Istanbul Gelisim University Journal of Health Sciences (IGUSABDER), 29, Special Issue on Artificial Intelligence in Health Applications, (2026): 178-186.

Artificial Intelligence and Nursing in Management of Diabetes Mellitus

Gamze YEĞİN*, Songül KARADAĞ**

Abstract

The morbidity, mortality, and economic burden associated with diabetes mellitus and its complications make it an important health concern. Artificial intelligence, becoming prominent in today's advancing technology, refers to application systems or machines capable of imitating human cognitive functions and enhancing their performance with the data they acquire. Artificial intelligence can provide data-oriented, sensitive treatment and care methods in addition to existing methods, resulting in a paradigm shift in management of diabetes mellitus. Artificial intelligence-based virtual assistants offer people 24/7 service and answer their questions instantly, send reminders, and provide educational materials. They play an important role particularly in monitoring patients' blood glucose levels and reminding them to take their medications. Continuous and individualized support helps patients comply with treatment and keep their blood glucose levels under control; thus, enhancing their quality of life and ability to cope with diabetes mellitus.

Keywords: Diabetes management, artificial intelligence, nursing.

Diyabet Yönetiminde Yapay Zeka ve Hemşirelik

Öz

Diyabet ve diyabetik komplikasyonların yol açtığı morbidite, mortalite ve bunlara bağlı gelişen ekonomik yük, diyabetin önemli bir sağlık sorunu haline gelmesine neden olmaktadır. Günümüz gelişen teknolojisinde öne çıkan yapay zeka, insanın bilişsel işlevlerini taklit edebilen, elde ettiği veriler ile kendini geliştirme niteliklerine sahip uygulama sistemleri veya makineler anlamına gelmektedir. Yapay zekâ, diyabet bakımında bir paradigma değişimine yol açarak mevcut yöntemlere ek olarak veri odaklı hassas tedavi ve bakım yöntemleri sağlayabilmektedir. Yapay zeka destekli oluşturulan sanal asistanlar 7/24 erişilebilir olup, hastaların anlık sorularına yanıt verebilmekte, hatırlatıcılar gönderebilmekte ve eğitim materyalleri sunabilmektedir. Özellikle hastaların kan şekeri seviyelerini izlemede ve ilaç alımını hatırlatmada önemli rol oynamaktadır. Sürekli ve bireyselleştirilmiş destek sunulması, hastaların tedaviye uyumunu artırmakta ve kan şekeri kontrolünü iyileştirmektedir. Bunun sonucunda hastaların yaşam kalitesi artmakta ve diyabetle başa çıkma yetenekleri gelişmektedir.

Anahtar Sözcükler: Diyabet yönetimi, yapay zeka, hemşirelik.

Derleme Makale (Review Article)
Geliş / Received: 28.01.2026 & **Kabul / Accepted:** 29.06.2026
DOI: https://doi.org/10.38079/igusabder.1873892
* PhD Student, Çukurova University, Institute of Health Sciences, Department of Nursing, Adana, Türkiye.
E-mail: gamzeyegin@windowslive.com ORCID https://orcid.org/0009-0004-2891-5058
** Prof. Dr., Çukurova University, Faculty of Health Sciences, Department of Nursing, Adana, Türkiye.
E-mail: skaradag201778@gmail.com ORCID https://orcid.org/0000-0003-0604-8008

Istanbul Gelisim University Journal of Health Sciences (IGUSABDER) is indexed by TUBITAK ULAKBIM TR Index.
Web site: https://dergipark.org.tr/en/pub/igusabder
Contact: igusabder@gelisim.edu.tr

Introduction

Diabetes mellitus has become a global public health concern of the 21st century due to its ever-increasing prevalence[1]. Diabetes mellitus is a chronic metabolic disorder characterized by insufficient production of insulin in the pancreas or the body's inability to utilize insulin effectively[2]. The high preventable morbidity and mortality rates related to diabetes mellitus and its complications, and the associated economic burden cause this disorder to turn into a major health problem[1].

Today, digital health technologies play a crucial role in the treatment, care, and education for patients suffering from diabetes mellitus[3]. Artificial intelligence (AI), which has recently come to the forefront among digital health technologies, refers to application systems or machines capable of imitating human cognitive functions and enhancing their performance with the data they acquire[4]. In terms of its theoretical framework, AI includes various sub-fields such as machine learning algorithms, artificial neural networks, random forest algorithms and deep learning, as well as approaches such as logistic regressions and decision trees[5,6]. AI has a self-evolving structure that learns from past data. Therefore, it is capable of continuously updating and optimizing itself to achieve better outcomes[7]. Researchers have been studying on design and development of AI-based clinical decision support systems ever since the mid-20th century[1].

