



International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Operating Publisher
SciFormat Publishing Inc.
ISNI: 0000 0005 1449 8214

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Calgary, Alberta, T3E0A7,
Canada
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ARTICLE TITLE	DIGITAL HEALTH INTERVENTIONS IN TYPE 2 DIABETES: A NARRATIVE REVIEW OF PATIENT ENGAGEMENT, SELF-MANAGEMENT, AND BARRIERS TO ADOPTION
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DOI	https://doi.org/10.31435/ijitss.2(50).2026.5544
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RECEIVED	17 February 2026
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ACCEPTED	14 April 2026
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PUBLISHED	20 April 2026
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DIGITAL HEALTH INTERVENTIONS IN TYPE 2 DIABETES: A NARRATIVE REVIEW OF PATIENT ENGAGEMENT, SELF-MANAGEMENT, AND BARRIERS TO ADOPTION

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ABSTRACT

Research objective: The aim of this paper was to present the role of digital health interventions in the treatment of type 2 diabetes, with a particular focus on their impact on patient engagement, self-management, clinical outcomes, and barriers related to their implementation

Methods: This study was conducted as a narrative review. The literature search was performed using PubMed and Google Scholar databases. Articles published between 2020 and 2026 were included, with priority given to systematic reviews, meta-analyses, and selected original studies concerning adult patients with type 2 diabetes.

Results: Digital health interventions can improve glycemic control, with the most consistent effect being a reduction in glycated hemoglobin (HbA1c). They also support patient engagement and self-management by facilitating regular monitoring, improving adherence, and promoting healthier behaviors. The most effective interventions were those combining data monitoring with feedback and professional support. At the same time, several barriers to implementation were identified, including limited digital literacy, technological usability issues, costs, access inequalities, and insufficient integration with healthcare systems.

Conclusion: Digital health interventions represent a valuable supplement to type 2 diabetes treatment. Their effectiveness depends not only on the technology itself, but also on the quality of implementation, integration with medical care, and adaptation to patients' individual needs.

KEYWORDS

Type 2 Diabetes, Digital Health, Telemedicine, Glycemic Control, Self-Management

CITATION

Anna Maria Kowalska, Aleksandra Kuls, Aleksandra Zofia Sobol, Bogusław Pabis, Justyna Maria Wiktorowicz, Martyna Kadłubańska, Nicole Bulińska, Zofia Sinczak, Sonia Zembrzuska, Stanisław Bajerski. (2026) Digital Health Interventions in Type 2 Diabetes: A Narrative Review of Patient Engagement, Self-Management, and Barriers to Adoption. *International Journal of Innovative Technologies in Social Science*. 2(50). doi: 10.31435/ijitss.2(50).2026.5544

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Introduction

Type 2 diabetes is one of the most common chronic diseases, it is a significant health problem and is becoming an increasingly global health issue. This problem is mainly spread by the aging of the population, bad eating habits, the increase in the number of obese people, and growing stress. This disease is associated with numerous complications and significantly affects both the functioning of patients and the burden on healthcare systems. (World Health Organization, 2024) The primary disorder in type 2 diabetes is hyperglycemia, which in the long term leads to the development of micro- and macroangiopathic complications. Therefore, it is crucial to maintain proper glycemic control. Treatment of type 2 diabetes is comprehensive and requires the use of several methods at the same time - non-pharmacological methods, i.e. education, multiple daily glycemic control, dietary treatment, physical activity, and pharmacological treatment. In practice, this means that in the treatment of type 2 diabetes, the patient's involvement in the therapy is of great importance. (World Health Organization, 2016; Goyal et al., 2023) The dynamic development of digital technology in recent years has led to the creation of new tools supporting the care of patients with chronic diseases. We can include platforms that enable remote data transfer and contact with medical staff, medical applications, continuous 24/7 glycemia monitoring systems, sensors, and applications. These tools improve disease monitoring, facilitate communication between the patient and the doctor, and help develop good habits that allow for better disease control, saving time. (Maida et al., 2025; American Diabetes Association Professional Practice Committee, 2026; Abdul Latif El Ejel et al., 2025) Digital health solutions are no longer treated only as supplementary tools, but increasingly as important elements of routine diabetes care. (Maida et al., 2025; American Diabetes Association Professional Practice Committee, 2026) An active patient attitude, known as patient engagement, is a key element of effective treatment. Digital tools can help increase engagement by providing up-to-date health information, reminders about treatment, and the ability to track progress. At the same time, they support the process of independent disease management, which is the basis

