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RESEARCH ARTICLE

DIABETES CARE IN THE ERA OF ARTIFICIAL INTELLIGENCE: APPLICATIONS, OPPORTUNITIES AND CHALLENGES

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Abstract

Background: Effective management of glycemic levels is important to minimalizing complications associated with diabetes.The traditional methods like self-monitoring, regular clinical assessments and standardized treatment plans. That way frequently encounters issues such as patient non-compliance, excessive data and restricted clinical resources.The start of continuous glucose monitoring (CGM), insulin delivery systemsand wearable technology have generated substantial volumes of real-time data, underscoring the necessity for intelligent systems capable of efficiently processing and interpreting this information.Artificial intelligence (AI) presents promising solutions to improve diabetes management through personalized, adaptive and predictive strategies.

Methods: This article consolidates recent research that utilized AI techniquesincluding machine learning (ML), deep learning (DL), reinforcement learning (RL) and natural language processing (NLP)in significant areas of glycemic management. The examination concentrated on applications like glucose forecasting, insulin dosing algorithms, closed-loop systems and digital coaching platforms. The studies were assessed according to the type of algorithm, sources of data input, validation techniques and clinical efficacy. A particular focus was given to model precision, interpretability, and compatibility with current diabetes technologies.

Findings: Artificial Intelligence (AI) has shown notableimprovements in the management of diabetes. Machine Learning (ML) models have successfully forecasted hypoglycemia and categorized patient risk with using Continuous Glucose Monitoring (CGM) and electronic health record (EHR) data. Deep Learning (DL) frameworks like convolutional and recurrent neural networks, have attained high precision in predicting short-term glucose levels.

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Reinforcement Learning (RL) algorithms have optimized adaptive insulin dosing within closed-loop systems, while Natural Language Processing (NLP) methods have improved behavioral monitoring and clinical documentation. The integration of mobile applications and wearable technology has further facilitated patient engagement and self-management.

Introduction:-

Diabetes mellitus is a chronic metabolic condition due to high blood glucose levels resulting from insufficient insulin production, decreased insulin sensitivity or a combination of both factors(1). This condition poses a significant global health challenge, leading to increased rates of morbidity, mortality and healthcare expenditures(2). It is crucial to keep blood glucose levels within the designated target range, referred to as effective glycemic control, to avert complications like neuropathy, nephropathy, retinopathy, cardiovascular diseases and strokes(3). Despite the availability of various advanced treatment options, achieving and sustaining optimal glycemic control continues to be a formidable task, particularly for individuals with chronic illnesses or multiple health issues.

Figure – 1

Diabetes emerged as a worldwide epidemic, impacting millions of individuals across various regions. According the International Diabetes Federation (IDF) reports that more than 540 million adults are currently diagnosed with the condition, with projections indicating that this figure could exceed 640 million by the year 2030(4). The significant burden is observed in low- and middle-income countries, where access to contemporary resources like continuous glucose monitoring (CGM), insulin pumps and structured educational programs is still inadequate(5). In addition, the personal hardships of individuals with diabetes imposes a substantial financial burden on healthcare systems, underscoring the pressing necessity for innovative and sustainable management approaches.

Conventional diabetes management relies on self-monitoring of blood glucose (SMBG), regular clinic appointments and clinician-guided treatment modifications(5). The traditional methods frequently do not account for the continuous fluctuations in glucose levels influenced with factors like diet, physical activity, stress and adherence to medication. As real-time data from CGM devices, insulin pumps, mobile applications and wearable sensors proliferate, both patients and healthcare professionals encounter difficulties in making sense of this intricate information(6). This situation results in a considerable disconnect between the generation of data and the ability to make informed clinical decisions.

Artificial intelligence (AI) havetextured as a formidable means to address this disparity(7). Through these application of machine learning, deep learning and various computational methodologies, AI is capable of examining extensive datasets, uncovering concealed trends and reliably forecasting future glucose patterns(8). Systems powered by AI can facilitate automated insulin administration, tailored dietary and activity suggestions, early identification of hypo- and hyperglycemia as well as ongoing remote surveillance(9). These advancements signify a transition towards precision medicine, fostering a more individualized and data-informed approach to diabetes management.