AI applications provide doctors with a comprehensive clinical decision support system by analyzing a wide range of sources such as medical images, laboratory results, medical histories and current data of patients. Algorithms such as convolutional neural networks can detect diseases from complex datasets, enable early detection of medical conditions by continuously monitoring data of patients, and thereby improve care processes.

Each patient's genetic, biochemical, and clinical conditions vary; therefore, individualized treatment plans are essential. AI analyzes separately genetic profiles, lifestyle, symptoms, and other data of each patient, provides personalized healthcare solutions, and makes this process more effective.

AI-based chatbots inform patients by answering their health-related questions and serve as patient advisors through their user-friendly interface. These chatbots support patients' self-management skills by analyzing their data on nutrition, exercise, sleep patterns, and stress levels, and accordingly giving them personalized recommendations. Thus, they are able to promote their health and elevate their well-being levels.

For healthcare professionals, it provides up-to-date and in-depth information on treatment methods and drug efficacy by processing medical images and analyzing medical literature, accelerates doctors' prescription processes, and increases accuracy rate. For physicians, AI organizes medical records of patients, thus allowing to quickly access their medical histories and facilitating data management and prognosis monitoring[3,8,9].

Istanbul Gelisim University Journal of Health Sciences (IGUSABDER) is indexed by TUBITAK ULAKBIM TR Index.
Web site: https://dergipark.org.tr/en/pub/igusabder
Contact: igusabder@gelisim.edu.tr

This review aims to both demonstrate how AI can be utilized in management of diabetes mellitus including the advantages it offers and to serve as a guideline for future studies on this field.

Artificial Intelligence in Management of Diabetes Mellitus

Modern medical approaches on diabetes mellitus involve education of patients on diabetes mellitus, regular monitoring of their blood glucose levels, healthy diet, exercise, lifestyle changes, and drug treatment (such as oral antidiabetics and insulin)[10]. Traditional treatment approaches in the prevention and management of diabetes mellitus remain inadequate in various aspects. Patients with diabetes mellitus should be checked regularly to monitor their blood glucose levels and prevent possible complications. An integrated team of nurses, podologists, dieticians, nephrologists, endocrinologists, and ophthalmologists take charge in managing diabetes mellitus. However, this process may be interrupted due to short appointment times, high number of patients, the need for continuous follow-up, insufficient capacity of health services, and lack of healthcare professionals[1,11]. It is considered that AI will help address these issues and mitigate the disease burden of diabetes mellitus in the future. AI is also expected to enhance diabetic patients' quality of life and make the healthcare system run more efficiently in management of this disease[1]. These patients should regularly monitor their blood glucose levels, adhere to appropriate diet and exercise programs, and take their medications properly[12]. Continuous information and support during this management process helps boost patients' motivation and control over this disease[13]. The use of AI-based digital health technologies for managing this disease can help develop diabetes prevention strategies for high-risk populations, follow up patients with diabetes mellitus who are unable to attend physician appointments, keep them informed about their disease, promote self-management, and save time and cost through remote patient monitoring[1]. The disruption in the follow-up of these patients during the COVID-19 pandemic has shown how vital such technologies are for their remote follow-up through virtual clinics[14].

AI can provide data-oriented, sensitive treatment and care methods in addition to existing methods, resulting in a paradigm shift in management of diabetes mellitus[15]. AI-based virtual assistants offer people 24/7 service and answer their questions instantly, send reminders, and provide educational materials. They play a crucial role particularly in monitoring their blood glucose levels and reminding them to take their medications[16].

Artificial Intelligence Applications Used in Management of Diabetes Mellitus

Treatment of diabetes mellitus mostly depends on self-management of the patient. As AI has advanced, patients can generate data for their parameters and manage their diabetes mellitus. Web-based programs can be integrated into smartphone applications and wearable technological devices, making them easier to use[9,17]. AI is capable of analyzing the data of patients and offering personalized care for them; thus, providing an individual-centered approach[18].