of type 2 diabetes control. The literature emphasizes that properly designed digital interventions can influence changes in health behaviors and improve treatment outcomes. (Kerr et al., 2024; He et al., 2022) However, it should be noted that the implementation of digital technologies in clinical practice is associated with a number of difficulties. The limitations may be due to the patient's characteristics, such as their level of digital competence or motivation, as well as systemic factors, including the availability of technology, costs, and the degree of integration with medical care. The varying effectiveness of the interventions indicates that their use requires an individual approach and appropriate adaptation to the needs of the users.

Although many studies have reported beneficial effects of digital health interventions, the results remain heterogeneous and depend on the type of technology used, patient characteristics, and the context of implementation. (Ravi et al., 2025; Kerr et al., 2024; Kim et al., 2022) Given the growing importance of technology in medicine, it is necessary to organize current knowledge about its application in type 2 diabetes. It is particularly important to determine the extent to which digital health solutions affect patient engagement, the self-management process, and what barriers limit their use in practice. (Ravi et al., 2025; Barchiesi et al., 2025; Duong et al., 2025) The aim of this paper is to present the role of digital health interventions in the treatment of type 2 diabetes, with a particular focus on their impact on patient engagement, self-management of the disease, and limitations related to their implementation.

Methodology

This study is a narrative review, the aim of which was to collect and synthetically present current data on the use of digital health technology in the treatment of type 2 diabetes. The analysis focused on three main areas: clinical results, the impact on patient engagement and the process of self-management of the disease, and barriers hindering the implementation of these solutions.

The literature search was conducted using PubMed and Google Scholar databases. A combination of keywords including "type 2 diabetes", "digital health", "mobile health", "telemedicine", "continuous glucose monitoring", "patient engagement", "self-management", and "barriers" was used. To increase the accuracy of the results, logical operators AND and OR were used, and the bibliographies of selected publications were analyzed.

Articles published between 2020 and 2026 were eligible for review, which allowed for the inclusion of current trends in technology development and contemporary therapeutic approaches. Preferred were review articles (systematic reviews, meta-analyses), which were the main source of data. Additionally, selected original studies were included if they provided significant information regarding the clinical effects or practical application of the interventions analyzed. The inclusion criteria included studies of adult patients with type 2 diabetes, which analyzed the use of digital tools in monitoring, treatment or supporting the therapeutic process. Publications concerning the factors limiting the implementation of digital health technology in practice were also taken into account.

The analysis excluded studies focusing solely on type 1 diabetes, gestational diabetes, and pediatric populations. Articles of limited methodological value and publications not available in English were also omitted. The selection process was multi-stage. First, titles and abstracts were evaluated, and then the full texts of the selected works were analyzed. The collected material was organized thematically and presented descriptively, in accordance with the main areas of analysis.

Due to the nature of the narrative review, formal systematic procedures or quantitative data synthesis were not used, which is a potential limitation of the study.