Strategy and Methodology:-

A comprehensive literature search was conducted using major databases including PubMed, Scopus, Web of Science, and Google Scholar. Relevant studies were identified using predefined keywords. Articles published in English were screened based on titles, abstracts, and full texts. Additional references were retrieved through citation tracking to ensure completeness.

Inclusion and exclusion criteria:

The review included studies published between 2018 and 2025 that examined the application of artificial intelligence, machine learning, deep learning, or real-time analytics in diabetes diagnosis, prediction, monitoring and management. Only peer-reviewed full-text articles written in English and involving human subjects with type 1, type 2 was excluded.If they lacked an AI component, were unrelated to diabetes, were non-English, editorial or opinion, animal or laboratory-based research, duplicate publications and full texts that were excluded.

AI Technologies Overview:

Artificial intelligence (AI) encompasses a broad spectrum of computational methodologies that allow machines to replicate human learning, reasoning and decision-making processes(10). In the context of diabetes management, AI analyzes extensive and intricate datasets, frequently gathered in real-time, to facilitate immediate prediction, diagnosis and optimization of treatment(11). The primary subfields of AI utilized in glycemic management consist of machine learning (ML), deep learning (DL), natural language processing (NLP), and reinforcement learning (RL)(12). Each of these subfields employs unique computational techniques and data types, yet they all share the common goal of enhancing clinical decision-making and providing more tailored patient care.

Machine Learning (ML):

Machine learning (ML) encompasses algorithms which acquire knowledge from data to distinguish patterns or may forecast outcomes without the need for explicit programming(13). In the context of diabetes management, ML models are frequently employed to anticipate hypoglycemia, project future glucose trajectories and categorize patients according to their risk levels. Supervised ML algorithms like random forests, support vector machines and gradient boosting treesexamine structured data derived from continuous glucose monitoring (CGM), insulin administration, dietary logs, and electronic health records (EHRs)(14). The unsupervised ML techniques, including clustering and principal component analysis are utilized to uncover concealed patient subgroups and behavioral trends that affect glycemic regulation.

Deep Learning (DL):

Deep learning (DL) represents a distinct subset of machine learning that employs multi-layered neural networks to capture intricate, nonlinear and time-dependent relationships inherent in data. Convolutional neural networks (CNNs) and recurrent neural networks (RNNs), particularly long short-term memory (LSTM) models are extensively utilized for analyzing continuous glucose monitoring (CGM) signals and forecasting short-term glucose trends(15). These models excel in detecting subtle temporal variations and interactions among physiological factors, thereby facilitating more precise and adaptive glycemic control(16). The nature of DL models often complicates the interpretation of their decision-making processes which can undermine clinical trust and hinder regulatory approval.

Natural Language Processing (NLP):

Natural language processing (NLP) enables artificial intelligence systems to comprehend, analyze and produce human language(17). The situation of diabetes management, NLP is employed to extract critical information from unstructured data sources, including physician notes, patient diaries and social media content(18). It can recognize problems like medication non-adherence, identify potential complications and facilitate the automated summarization of patient records. When combined with electronic health systems, NLP aids in ongoing monitoring and provides personalized feedback to improve diabetes education and self-management.

Reinforcement Learning (RL):

Reinforcement learning (RL) signifies a methodology in artificial intelligence where algorithms enhance with their decision-making capabilities and engaging with an environment and obtaining feedback in the form of rewards or penalties(19).In the realm of diabetes management, RL has played a pivotal role in the development of closed-loop insulin delivery systems, commonly stated to as "artificial pancreas" models(20). These systems are designed to continuously modify insulin delivery based on real-time continuous glucose monitoring (CGM) data, ensuring that glucose levels remain within the desired range(21).Through RL, these systems can adaptively respond to various factors such as meal intake, physical activity and individual physiological variations, thereby offering a sophisticated and autonomous approach to glycemic control.