Istanbul Gelisim University Journal of Health Sciences (IGUSABDER) is indexed by TUBITAK ULAKBIM TR Index.
Web site: https://dergipark.org.tr/en/pub/igusabder
Contact: igusabder@gelisim.edu.tr

A study conducted with patients who suffered from type 1 diabetes mellitus reported that while using an insulin pump, the AI-based virtual nurse support lowered the hemoglobin A1c (HbA1c) levels of patients and reduced number of their hospitalizations[19]. Likewise, another study reported that the virtual assistant application developed for older patients with Type 2 diabetes mellitus improved their self-care, medication intake, physical activity and dietary adherence in such a way that healthcare professionals want them to do[20].

In an AI model developed to predict the development of type 2 diabetes mellitus, the variables of fasting plasma glucose, HbA1c, triglycerides, BMI, gamma-glutamyl transferase, uric acid, age, gender, smoking, alcohol, physical activity, and family history were used. The studies proved that performance of this prediction model was highly effective[21].

Nowadays, AI systems that deliver insulin through an insulin pump in accordance with the values in the continuous glucose measurement system are used for type 1 diabetes mellitus[15]. Likewise, an AI-based system adapted for remote adjustment of insulin dosage sends the data of patient's self-blood glucose measurement to a cloud server, and then a physician can inform patients and offer them advices[22].

Related studies have indicated that algorithms such as deep learning and machine learning can predict blood glucose levels[23]. One AI-based continuous glucose monitoring smartphone application demonstrated that AI could predict hypoglycemic episodes half an hour before they happened and notify the patient in advance using the data with the accuracy of 98.5%.

Advanced AI algorithms, such as decision trees, can detect diabetic foot ulcers in images and assess the risk of amputation[25,26]. The application was developed by Yap et al., to determine whether or not an image contains a diabetic foot ulcer and it has been highly beneficial for clinicians or visually impaired patients in regions where people are not highly trained on management of diabetic foot ulcer[25].

Machine learning and deep learning have shown advances in the field of medical imaging. Image and pattern recognition has become increasingly important in the analysis of retinal scans for individuals with diabetes mellitus. Some applications perform well[27].

Management of diabetes mellitus requires physical health as well as psychosocial support. Depression and anxiety are prevalent among diabetic patients and only complicate the management of the disease. AI-assisted chatbots provide emotional support to patients, boost their motivation, and help them cope with stress. These systems also support regular follow-up and treatment processes by facilitating users' access to healthcare professionals[28].

AI algorithms can provide long-term health monitoring by collecting personal data of patients. Changes in their health conditions can be detected at an early stage, whereby

Istanbul Gelisim University Journal of Health Sciences (IGUSABDER) is indexed by TUBITAK ULAKBIM TR Index.
Web site: https://dergipark.org.tr/en/pub/igusabder
Contact: igusabder@gelisim.edu.tr

healthcare professionals, especially nurses, adjust their treatment plans in a timely and effective manner[29]. Continuous and individualized support helps patients comply with treatment and keep their blood glucose levels under control; thus, enhancing their quality of life and ability to cope with diabetes mellitus[30].

Artificial Intelligence and Nursing

The impact of AI has been increasing in various roles of nursing, including care, education, counseling, research, management, and collaboration. Tasks such as organizing shift schedules and workflow charts, examining diagnostic and observation procedures, digitally recording patient data, measuring vital signs, and analyzing data of vital signs—all performed with the help of AI—reduce the workload on nurses, allowing them to devote more time to healthcare and carry out these tasks more quickly and accurately. In high-risk healthcare environments (such as radiation, pressure, and chemotherapy rooms), the use of AI-based systems and robots can reduce the frequency of nurses' exposure to hazardous conditions, contribute to improved care standards, and lead to higher job satisfaction and lower turnover rates. In regions offering limited access to healthcare, AI can enable nurses to maintain uninterrupted communication with patients regardless of location, thereby contributing to the equitable and fair delivery of nursing services[31,32].

Concepts such as AI-driven data analysis, digital data security, conscious use, and digital literacy bring new responsibilities for nurses. Nursing educators, nursing managers, and nurses must improve their skills and serve as guides to increase the use of AI technologies in nursing[31].

Failing to account for the balance between humans and technology in decision-making processes, and neglecting the unique interactions nurses have with patients as well as lack of AI support in their roles of providing empathy and emotional support can undermine the human-centered care approach and negatively affect the patient experience[32].

Moreover, the use of AI is not equal across the board because many patients lack digital literacy or cannot use, access, or afford computer technology or the internet. Various strategies, such as improved access and more training may be needed to solve this issue[11].