Results

Types of digital health interventions

Digital health interventions for type 2 diabetes include a wide range of technologies designed to support treatment, monitoring, and improving disease control. The most commonly used are mobile applications (mHealth), telemedicine systems, continuous glucose monitoring (CGM) devices, and integrated digital platforms that enable comprehensive patient care. (Maida et al., 2025; Ravi et al., 2025; American Diabetes Association Professional Practice Committee, 2026) Mobile applications are one of the most accessible and frequently used forms of support. Their functionality includes monitoring glucose levels, diet control, nutritional value analysis, physical activity assessment, and reminders for taking medication. In many cases, these apps also offer educational elements, enable analysis of glycaemia trends, and provide personalized feedback. This allows the patient to better understand the impact of lifestyle on the course of the disease and make more informed therapeutic decisions. (He et al., 2022; Lee et al., 2023; Kim et al., 2022) Telemedicine

systems enable remote consultations and continuous monitoring of the patient's health status. They allow for sending test results, data analysis by medical staff, and quick response to irregularities. Additionally, telemedicine supports the process of health education and enables constant contact with a doctor or a diabetes educator. The importance of these solutions has increased especially during the COVID-19 pandemic, when limited access to in-person care required the implementation of alternative forms of contact with the patient. (Dat et al., 2024; Zhang et al., 2023; Ravi et al., 2025) Continuous glucose monitoring (CGM) devices provide real-time data, allowing for ongoing tracking of glucose level changes and identification of glycemic patterns. This allows for a quick response to deviations from the norm and more precise adjustment of therapy. In clinical practice, the use of CGM is associated with improved metabolic control and a reduction in the risk of hypoglycemic episodes. The integration of CGM with mobile applications and telemedicine systems further increases the possibilities of data analysis and supports the process of making therapeutic decisions. (Martens et al., 2021; Bergenstal et al., 2021; Barchiesi et al., 2025; American Diabetes Association Professional Practice Committee, 2026) The effectiveness of digital health interventions is often greater when technology is combined with regular professional support and ongoing interpretation of the collected data (Ravi et al., 2025; Dat et al., 2024; Zhang et al., 2023) Integrated digital systems that combine various functions within one platform are also being used more and more often. Such solutions include simultaneous monitoring of health parameters, data analysis, communication with medical staff, and educational support. A comprehensive approach to disease management can increase the effectiveness of treatment and improve patient comfort. The interventions that integrate multiple functions within one system may be effective than single-purpose tools, because they support several aspects of disease management at the same time. (Abdul Latif El Ejel et al., 2025; Xiao et al., 2025; Maida et al., 2025) Additionally, some systems use wearable devices, such as smartwatches or fitness trackers. They allow for assessing the level of activity, sleep quality and remind you to take your medication. However, their role in the treatment of type 2 diabetes is less clearly defined and often serves as a supporting element for other technologies. (Stevens et al., 2022; Maida et al., 2025)

Barriers to Adoption

Despite numerous benefits, implementing digital health interventions faces significant limitations that can be divided into factors related to the patient, technology, availability, and the healthcare system. (Ravi et al., 2025; Barchiesi et al., 2025; Duong et al., 2025; Moschonis et al., 2023) These barriers often do not occur separately, but overlap and reinforce one another, which may significantly reduce the effectiveness of digital interventions (Ravi et al., 2025; Duong et al., 2025) The most important barriers on the patient's side include limited digital skills and difficulties in using technological tools. This problem is particularly evident among the elderly, who use modern solutions less frequently and may have difficulty adapting to them. Additionally, some patients show lower motivation to use technology or lose interest over time, which affects the effectiveness of the intervention. Another significant problem may be the difficulty in interpreting health data, which limits the possibility of their practical use. (Lee et al., 2023; Barchiesi et al., 2025; Ravi et al., 2025) Technological barriers include, above all, the complexity of interfaces and insufficient intuitiveness of operation. Low usability of the application may lead to users abandoning it. In many cases, the problem is also the lack of proper feedback that would enable the correct interpretation of the data. Additionally, users may experience difficulties related to using devices, such as discomfort from wearing CGM sensors or the need for regular maintenance. (Barchiesi et al., 2025; Stevens et al., 2022; Maida et al., 2025) Availability factors are another important group of limitations. High technology costs, limited internet access, and lack of suitable devices can lead to inequalities in the use of digital health solutions. This problem particularly affects people with lower socio-economic status and residents of areas with limited technological infrastructure. (Duong et al., 2025; Ravi et al., 2025) At the system level, the difficulties associated with integrating digital technologies with existing healthcare systems are of great importance. Lack of interoperability between different platforms, insufficient support from medical staff, and lack of standardization of solutions limit their effectiveness in clinical practice. Additionally, there are concerns about data security and patient privacy protection. For this reason, successful implementation of digital health solutions requires not only effective technology, but also appropriate patient support, accessibility and integration with routine clinical care. (Ravi et al., 2025; Maida et al. 2025)