Applications in Glycemic Management:

Continuous Glucose Monitoring (CGM)

Artificial Intelligence enhances continuous glucose monitoring (CGM) with examining glucose trends in real time, detecting variations and forecasting upcoming glucose levels. This facilitates prompt interventions and contributes to achieving more consistent glycemic control(22). Here below the table 1, a Comparison of AI technologies used in glycemic management.

Table 1. Comparison of AI technologies used in glycemic management

AI Technology	Core Principle	Typical Data Inputs	Common Use Cases in Diabetes	Advantages	Limitations	Key References
Machine Learning (ML)	Learns patterns from labeled datasets using statistical models	CGM readings, insulin dose, diet, physical activity, EHR data	Hypoglycemia prediction, glucose level forecasting, patient risk stratification	Simple implementation, interpretable models	May underperform on highly nonlinear data; requires feature engineering	Wolff, M.K. Research Foundations for Blood Glucose Prediction2025Pages 80(23)
Deep Learning (DL)	Multi-layer neural networks capturing complex nonlinear relationships	Time-series glucose data, wearables, image data, multimodal inputs	Glucose trend prediction, signal denoising, automated insulin dosing	High predictive accuracy, handles raw data	Requires large datasets, less interpretable, computationally demanding	Ramazi Ret al. (24)
Natural Language Processing (NLP)	Understands and analyzes human language to extract structured information	Clinical notes, patient diaries, EHR narratives, chatbots	Automated clinical text mining, behavioral monitoring, patient communication	Processes unstructured data, supports patient engagement	Context sensitivity, domain adaptation challenges	Wishal k et al.(25)

Reinforcement Learning (RL)	Learns optimal actions through trial-and-error using reward-based feedback	Real-time CGM and insulin pump data	Closed-loop insulin control (“artificial pancreas”), adaptive insulin dosing	Enables continuous self-learning and dynamic adaptation	Needs safe training environment, interpretability issues	Yoo. et al.(26)

AI-Driven Insulin Dosing Algorithms:
Machine learning models integrate data from continuous glucose monitors (CGM), dietary logs and activity trackers to enhance insulin dosing(1). These algorithms customize insulin administration according to individual requirements, thereby minimizing the likelihood of both hypoglycemia and hyperglycemia.

Predictive Models for Hypoglycemia:
AI-powered predictive analytics can detect patients who are at risk of hypoglycemia prior to its onset(27). These models improve patient safety and support healthcare professionals in making well-informed decisions regarding diabetes management.

The elements an effective diabetes management application:
A successful diabetes management application tough to be developed through the collaboration of healthcare professionals, researchers and technology specialists from both local and global perspectives. This interdisciplinary strategy guarantees that the application addresses a variety of clinical requirements while also being culturally appropriate for its users, as like below in figure 1.

