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Enhancing Medication Safety in Hospital Setting Through Artificial Intelligence

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SUMMARY

Artificial Intelligence (AI) is revolutionizing medication safety in hospital settings by enhancing accuracy, efficiency and patient outcomes. AI-driven systems assist healthcare professionals in verifying prescriptions, identifying potential drug interactions, and ensuring appropriate dosages, thereby reducing the risk of medication errors. By analyzing patient data, including medical histories and laboratory results, AI tools provide personalized recommendations that support informed clinical decisions. Additionally, AI facilitates real-time monitoring of patient adherence to treatment plans, enabling timely interventions when deviations occur. Automated dispensing systems, guided by AI, ensure precise medication distribution, minimizing human errors and optimizing inventory management. Furthermore, AI contributes to the detection of adverse drug reactions by continuously analyzing patient responses and flagging anomalies. As AI technologies continue to evolve, their integration into hospital workflows promises to further enhance medication safety, streamline pharmaceutical processes, and improve overall patient care. However, successful implementation requires robust infrastructure, staff training, and adherence to ethical standards to fully realize AI's potential in healthcare.

Keywords: Artificial Intelligence, Medicinal Product, Medication Safety, Pharmaco-Intelligence.

Introduction

Medication errors remain a significant concern in hospital settings, contributing to adverse patient outcomes and increased healthcare costs. The integration of Artificial Intelligence (AI) into healthcare systems offers promising avenues to address these challenges. AI encompasses a range of technologies, including machine learning and natural language processing, which can analyze vast amounts of data to identify patterns and predict potential errors. In the context of medication safety, AI can assist in optimizing prescription practices, monitoring drug interactions, and ensuring accurate dosing. By leveraging these capabilities, healthcare providers can enhance decision-making processes, reduce the incidence of medication-related errors, and improve overall patient safety. As hospitals continue to adopt AI-driven solutions, it is crucial to understand the mechanisms through which these technologies contribute to safer medication practices and to address any associated implementation challenges.

Research Objective

This study aims to evaluate the impact of Artificial Intelligence (AI) on enhancing medication safety within hospital environments. The focus is on how AI technologies can optimize medication management processes, support clinical decision-making, and reduce the incidence of medication errors, thereby improving patient outcomes and healthcare efficiency.

Methodology

The research employs a comprehensive literature review approach, analyzing both international and local sources, including academic studies, practical implementations, and regulatory frameworks. The review concentrates on the application of AI technologies across various stages of hospital medication management systems, such as medication procurement and inventory management, monitoring of storage conditions, drug dispensing and administration processes, patient monitoring and feedback mechanisms, and prevention of medication errors and risk management strategies. By synthesizing findings from these sources, the study seeks to identify best practices and potential challenges in implementing AI solutions to enhance medication safety in hospitals.

Results

AI technologies have a wide range of applications in hospital healthcare systems. With AI, it is possible to determine appropriate individual doses, select optimal methods for drug administration, and develop treatment strategies. Managing patient medical records is a complex and labor-intensive task, but AI simplifies the collection, storage, and analysis of data. For example, Google's DeepMind Health facilitates the rapid and efficient processing of medical records, significantly improving the quality of healthcare services.

Moor fields Eye Hospital (NHS) collaborates with DeepMind Health to improve the diagnosis and treatment of ophthalmic diseases. Meanwhile, IBM Watson for Oncology uses AI algorithms to compare patient data with thousands of historical cases, assisting doctors in making accurate treatment decisions. Its database contains millions of pages of scientific literature and more than 300 medical journals and textbooks, enabling deep analysis of information.

AI technologies play a crucial role in diagnostic imaging and visualization processes. This includes analyzing X-rays, CT scans, echocardiograms, and ECGs. IBM's Medical Sieve is a "cognitive assistant" that utilizes deep learning algorithms to analyze specialized medical imaging, improving diagnostic accuracy.

AI technologies assist in diagnostic imaging and visualization processes, such as X-rays, CT scans, echocardiograms, and ECGs, by helping to identify diseases. IBM’s Medical Sieve algorithm is a "cognitive assistant" equipped with both analytical and diagnostic capabilities. It utilizes deep learning techniques to analyze specialized medical visuals based on specific body parts.