Clinical outcomes

Digital health interventions have a number of important clinical effects, the most important of which is improved glycemic control. Several studies have shown that the use of digital tools can lead to a decrease in the level of glycated hemoglobin (HbA1c), typically in the range of about 0.3% to 0.8%. This effect is one of the most consistent and repeatable in the literature analyzed. The magnitude of HbA1c reduction may differ depending on the type of digital interventions, baseline glycemic control, and the level of patient engagement. (Kim et al., 2022; Kerr et al., 2024; Dat et al., 2024; Xiao et al., 2025) Evidence of effects beyond HbA1c remains less consistent and the long-term sustainability of these clinical benefits still requires further investigation. (Stevens et al., 2022; Yan et al., (2025) Even a small reduction in HbA1c is of significant clinical importance, as it is associated with a reduction in the risk of micro- and macro-vascular complications. This suggests the potential role of digital health interventions as an effective element supporting treatment. (Goyal et al., 2023) In addition to improving glycemic control, some studies also indicate beneficial changes in other metabolic parameters, such as body weight, BMI, or lipid profile. However, these effects are less clear and may vary depending on the type of intervention used, its duration, and the characteristics of the patients. (Kim et al., 2022; Stevens et al., 2022; Lee et al., 2023; Xiao et al., 2025) The intensity and method of intervention also play a significant role. The best clinical results are observed in the case of solutions that enable regular monitoring of health parameters and provide quick and personalized feedback. Integrating technology with medical care further increases the effectiveness of treatment. (Ravi et al., 2025; Dat et al., 2024; Xiao et al., 2025; Martens et al., 2021) Interventions that combine monitoring, education, feedback, and professional support appear to produce more favorable clinical outcomes than less interactive or single-component solutions. (Ravi et al., 2025; Xiao et al., 2025; He et al., 2022)

Impact on patient engagement and self-management

Digital health interventions play a significant role in increasing patient engagement and supporting the process of self-management of the disease. Thanks to them, patients have constant access to information about their health status and the possibility of current monitoring of metabolic parameters. (Kerr et al., 2024; He et al., 2022; Kim et al., 2022; Lee et al., 2023) The positive effects of these interventions on engagement depend not only on access to technology, but also on the regular use of the tools provided. (Kerr et al., 2024; Kim et al., 2022; Stevens et al., 2022) Functions such as reminders to take medication, monitoring physical activity and analyzing health data promote more systematic treatment. Patients can respond more quickly to changes in their glucose levels and make more informed decisions about their diet and lifestyle. (He et al., 2022; Lee et al., 2023; Stevens et al., 2022) An important mechanism of these interventions is the increase in the patient's sense of self-efficacy. The ability to observe the effects of one's own actions and set individual therapeutic goals increases the motivation to follow the recommendations. At the same time, digital technologies can support the process of changing health behaviors by providing feedback and reinforcing positive habits. (Kerr et al., 2024; Kim et al., 2022; He et al., 2022) Personalized feedback and the possibility of tracking progress over time may further strengthen motivation and long-term support adherence to therapeutic recommendations. (He et al., 2022; Kerr et al., 2024; Lee et al., 2023) The most effective interventions combine technology with elements of support from medical staff. This approach allows for better interpretation of data and increases the chances of maintaining the patient's long-term commitment. (Ravi et al., 2025; Dat et al., 2024; Xiao et al., 2025)