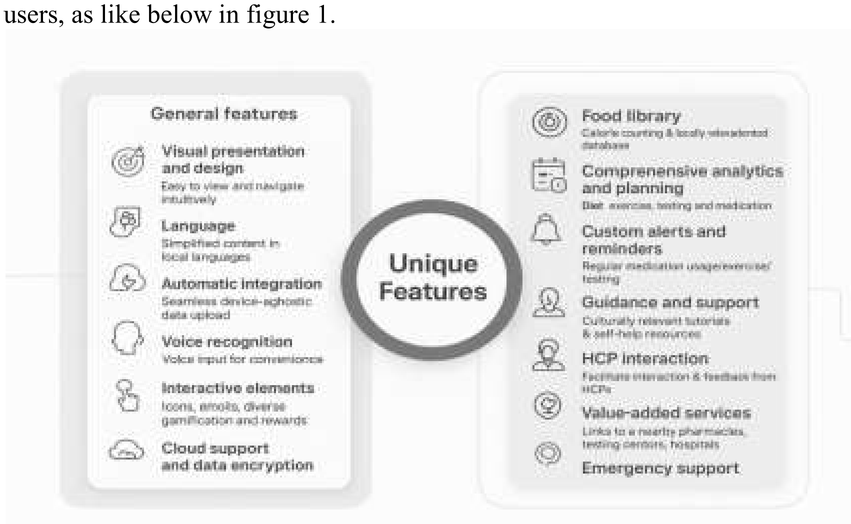

Figure – 2

Employing standardized reporting frameworks, like the mHealth Evidence Reporting(28) and Assessment (mERA) guidelines are essential for guaranteeing accuracy, reliability and transparency in the assessment of app performance(29).The selection of app features ought to be informed with evidence derived from randomized controlled trials, systematic reviews, user feedback and clinical evaluations.This evidence-based methodology facilitates the development of tools that cater to psychological, behavioraland practical requirements, that’s why assisting users in attaining improved glycemic control and promoting sustained adherence to self-management practices.

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Smart Apps and Wearables:
I-driven mobile applications and wearable technology consistently monitor health information, providing feedback, alerts and tailored suggestions to aid in the self-management of diabetes.

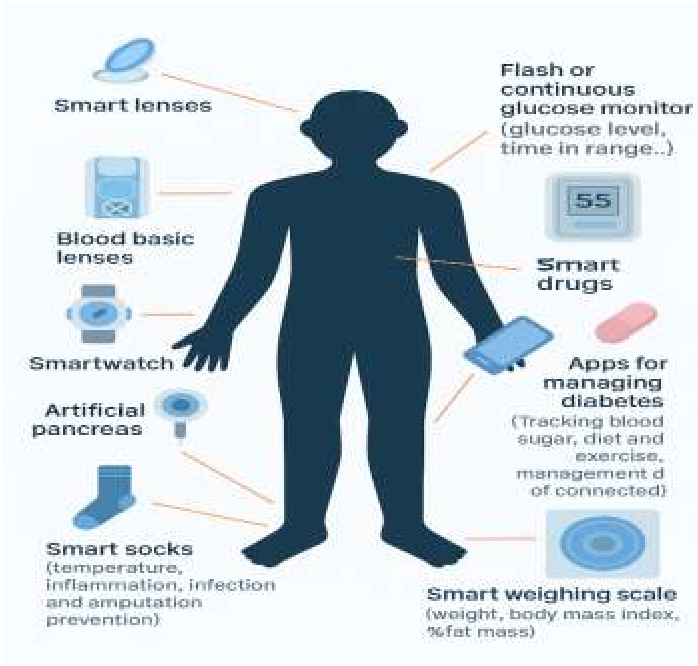

Figure – 2

Figure 2 depicts the incorporation of intelligent technologies in the management of diabetes. A central human figure 2 connects to devices like smart lenses, glucose monitoring systems and artificial pancreas technologies. Each device tracks essential metricsglucose levels, heart rate and inflammationand transmits data to AI platforms. This configuration exemplifies a comprehensive, real-time strategy for personalized glycemic regulation.

Challenges :
The implementation of AI in healthcare encounters several significant challenges like risks to data privacy, biases present in training datasets, regulatory obstacles and issues related to clinician trust(30). Privacy issues emerge from extensive data collection and inadequate storage security. It can be alleviated through the use of encryption, federated learning and adherence to legal regulations. Biasness when datasets fail to adequately represent certain demographic groups or perpetuate historical inequalities(31). This issue can be mitigated with employing diverse datasets, fairness-oriented algorithms and continuous validation processes. Regulatory hurdles arise from the dynamic nature of laws and the lack of uniform standards, necessitating proactive engagement with regulatory bodies and compliance with AI frameworks(32). Establishing trust among clinicians hinges on the development of explainable AI, a focus on user-centered design, and comprehensive training to facilitate seamless integration into clinical practices.