Artificial intelligence is successfully used in patient management. For instance, Molly is a virtual nurse that supports patients in managing their treatment, particularly for chronic conditions. The AI Cure app tracks patients' medication intake using smartphone cameras, proving especially useful in clinical trials and complex treatment regimens.

AI also significantly impacts genomics and genetic diagnostics. The Deep Genomics system analyzes genetic data and medical records to detect pathological mutations. An algorithm developed by Craig Venter, the author of the Human Genome Project, provides insights into human physical traits based on their genetic makeup. This technology is also used for early cancer and cardiovascular disease diagnostics.

The development of pharmaceutical products often takes decades and requires billions in costs. Atomwise is an AI platform that analyzes molecular structures using supercomputers. It identified potential Ebola treatments in just one day—a process that typically takes months or even years. Another example is a biopharmaceutical company in Boston that employs AI to determine the effectiveness of treatments based on patient biological data.

The open AI ecosystem was named one of 2016’s most promising technologies. It collects and analyzes social and medical data to better understand patients’ lifestyles and habits. When medical data is fully computerized, its analysis and systematic improvement become much easier. In the Netherlands, 97% of invoices are in digital format. Local company Zorgprisma Publiek uses IBM Watson to effectively analyze this data and identify patient service issues in real-time, helping to prevent unnecessary hospitalizations.

Today, leading global pharmaceutical companies are actively collaborating with AI technology providers and integrating them into their research and development processes, drug discovery, and manufacturing. According to data, around 62% of organizations in the healthcare sector are considering investments in AI, with 72% believing that AI will play a pivotal role in their future business models. The growing role of artificial intelligence in the pharmaceutical sector is evident from the examples of major companies such as Roche, Pfizer, Merck, AstraZeneca, GSK, Sanofi, AbbVie, Bristol-Myers Squibb, and Johnson & Johnson. For example, in 2018, the Massachusetts Institute of Technology (MIT) began collaborating with Novartis and Pfizer to radically transform drug design and manufacturing processes. McKinsey Global Institute estimates that AI and machine learning could add nearly $100 billion annually to the U.S. healthcare system. These technologies improve decision-making, enhance the quality and effectiveness of innovations, streamline research and clinical trials, and create new tools for doctors, patients, insurers, and regulators.

The pharmaceutical industry is continuously working on discovering new active substances for diseases that currently have no treatment. Meanwhile, efforts are being made to improve the safety of existing drugs, overcome drug resistance, and reduce therapeutic ineffectiveness. This has led to an explosion in biomedical data growth and diversity, facilitating the integration of AI technologies. For instance:

- GNS Healthcare uses the AI system REFS (Reverse Engineering and Forward Simulation), which processes millions of data points—ranging from clinical to genetic and laboratory data—to better understand causal relationships.
- Atomwise developed the first deep learning neural network, AtomNet, based on 3D protein and molecular structures, allowing researchers to quickly and accurately assess a drug's toxicity, effectiveness, and compatibility.
- Insilico Medicine employs genetic adversarial networks (GANs) and reinforcement learning algorithms in the Pharm AI project, which creates new molecular structures and explores the biological mechanisms of diseases.

Artificial intelligence (AI) is being effectively utilized in clinics and hospitals. Chatbots are deployed to enhance customer service by automatically answering simple questions and redirecting complex requests to human staff members. Walgreens has partnered with telehealth firm Medline to provide patients with video consultations with specialists. AI helps pharmacies predict their inventory needs, reducing shortages or overstocking. For instance, software created by Blue Yonder for the Otto Group achieved 90% accuracy in forecasting and optimizing delivery times. The University of California, San Francisco (UCSF) Medical Center uses robotic systems to automate medication preparation and dosing, with these systems having already prepared 350,000 medications without error. Robots are responsible for the precise dosing of both toxic chemotherapy and intravenous medications, freeing up pharmacists and nurses for direct patient care [1, 2,3].