Discussion

The results of this review indicate that digital health interventions can play a significant role in the treatment of type 2 diabetes, particularly in terms of improving glycemic control, increasing patient engagement, and supporting self-management of the disease. The most consistent and repetitive effect observed in the analyzed studies was the reduction in HbA1c levels, which confirms the clinical usefulness of digital tools as a supplement to standard care. (Kim et al., 2022; Kerr et al., 2024; Dat et al., 2024; Xiao et al., 2025) An important conclusion drawn from the review is that the effectiveness of digital interventions does not result from the use of technology alone, but primarily from its functionality and the way it is used. Tools that enable regular monitoring of health parameters, while also offering data interpretation and feedback, are more effective than solutions that only passively collect data.

This points to the importance of interactivity and the presence of elements supporting therapeutic decision-making. (He et al., 2022; Ravi et al., 2025; Xiao et al., 2025; Buendia et al., 2021) The analyzed works also show that particularly beneficial results are achieved in models combining technology with the participation of medical staff. Hybrid interventions, in which data collected by digital systems are supplemented by feedback from a doctor or educator, allow for more precise treatment adjustments and

increase the effectiveness of therapy. This suggests that digital health should be treated as a tool to support, not replace, traditional care. (Ravi et al., 2025; Dat et al., 2024; Zhang et al., 2023; Dunkel et al., 2024; American Diabetes Association Professional Practice Committee, 2026) Patient's commitment and ability to self-manage the disease also play a significant role in the achieved results. Digital interventions promote more systematic monitoring of glycemia, improve adherence to treatment, and support changes in health behaviors. Mechanisms such as reminders, progress tracking, and access to real-time information can increase motivation and a sense of control over the disease. At the same time, it is pointed out that maintaining long-term commitment remains a challenge, and the effectiveness of intervention may decrease over time. (Kerr et al., 2024; He et al., 2022; Kim et al., 2022; Stevens et al., 2022; Lee et al., 2023) The findings also suggest that digital interventions should not be treated as universal solutions, as their effectiveness may differ depending on patient age, digital literacy, baseline metabolic control, and readiness to engage in long-term self-management. (Lee et al., 2023; Ravi et al., 2025; Barchiesi et al., 2025) Despite the observed benefits, implementing digital health interventions is associated with numerous limitations. Barriers affect both patients and the technology and healthcare system itself. Limited digital skills, especially among the elderly, can make it difficult to use available tools. Additionally, problems related to the usability of the application, lack of an intuitive interface or insufficient support in data interpretation limit their effectiveness in practice. (Barchiesi et al., 2025; Ravi et al., 2025; Lee et al., 2023; Maida et al., 2025) Availability and cost are also important factors. Limited access to devices and the internet, as well as the lack of reimbursement for some technologies, can lead to inequality in the use of digital solutions. At the system level, a significant problem is the lack of integration of digital health tools with existing healthcare systems and limited interoperability between different platforms. (Duong et al., 2025; Ravi et al., 2025; American Diabetes Association Professional Practice Committee, 2026; Maida et al., 2025) At the same time, the wider implementation of digital health should be accompanied by efforts to prevent inequalities in access, especially among older adults and patients with fewer technological or financial resources. (Duong et al., 2025; Lee et al., 2023; Ravi et al., 2025) It is also worth noting the diversity of the interventions analyzed. The research covers a wide range of technologies at different stages of development, which makes it difficult to directly compare the results and generalize the conclusions. (Moschonis et al., 2023) Furthermore, most of the available data concerns a relatively short observation period, which limits the possibility of assessing the long-term effectiveness of the intervention. (Stevens et al., 2022; Yan et al., 2025; Maida et al., 2025; Abdul Latif El Ejel et al., 2025) The limitation of this work is its narrative review nature, which did not assume the use of rigorous systematic methods. Therefore, the selection and interpretation of data can be somewhat subjective. Additionally, the dynamic development of digital technologies means that some solutions quickly become outdated, and new tools require further evaluation. In summary, digital health interventions are a promising supplement to type 2 diabetes treatment, particularly in terms of improving glycemic control and supporting patient engagement. However, their effectiveness depends on many factors, including the quality of the technological design, the level of integration with medical care, and the individual characteristics of the patient. Further research should focus on optimizing these solutions and identifying ways to effectively implement them in clinical practice. (Ravi et al., 2025; Kim et al., 2022; Kerr et al., 2024; Maida et al., 2025; American Diabetes Association Professional Practice Committee, 2026)