Challenge root causes mitigation strategies

Aspects	**Challenge**	**Strategies**	**References**
Data Privacy and Security	Large-scale health data collection increases exposure risk - Inconsistent encryption and anonymization standards - vulnerabilities in cloud-based storage and data transfer	Implement end-to-end encryption and secure data pipelines - Apply federated learning and differential privacy techniques - Regular security audits and compliance with HIPAA/GDPR	Kothai et al. (33)

Bias in Training Datasets	- Historical biases embedded in electronic health records (EHRs) - Underrepresentation of minority populations - Selection bias in clinical trial data	- Curate diverse, representative datasets - Use bias detection and fairness-aware AI algorithms - Continuous model validation across subpopulations	Lawrance et al.(34)
Regulatory Hurdles	- Rapid evolution of AI outpaces legislation - Ambiguous approval pathways for AI-based medical devices - Variability in international regulatory standards	- Engage regulators early in development - Adopt transparent reporting and validation frameworks - Align with ISO/IEC AI standards and FDA guidance	Reddy et al. (35)
Clinician Trust and Adoption	- Limited interpretability of AI predictions (“black box” models) - Fear of replacement or liability concerns - Lack of integration with existing workflows	- Implement explainable AI (XAI) techniques - Provide clinician education and training - Co-design AI tools with end-users for seamless integration	Ahamed et al. (36)

Intelligent medicine used with artificial intelligence (AI) holds the potential to revolutionize healthcare. Its implementation can reduce costs, enhance patient outcomes and improve diagnostic precision through predictive analytics, tailored treatment strategies and more effective resource distribution like AI can detect high-risk patients for early intervention, potentially decreasing healthcare expenses as much as 30% but facilitating timely treatments that enhance health results(37).

Despite its potential the integration of AI in healthcare encounters considerable obstacles that delay its widespread acceptance. Its cognitive capabilities are limited, which may result in mistakes when addressing cases beyond the range of its training data or when utilizing low-quality or diverse datasets. AI models frequently lack generalizability, exhibiting biases and diminished accuracy for specific racial or ethnic populations, which raises issues regarding equity. Additional challenges include establishing accountability for diagnostic inaccuracies, protecting patient privacy within extensive integrated databases and addressing the lack of transparency in AI algorithms. It can undermine clinician confidence and obstruct effective application.

Conclusion:-

Artificial intelligence (AI) is reshaping diabetes management with transforming the complex clinical data into actionable insights for bothhealthcare professionals and patients. The machine learning, deep learning and real-time analytics. AI systems can predict blood glucose fluctuations, optimize insulin dosing and support personalized treatment planning but the smart applications and wearable technologies have improved monitoring and patient engagement. The current evidence shows variability in model accuracy, limited external validation and challenges in integrating AI tools into routine clinical workflow. Additionally, issues related to algorithmic bias, data privacy, transparency and regulatory compliance remain inadequately resolved.

Overall, although AI demonstrates substantial potential to enhance the precision, proactivity and patient-centeredness of diabetes care, important research gaps persist. Future work should prioritize large-scale clinical validation of AI algorithms, development of unbiased and interoperable datasets, clearer regulatory frameworks and strategies to incorporate AI tools seamlessly into clinical decision-making. Addressing these gaps will be essential to ensure safe, equitable and effective use of AI in diabetes management.

Abbreviations:
AI – Artificial Intelligence
ML – Machine Learning
DL – Deep Learning
NLP – Natural Language Processing

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RL – Reinforcement Learning
CGM – Continuous Glucose Monitoring
EHR – Electronic Health Record
mERA – mHealth Evidence Reporting and Assessment