AI is actively applied to predict and detect adverse drug reactions (ADRs). Several studies have clearly demonstrated the potential of this technology. For example, a study by Mohsen and colleagues combined two distinct data sources: gene expression profiles from the Toxicogenomics Project (TG-GATEs) caused by drugs and ADR cases from the FDA's Adverse Event Reporting System (FAERS). Using deep neural networks (DNN), they developed a prediction model that involved data filtering, cleansing, feature selection, and hyperparameter tuning. Yalçın and colleagues created a clinical decision support tool based on machine learning (ML), a risk score that predicts the likelihood of ADR development in newborns. They used the NAESS severity scale, the "Du'ADRs" algorithm, and risk matrix analysis, incorporating a multidisciplinary team, including clinical pharmacists. A study by Hamman and colleagues applied decision tree induction to determine which chemical, physical, and structural properties characterize compounds that cause ADRs. The models demonstrated high predictive accuracy for allergic, kidney, central nervous system, and liver ADRs (78.9–90.2%). Cami and colleagues used logistic regression classifiers to predict unknown ADRs for existing drugs, based on structural drug-ADR network characteristics, chemical, and taxonomic data. Rahmani and colleagues utilized a random walk algorithm on the drug-ADR network, where nodes represented drugs and known side effects. However, the newly identified ADRs were not confirmed in real clinical data. Bresso and colleagues developed a database that integrates knowledge about drugs, ADRs, and target molecules. They used decision trees and inductive logic programming to predict ADR profiles (not individual reactions), validated by FAERS data. Bean and colleagues created a knowledge graph encompassing four nodes: drugs, protein targets, indications, and side effects. The ML algorithm developed using the graph relied on enrichment testing and successfully classified the causes of side effects.

Other studies have focused on:

- Automating pharmacovigilance processes,
- Early prediction and prevention of side effects to improve patient safety.

Overall, these studies highlight the vast potential of AI in detecting and predicting ADRs, ranging from clinical decision support systems to knowledge-based algorithms [4, 5, 6].

By integrating AI technologies into hospital workflows, healthcare professionals can enhance the evidence-based approach to pharmacy, improving clinical decision-making and reducing the risk of medication-related harm [7, 8].

Drug-drug interactions (DDIs) are recognized as a major cause of ADRs, contributing to increased healthcare costs. Predicting DDIs requires analyzing the characteristics of different medications and leveraging existing data. The most commonly used databases for DDI prediction include DrugBank, SIDER, TWOSIDES, KEGG (Kyoto Encyclopedia of Genes and Genomes), Lexicomp, and Micromedex. Existing predictive models for DDIs are divided into three main categories:

Van Laere and colleagues developed an algorithm that assesses the risk of QTc interval prolongation and provides warnings when a combination of medications increases this risk. Suyu Mei and Kun Zhang proposed an f-drug target profile model based on L2-regularized logistic regression for predicting drug-drug interactions (DDIs). Song and others created a large-scale DDI prediction model using five types of drug similarities: 2D structure, 3D pharmacophores, interaction profiles, target-related features, and side effect similarities. Based on these data, they developed a polynomial kernel support vector machine (PK-SVM).

Integrating Artificial Intelligence (AI) into electronic health record (EHR) algorithms can significantly enhance clinical decision-making processes. AI can help identify improper medication usage patterns and patient risks by learning from large volumes of EHR data. Additionally, AI supports the optimization of drug selection by predicting which patients are at a lower risk of experiencing side effects. The Patient Safety Learning Laboratory (PSLL) helps AI embedded in EHR systems identify and mitigate potential risks.

Natural Language Processing (NLP) and Machine Learning (ML) technologies are increasingly used in hospitals and healthcare systems to process unstructured text data, including medication safety, patient history, side effects, and therapeutic outcomes. These approaches can improve patient care and medication effectiveness assessment in real-time. This strategy can also be applied to improve decisions made by Pharmacy and Therapeutics (P&T) committees. For instance, Balestra M and colleagues developed a predictive model that detects orders that may require intervention by analyzing the actions within the provider's EHR.