Conclusions

Digital health interventions are a significant supplement to type 2 diabetes treatment and can contribute to improved clinical outcomes, especially in terms of glycemic control. The most common effect of their use is a reduction in the level of glycated hemoglobin (HbA1c), which confirms their practical significance in everyday patient care. Importantly, these benefits appear to be more pronounced in individuals with suboptimal baseline control, suggesting that digital interventions may play a particularly valuable role in higher-risk patient groups. (Kim et al., 2022; Kerr et al., 2024; Dat et al., 2024; Xiao et al., 2025)

However, the effectiveness of these solutions does not depend solely on the technology itself, but also on how it is used. The best results are observed in interventions that combine data monitoring with feedback and support from medical staff, which indicates that hybrid models are superior to solutions based solely on passive data collection. This finding underscores the need to position digital tools within structured models of care rather than treating them as independent or isolated interventions. (Ravi et al., 2025; Dat et al., 2024; Zhang et al., 2023; He et al., 2022; American Diabetes Association Professional Practice Committee, 2026)

The patient's commitment and ability to manage the disease independently also play a significant role. Digital tools can support the regularity of therapeutic activities, improve adherence, and increase health

awareness, but maintaining long-term engagement remains a challenge. Sustained effectiveness is therefore closely linked to usability, personalization, and the ability of interventions to remain relevant and engaging over time. (Kerr et al., 2024; He et al., 2022; Kim et al., 2022; Lee et al., 2023; Stevens et al., 2022)

Despite the growing importance of digital technologies, their implementation faces numerous barriers. They include factors related to the patient, such as the level of digital competence, as well as technological, economic and systemic limitations, including access to tools and their integration with healthcare systems. Addressing these barriers is essential not only for improving effectiveness but also for ensuring equitable access and preventing the widening of existing health disparities. (Barchiesi et al., 2025; Duong et al., 2025; Ravi et al., 2025; Maida et al., 2025)

In summary, digital health interventions have significant potential to improve the treatment of type 2 diabetes, but their effectiveness depends on their proper adaptation to the patient's needs, quality of implementation, and integration with the healthcare system. Future research should extend beyond short-term clinical outcomes and focus on long-term sustainability, cost-effectiveness, and the identification of patient populations that benefit most from specific types of digital interventions. (Ravi et al., 2025; Maida et al., 2025; Yan et al., 2025; American Diabetes Association Professional Practice Committee, 2026)

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All authors have read and agreed with the published version of the manuscript.

Funding statement: The study did not receive special funding.

Conflict of Interest Statement: The authors report no conflict of interest.