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References:-

1.Sarma AD, Devi M. Artificial intelligence in diabetes management: transformative potential, challenges, and opportunities in healthcare. Hormones. 2025:1–16.
2.Vargas-Santiago M, León-Velasco DA, Maldonado-Sifuentes CE, Chanona-Hernandez L. A State-of-the-Art Review of Artificial Intelligence (AI) Applications in Healthcare: Advances in Diabetes, Cancer, Epidemiology, and Mortality Prediction. Computers. 2025;14(4):143.
3.Gupta S. AI-Powered Approaches for Diabetes Detection in Healthcare and Monitoring: A Review of Recent Advances. Journal of Global Trends in Artificial Intelligence. 2025;1(1):7–14.
4.Zhao Q, Peng C. The Global Burden of Disease Attributable to High Fasting Plasma Glucose in 204 Countries and Territories, 1990–2021: A Systematic Analysis of the Global Burden of Disease Study 2021. Cheng, The Global Burden of Disease Attributable to High Fasting Plasma Glucose in.204:1990–2021.
5.Cangelosi G, Conti A, Caggianelli G, Panella M, Petrelli F, Mancin S, et al. Barriers and Facilitators to Artificial Intelligence Implementation in Diabetes Management from Healthcare Workers' Perspective: A Scoping Review. Medicina. 2025;61(8):1403.
6.Lim P-C, Chong Y-W, Chie Q-T, Zainal H, Yau K-LA, Teoh S-H. Healthcare professionals' perspectives on artificial intelligence (AI)-based mobile applications (apps) for diabetes education and behavioural management. Digital Health. 2025;11:20552076251329991.
7.Guan H, Wang Y, Niu P, Zhang Y, Zhang Y, Miao R, et al. The role of machine learning in advancing diabetic foot: a review. Frontiers in Endocrinology. 2024;15:1325434.
8.Kiran M, Xie Y, Anjum N, Ball G, Pierscionek B, Russell D. Machine learning and artificial intelligence in type 2 diabetes prediction: a comprehensive 33-year bibliometric and literature analysis. Frontiers in Digital Health. 2025;7:1557467.
9.Sharma A, Dixit S, Gupta S. Future of diabetic management using artificial intelligence. Artificial Intelligence in Healthcare: CRC Press; 2024. p. 104–27.
10.Joshi R, Pandey K, Kumari S, Badola R. Artificial Intelligence: A Gateway to the Twenty-First Century. The Intersection of 6G, AI/Machine Learning, and Embedded Systems: CRC Press; 2025. p. 146–72.
11.Faiyazuddin M, Rahman SJQ, Anand G, Siddiqui RK, Mehta R, Khatib MN, et al. The impact of artificial intelligence on healthcare: a comprehensive review of advancements in diagnostics, treatment, and operational efficiency. Health Science Reports. 2025;8(1):e70312.
12.Mir RR, Haq NU, Ishaq K, Safie N, Dogar AB. Impact of machine learning on dietary and exercise behaviors in type 2 diabetes self-management: a systematic literature review. PeerJ Computer Science. 2025;11:e2568.
13.Kumar S, Machireddy JR, Sankaran T, Sholapurapu PK. Integration of Machine Learning and Data Science for Optimized Decision-Making in Computer Applications and Engineering. Journal of Information Systems Engineering and Management. 2025;10.
14.Noor N, Norman G, Sonabend R, Chao L, Kamboj M, Golden L, et al. An observational crossover study of people using real-time continuous glucose monitors versus self-monitoring of blood glucose: real-world evidence