Potentially inappropriate medications (PIMs) are those where the risks outweigh the benefits, especially in the elderly, who often have multiple comorbidities and take several medications (polypharmacy). Criteria such as Beers and STOPP/START are used to assess the risk of potentially inappropriate prescribing (PIP). Although these criteria are effective for evaluating medications after they have been prescribed, early detection helps prevent adverse drug reactions (ADRs). To this end, AI/ML algorithms are increasingly used in predictive models for PIMs.

For example:

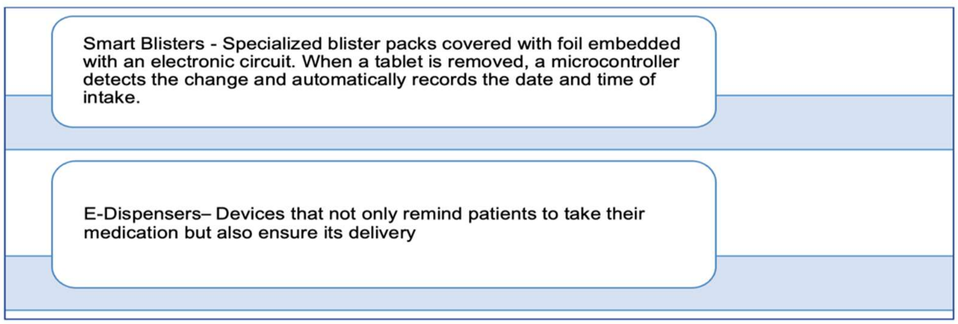
- Chun-Tien Tai and colleagues predicted the risks of digoxin using ML and successfully identified high-risk patients.
- Wongyikul et al. created a model for screening HAD medications using Gradient Boosting Classifiers, which accurately identified inappropriate prescriptions with 98-99% success.
- Patel et al. identified the risks of potentially inappropriate use of NSAIDs in elderly patients with osteoarthritis.
- Xingwei and colleagues developed over 270 ML models to predict PIP, PIM, and PPO, which have high potential for clinical use [4,9]

Approximately half of patients with chronic diseases do not adhere to their prescribed medications, leading to increased morbidity and mortality. Pharmaceutical interventions, despite their effectiveness, are often complex and multi-component. Therefore, AI technologies could become a promising tool for addressing this issue. AI technologies used to improve medication adherence are categorized into eight main types:

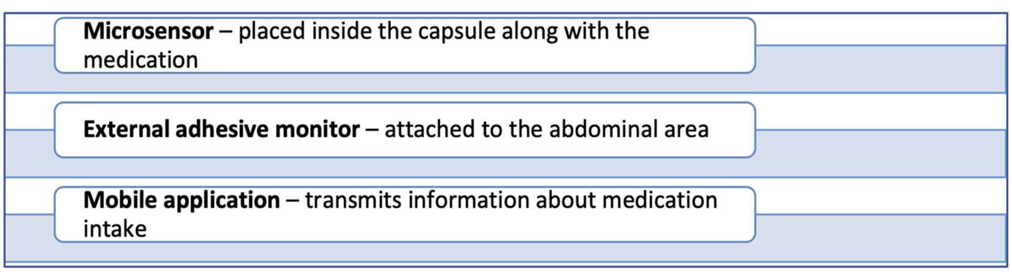
1. Electronic pillboxes/bags
2. Electronic bottles
3. Swallowable sensors
4. Blister pack technology
5. Electronic medication management systems
6. Self-reporting systems
7. Video-based methods
8. Motion sensor technology

These technologies ensure medication adherence monitoring, timely responses, and contribute to improving patients' health conditions.

Medication Event Monitoring Systems (MEMS) are technologies that enable the recording of medication intake events. For example, a sensor embedded in a pill bottle detects each opening, indicating that the patient may have taken the medication. Some modern bottles wirelessly transmit data, allowing real-time monitoring of medication intake. Near Field Communication (NFC) technology is often used in modern smartphones and medical devices, enabling data transmission over short distances (a few centimeters). NFC tags can be placed on medications, and the patient simply taps the tag with a smartphone to record the medication intake. These technologies are used for monitoring purposes.