Furthermore, the widespread use of AI brings along some ethical and security concerns. Security of user data, ethics, and user privacy are critical for the development of these technologies[33]. Also, inaccurate assessments or recommendations made by AI lead to inadequate care; however, who is responsible for that is unclear. Healthcare professionals should remember that AI is only a supportive tool and does not substitute their own clinical judgement[26]. Mechanisms that would supervise the recommendations of these systems should be established and final decisions should be designed to preserve the autonomy of healthcare professionals and maintain nurse-patient interaction and communication[32].

Istanbul Gelisim University Journal of Health Sciences (IGUSABDER) is indexed by TUBITAK ULAKBIM TR Index.
Web site: https://dergipark.org.tr/en/pub/igusabder
Contact: igusabder@gelisim.edu.tr

Conclusion

AI has the potential to improve the care of individuals with diabetes mellitus in the healthcare process by offering advantages such as enhancing screening and diagnostic processes, delivering earlier and targeted treatments, predicting possible complications, and lowering morbidity and mortality rates. It is also capable of optimizing care of diabetes mellitus by delivering personalized, precise, and data-oriented support to patients and healthcare professionals. By overcoming challenges and using opportunities effectively, AI could revolutionize diabetes care and improve the lives of millions of people with diabetes mellitus around the world. To maximize the potential of AI, developers, clinicians, and policymakers should collaborate with each other and establish standards for patient-centered design, ethical and regulatory frameworks, along with data security and privacy. Furthermore, healthcare professionals should be trained for the effective integration of AI into clinical practice, and the effectiveness of these interventions should be evaluated with evidence-based, long-term studies.

Author Contributions

Idea / Concept: GY, Design: GY, SK, Supervision/Consultancy: SK, Analysis / Interpretation: GA, SK, Literature Review: GY, Writing the Article: GY, SK, Critical Review: SK.

Funding: No funding has been received.

Conflict of interest: The authors have declared that there is no conflict of interest among them.

REFERENCES

1. Guan Z, Li H, Liu R, et al. Artificial intelligence in diabetes management: Advancements, opportunities, and challenges. *Cell Rep Med*. 2023;4(10):101213.

2. Cleveland Clinic. Diabetes: what It Is, Causes, Symptoms, Treatment & Types. 2023; Available from: https://my.clevelandclinic.org/health/diseases/7104-diabetes

3. Ceviz A, Özden G. Diyabet yönetiminde yapay zeka destekli sanal hemşirelerin rolü ve geleceği. *Artuklu Health*. 2025;11:80-87.

4. McCarthy J, Minsky ML, Shannon CE. A proposal for the Dartmouth summer research project on artificial intelligence. *AI Mag*. 2006;27:12–14.

5. Jiang F, Jiang Y, Zhi H, et al. Artificial intelligence in healthcare: past, present and future. *Stroke Vasc Neurol*. 2017;2:230-43.

6. Li J, Huang J, Zheng L, Li X. Application of artificial intelligence in diabetes education and management: present status and promising prospect. *Frontiers in Public Health*. 2020;8:2296-2565.

7. İşcan H, Durgun Kaygısız A. Yapay zekâ: alt dalları ve uygulama alanları. *Aksaray Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*. 2024;16(4):201-234.

8. Hoşgör H, Güngördü H. A Qualitative study on the areas of use of artificial intelligence in healthcare. *European Journal of Science and Technology*. 2022;35:395 407.

9. Sarma AD, Devi M. Artificial intelligence in diabetes management: transformative potential, challenges, and opportunities in healthcare. *Hormones*. 2025;24:307–322.

10. Davies MJ, Aroda VR, Collins BS, et al. Management of hyperglycemia in type 2 diabetes, 2018. A consensus report by the American Diabetes Association (ADA) and the European Association for The Study of Diabetes (EASD). *Diabetes Care*. 2018;41(12):2669–2701.

11. Mackenzie SC, Sainsbury CAR, Wake DJ. Diabetes and artificial intelligence beyond the closed loop: a review of the landscape, promise and challenges. *Diabetologia*. 2024;67:223–235.

12. Powers MA, Bardsley J, Cypress M, et al. Diabetes self-management education and support in type 2 diabetes: A joint position statement of the American Diabetes Association, the American Association of diabetes educators, and the Academy of nutrition and dietetics. *Clinical Diabetes*. 2017;43(1):40–53.