REFERENCES

1. Abdul Latif El Ejel, B., Sattar, S., Fatima, S. B., Khan, H. N., Ali, H., Iftikhar, A., Sarwer, M. A., & Mushtaq, M. (2025). Digital diabetes management technologies for type 2 diabetes: A systematic review of home-based care interventions. *Cureus*, *17*(5), e84177. <https://doi.org/10.7759/cureus.84177>
2. American Diabetes Association Professional Practice Committee. (2026). 7. Diabetes technology: Standards of Care in Diabetes—2026. *Diabetes Care*, *49*(Supplement_1), S150–S165. <https://doi.org/10.2337/dc26-S007>
3. Barchiesi, M. A., Calabrese, A., Costa, R., Di Pillo, F., D'Uffizi, A., Tiburzi, L., & Zahid, E. (2025). Continuous glucose monitoring in type 2 diabetes: A systematic review of barriers and opportunities for care improvement. *International Journal for Quality in Health Care*, *37*(3), mzaf046. <https://doi.org/10.1093/intqhc/mzaf046>
4. Bergenstal, R. M., Layne, J. E., Zisser, H., Gabbay, R. A., Barleen, N. A., Lee, A. A., Majithia, A. R., Parkin, C. G., & Dixon, R. F. (2021). Remote application and use of real-time continuous glucose monitoring by adults with type 2 diabetes in a virtual diabetes clinic. *Diabetes Technology & Therapeutics*, *23*(2), 128–132. <https://doi.org/10.1089/dia.2020.0396>
5. Buendia, R., Havsol, J., Lundberg, V., Sooben, K., Jornten-Karlsson, M., Nyman, E., Khan, F. M., & Dennis, G. (2021). Analysis of use and outcomes of the Balance digital disease management tool for patients with type 2 diabetes. In *2021 43rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC)* (pp. 1372–1375). IEEE. <https://doi.org/10.1109/EMBC46164.2021.9630389>
6. Dat, T. V., Binh, V., Hoang, T. M., Tu, V. L., Luyen, P. D., & Anh, L. T. K. (2024). The effectiveness of telemedicine in the management of type 2 diabetes: A systematic review. *SAGE Open Medicine*, *12*, 20503121241271846. <https://doi.org/10.1177/20503121241271846>
7. Dunkel, A., von Storch, K., Hochheim, M., Zank, S., Polidori, M. C., & Woopen, C. (2024). Long-term effects of a telemedically-assisted lifestyle intervention on glycemic control in patients with type 2 diabetes: A two-armed randomized controlled trial in Germany. *Journal of Diabetes & Metabolic Disorders*, *23*(1), 519–532. <https://doi.org/10.1007/s40200-023-01290-6>

