care, but the evidence rarely reported improvement that exceeded commonly used thresholds for meaningful clinical benefit. Further, evidence suggests that such small benefit will reduce over time. After accounting for the cost of these products, these solutions increase net healthcare spending for purchasers because the small estimated savings are less than the cost of the solution.

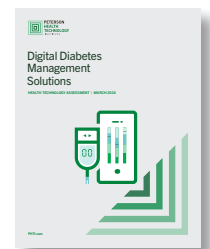
Exceptions may include 1) people with higher starting HbA1c who are newly-starting insulin, and 2) people seeking diabetes remission through nutritional ketosis.

If you and your patient are aligned on achieving diabetic remission, you might suggest a nutritional ketosis solution, if the patient is:

- motivated to manage their diabetes and willing to make sustained, significant diet changes;
- comfortable with using apps on their smart-phone or tablet, or interested in learning; and
- motivated by real-time feedback and coaching.

Accessing PHTI's Full Report

You can access the full report [here](#).



* Feingold, Kenneth R. "Oral and Injectable (Non-Insulin) Pharmacological Agents for the Treatment of Type 2 Diabetes." In Endotext, edited by Kenneth R. Feingold, B. Anawalt, M.R. Blackman et al. Dartmouth: MDText.com. Updated August 26, 2022.

<https://www.ncbi.nlm.nih.gov/books/NBK279141/#:~:text=If%20one%20average%20the%20effect,%2D1%20receptor%20agonists%201.24%25.>