13. Polonsky WH, Fisher L, Hessler D, Edelman SV. Investigating hypoglycemic confidence in type 1 and type 2 diabetes. *Diabetes Technology and Therapeutics*. 2017;19(2):131–6.

14. Garg SK, Almurashi AM, Rodriguez E. Virtual clinics for diabetes care. *Diabetes Technology & Therapeutics*. 2023;25(1):2–14.

15. Papazafiropoulou AK. Diabetes management in the era of artificial intelligence. *Arch Med Sci Atheroscler Dis*. 2024;25;9:e122-e128.

16. Gal RL, Raghinaru D, Aleppo G, et al. 149-LB: Telemedicine intervention impact on diabetes self-management—Twelve-Month Virtual Diabetes Specialty Clinic (VDISC) Study Outcomes. *Diabetes*. 2023;72(1).

17. Rollo ME, Aguiar EJ, Williams RL, et al. eHealth technologies to support nutrition and physical activity behaviors in diabetes self-management. *Metab Syndr Obes*. 2016;9:381-90.

18. Mahmoudi H, Moradi MH. The progress and future of artificial intelligence in nursing care: a review. *The Open Public Health Journal*. 2024;17:e18749445304699.

19. Mumford B, Oldham V, Lee D, Jones J, Das G. The effectiveness of running virtual clinics as part of insulin pump services for patients with type 1 diabetes. *Endocrine and Metabolic Science*. 2021;3:100083.

20. Buinhas S, Cláudio AP, Carmo MB, et al. Virtual assistant to improve self-care of older people with type 2 diabetes: First prototype. *Communications in Computer and Information Science*. 2019;1016:236–248.

21. Deberneh HM, Kim I. Prediction of type 2 diabetes based on machine learning algorithm. *Int J Environ Res Public Health*. 2021;18:3317.

22. Nimri R, Oron T, Muller I, et al. Adjustment of insulin pump settings in type 1 diabetes management: advisor pro device compared to physicians' recommendations. *J Diabetes Sci Technol*. 2022;16:364-72.

23. Kozinetz RM, Berikov VB, Semenova JF, Klimontov VV. Machine learning and deep learning models for nocturnal high- and low-glucose prediction in adults with Type 1 Diabetes. *Diagnostics*. 2024;14:740.

24. Abraham SB, Arunachalam S, Zhong A, Agrawal P, Cohen O, McMahon CM. Improved real-world glycemic control with continuous glucose monitoring system predictive alerts. *J Diabetes Sci Technol*. 2021;15:91-7.

25. Goyal M, Reeves ND, Rajbhandari S, Yap MH. Robust methods for real-time diabetic foot ulcer detection and localization on mobile devices. *IEEE J Biomed Health Inform*. 2019;23(4):1730-1741.

26. Persson V, Lovén Wickman U. Artificial intelligence as a tool for self-care in patients with Type 1 and Type 2 Diabetes—An integrative literature review. *Healthcare*. 2025;13(8):950.

27. Skandarani Y, Jodoin PM, Lalande A. GANs for medical image synthesis: an empirical study. *Journal of Imaging*. 2023;9(3):69.

28. McCoy MA, Theeke LA. A systematic review of the relationships among psychosocial factors and coping in adults with type 2 diabetes mellitus. *International Journal of Nursing Sciences*. 2019;6(4):468–477.

29. Wu Y, Yao X, Vespasiani G, et al. Mobile app-based interventions to support diabetes self-management: A systematic review of randomized controlled trials to identify functions associated with glycemic efficacy. *JMIR MHealth and UHealth*. 2017;5(3):e6522.

30. Rony MKK, Parvin MR, Ferdousi S. Advancing nursing practice with artificial intelligence: Enhancing preparedness for the future. *Nurs Open*. 2024;11(1):10.

31. Gökçen Gökalp M, Üzer MA. Nursing Care in the Age of Artificial Intelligence. *SBU Journal of Nursing*. 2024; 6(1), 89-94.

32. Nurkalem S, Gülseven Karabacak B. Artificial intelligence in nursing: The ethical and humanistic dimensions of the technological revolution. *Journal of Health and Life Sciences*. 2025;7(2), 116-123.

33. Almalawi A, Khan AI, Alsolami F, Abushark YB, Alfakeeh AS. Managing security of healthcare data for a modern healthcare system. *Sensors*. 2023;23(7):3612.