8. Duong, T., Olsen, Q., Menon, A., Woods, L., Wang, W., Varnfield, M., Jiang, L., & Sullivan, C. (2025). Digital health interventions to prevent type 2 diabetes mellitus: Systematic review. *Journal of Medical Internet Research*, 27, e67507. <https://doi.org/10.2196/67507>
9. Goyal, R., Singhal, M., & Jialal, I. (2023). Type 2 diabetes. In *StatPearls*. StatPearls Publishing. <https://www.ncbi.nlm.nih.gov/books/NBK513253/>
10. He, Q., Zhao, X., Wang, Y., Xie, Q., & Cheng, L. (2022). Effectiveness of smartphone application-based self-management interventions in patients with type 2 diabetes: A systematic review and meta-analysis of randomized controlled trials. *Journal of Advanced Nursing*, 78(2), 348–362. <https://doi.org/10.1111/jan.14993>
11. Kerr, D., Ahn, D., Waki, K., Wang, J., Breznen, B., & Klonoff, D. C. (2024). Digital interventions for self-management of type 2 diabetes mellitus: Systematic literature review and meta-analysis. *Journal of Medical Internet Research*, 26, e55757. <https://doi.org/10.2196/55757>
12. Kim, J. E., Park, T. S., & Kim, K. J. (2022). The clinical effects of type 2 diabetes patient management using digital healthcare technology: A systematic review and meta-analysis. *Healthcare*, 10(3), 522. <https://doi.org/10.3390/healthcare10030522>
13. Lee, J. J. N., Abdul Aziz, A., Chan, S. T., Raja Abdul Sahrizan, R. S. F. B., Ooi, A. Y. Y., Teh, Y. T., Iqbal, U., Ismail, N. A., Yang, A., Yang, J., Teh, D. B. L., & Lim, L. L. (2023). Effects of mobile health interventions on health-related outcomes in older adults with type 2 diabetes: A systematic review and meta-analysis. *Journal of Diabetes*, 15(1), 47–57. <https://doi.org/10.1111/1753-0407.13346>
14. Maida, E., Caruso, P., Bonavita, S., Abbadessa, G., Miele, G., Longo, M., Scappaticcio, L., Ruocco, E., Trojsi, F., Esposito, K., Lavorgna, L., & Maiorino, M. I. (2025). Digital health in diabetes care: A narrative review from monitoring to the management of systemic and neurologic complications. *Journal of Clinical Medicine*, 14(12), 4240. <https://doi.org/10.3390/jcm14124240>
15. Martens, T., Beck, R. W., Bailey, R., Ruedy, K. J., Calhoun, P., Peters, A. L., Pop-Busui, R., Philis-Tsimikas, A., Bao, S., Umpierrez, G., Davis, G., Kruger, D., Bhargava, A., Young, L., McGill, J. B., Aleppo, G., Nguyen, Q. T., Orozco, I., Biggs, W., ... Bergenstal, R. M. (2021). Effect of continuous glucose monitoring on glycemic control in patients with type 2 diabetes treated with basal insulin: A randomized clinical trial. *JAMA*, 325(22), 2262–2272. <https://doi.org/10.1001/jama.2021.7444>
16. Moschonis, G., Siopis, G., Jung, J., Ewena, E., Willems, R., Kwaśnicka, D., Asare, B. Y. A., Kodithuwakku, V., Verhaeghe, N., Vedanthan, R., Annemans, L., Oldenburg, B., & Manios, Y. (2023). Effectiveness, reach, uptake, and feasibility of digital health interventions for adults with type 2 diabetes: A systematic review and meta-analysis of randomised controlled trials. *The Lancet Digital Health*, 5(3), e125–e143. [https://doi.org/10.1016/S2589-7500\(22\)00233-3](https://doi.org/10.1016/S2589-7500(22)00233-3)
17. Ravi, S., Meyerowitz-Katz, G., Yung, C., Ayre, J., McCaffery, K., Maberly, G., & Bonner, C. (2025). Effect of virtual care in type 2 diabetes management: A systematic umbrella review of systematic reviews and meta-analysis. *BMC Health Services Research*, 25(1), 348. <https://doi.org/10.1186/s12913-025-12496-0>
18. Stevens, S., Gallagher, S., Andrews, T., Ashall-Payne, L., Humphreys, L., & Leigh, S. (2022). The effectiveness of digital health technologies for patients with diabetes mellitus: A systematic review. *Frontiers in Clinical Diabetes and Healthcare*, 3, 936752. <https://doi.org/10.3389/fcdhc.2022.936752>
19. World Health Organization. (2016). *Global report on diabetes*. <https://www.who.int/publications/i/item/9789241565257>
20. World Health Organization. (2024). *Diabetes*. <https://www.who.int/news-room/fact-sheets/detail/diabetes>
21. Xiao, Y., Wang, Z., Zhang, L., Xie, N., Chen, F., Song, Z., & Zhao, S. (2025). Effectiveness of digital diabetes management technology on blood glucose in patients with type 2 diabetes at home: Systematic review and meta-analysis. *Journal of Medical Internet Research*, 27, e66441. <https://doi.org/10.2196/66441>
22. Yan, Y., Li, N., & Tian, C. (2025). Application of digital tools in the care of patients with diabetes: Scoping review. *Journal of Medical Internet Research*, 27, e72167. <https://doi.org/10.2196/72167>
23. Zhang, J., Ji, X., Xie, J., Lin, K., Yao, M., & Chi, C. (2023). Effectiveness of synchronous teleconsultation for patients with type 2 diabetes mellitus: A systematic review and meta-analysis. *BMJ Open Diabetes Research & Care*, 11(1), e003180. <https://doi.org/10.1136/bmjdr-2022-003180>