using electronic medical record data from more than 12,000 people with type 1 diabetes. Journal of diabetes science and technology. 2025;19(1):63–71.
15.Mohajeri N. Time Series Modeling for Blood Glucose Prediction in Individuals with Type 1 Diabetes. 2025.
16.Al Ali H, Daneshkhah A, Boutayeb A, Merabet N, Mukandavire Z. A Comprehensive Review of Mathematical and Data-Driven Models in Glucose Homeostasis and Diabetes Pathways. Computational Mathematics and Modelling for Diabetes. 2025:133–65.
17.Rongali SK. Natural Language Processing (NLP) in Artificial Intelligence. World Journal of Advanced Research and Reviews. 2025;25(1):1931–5.
18.Blanco-Carrasco A, Merino-Torres J, Almanza MR, Molina GC, Brito-Sanfiel M, Galindo DB, et al. Characterizing the clinical profile and prevalence of people with diabetes attended in the hospital setting by using unstructured healthcare data and natural language processing: the Diabetic@ study. Diabetes Research and Clinical Practice. 2025:112214.
19.Xi Z, Huang J, Liao C, Huang B, Guo H, Liu J, et al. Agentgym-rl: Training llm agents for long-horizon decision making through multi-turn reinforcement learning. arXiv preprint arXiv:250908755. 2025.
20.Yu X, Yang Z, Sun X, Liu H, Li H, Lu J, et al. Deep Reinforcement Learning for Automated Insulin Delivery Systems: Algorithms, Applications, and Prospects. AI. 2025;6(5):87.
21.Kelvin-Agwu M, Mustapha AY, Mbata AO, Tomoh BO, Forkuo AY. Development of Smart Insulin Delivery Systems for Improving Diabetes Management in Public Health. Development. 2025;9(3):19–32.
22.Hussain S, Polonsky W, Scibilia R, Glatzer T. Beyond the Trend Arrow: Potential Value of Artificial Intelligence–Supported Glucose Predictions for People with Type 1 Diabetes Using Continuous Glucose Monitoring Systems. Diabetes Technology & Therapeutics. 2025.
23.Wolff MK. Machine Learning-Driven Blood Glucose Prediction and Diabetes Decision Support: A Real-Life Experiment. Research Foundations for Blood Glucose Prediction. 2025:80.
24.Ramazi R. Multi-modal data, Deep learning, Clustering, Predictive modeling, Type 2 Diabetes, Dementia, Clustering. 2025.
25.Vishal K. Natural Language Processing in Digital Health: Transforming Clinical Narratives into Actionable Intelligence. 2025.
26.Yoo J, Rachim VP, Jung S, Park S-M. Intelligent dual basal–bolus calculator for multiple daily insulin injections via offline reinforcement learning. IEEE Access. 2024;12:192572–85.
27.Kohli M, Pandey P, Jakhmola V, Saha S, Chaudhary M, Ansori ANM, et al. Revolutionizing diabetes care: the role of artificial intelligence in prevention, diagnosis, and patient care. Journal of Diabetes & Metabolic Disorders. 2025;24(1):132.
28.Cesario A, Gorini M, D'Amario D. Digital Tools and Applications. Digital Medicine Starter Guide: Springer; 2025. p. 39–58.
29.Liyanage A, Irfaan S, Moonesinghe L, Kasturiaratchi K, Perrin Franck C, Hussein R. Reporting Digital Health Implementations Based on the iCHECK-DH Guidelines and Checklist: Development of an Interactive Toolkit. Journal of Medical Internet Research. 2025;27:e74235.
30.Goktas P, Grzybowski A. Shaping the future of healthcare: ethical clinical challenges and pathways to trustworthy AI. Journal of Clinical Medicine. 2025;14(5):1605.
31.Bhimavarapu U. Bias in AI-Driven Diabetes Prediction Models: Challenges, Impacts, and Mitigation Strategies. AI-Powered Systems for Healthcare Diagnostics and Treatment: IGI Global Scientific Publishing; 2025. p. 195–214.
32.Razavi J, Dhafar HO, BaHammam AS. Transforming health care with artificial intelligence: Regulations, challenges, and future directions. Saudi Journal for Health Sciences. 2025;14(1):11–22.
33.Kothai G, Harish P, Ajinesh D, Sathyanarayanan V. Optimizing data privacy and scalability in health monitoring: Leveraging, encryption, blockchain, and cloud technologies. Critical Phishing Defense Strategies and Digital Asset Protection: IGI Global Scientific Publishing; 2025. p. 245–70.
34.Lawrence K. Bias and Disparities in the Electronic Health Record. Ethics and Medical Technology: Essays on Artificial Intelligence, Enhancement, Privacy, and Justice: Springer; 2025. p. 245–60.
35.Reddy S. Global harmonization of artificial intelligence-enabled software as a medical device regulation: addressing challenges and unifying standards. Mayo Clinic Proceedings: Digital Health. 2025;3(1).
36.Ahamed SM, Jabez J. Bridging the Gap: Clinical Adoption and User Perspectives of Explainable AI in Healthcare. Explainable Artificial Intelligence in the Healthcare Industry. 2025:349–74.
37.Hahn D, Sherman K, Sims D, Oye E. Mobile Health Technologies and Their Impact on Reducing Diabetes-Related Complications in Home-Based Care Settings. 2025.