Technologies based on motion sensors, particularly triaxial accelerometers, are of interest as they are integrated into wireless wearable devices (e.g., wristbands). These sensors track the patient's movement during medication intake. Additionally, there are medications that are combined with a fluorophore—a substance that appears in the patient's bloodstream and can be detected with a handheld device. The system of ingestible sensors includes the following:

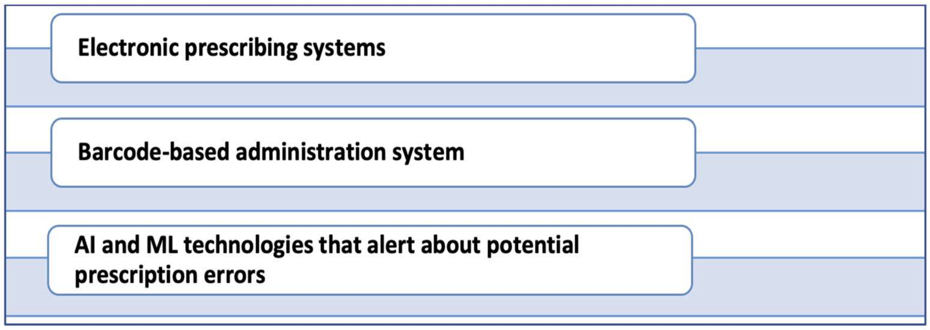


When a patient takes a capsule, stomach fluids dissolve it, and a sensor sends a signal to an external device, which then transmits the data to an application, recording information about the medication intake, heart rate, and other parameters.

Electronic Medication Management Systems (EMMS) utilize Radio Frequency Identification (RFID) to track medication adherence. The system records the intake and transmits the data for monitoring.

Video monitoring technologies use cameras to capture the process of medication intake by the patient. These videos are analyzed either by clinical staff or AI. There are also self-reporting systems for patients, such as smart buttons, e-diaries, web platforms, and mobile applications. These systems provide real-time information about the patient's medication adherence. The US FDA receives over 100,000 reports annually regarding medication errors. The prevalence of medication errors in European hospitals varies between 0.3% and 9.1%.

Prospective strategies for reducing medication errors include:



For example, an Israeli company has developed an ML-based algorithm that warns about excessive or inappropriate prescriptions.

Medication Therapy Management (MTM). The CMM-Wrap program utilizes an artificial intelligence platform to identify high-risk patients and provide telemedicine services for them. The involvement of pharmacists and medical assistants, supported by AI, helps reduce healthcare costs, emergency visits, and hospitalizations. During the COVID-19 pandemic, a hospital in Shanghai implemented an online pharmacy where prescriptions were first verified by AI, followed by double-checking by pharmacists. Patients could access their medications at the hospital or through third-party pharmacies using a QR code [4,10,11].

Telehealth, also known as telemedicine, involves the exchange of medical information between different locations through electronic communication, aiming to improve health outcomes. Modern chatbots, using Natural Language Processing (NLP), can expedite the process of patient symptom self-description or answering questions, speeding up medical history collection, generating questionnaires, and conducting preliminary diagnostic assessments, including identifying adverse drug reactions (ADRs). These data can be stored, encrypted, and used during the patient's next visit. AI-driven conversational platforms compliant with the Health Insurance Portability and Accountability Act (HIPAA) have developed modules that automatically identify adverse events (AEs) using deep learning and NLP technologies. These modules detect and analyze questions and formulations provided by virtual assistants, automatically processing and transmitting relevant information to pharmaceutical companies and assisting in reporting to the FDA.

AI has the potential to significantly improve pharmacological safety within telehealth environments. One study showed that automated phone calls to patients after prescribing a new medication effectively identified ADR cases. Patients whose responses indicated potential issues were referred to a pharmacist for further evaluation. AI can also be used to determine which patients need screening and when. Combined with patient portals, text messaging, and other technologies, AI plays a crucial role in enhancing the effectiveness and safety of medication therapy.

Patients are also increasingly using health information technologies such as telemonitoring, mobile applications, and wireless monitoring devices. These include disease tracking, symptom or medication logs, nutrition diaries, reminders, and communication platforms. Wearable devices and mobile health apps provide personalized analytics and monitor physiological parameters, helping patients adhere to treatment schedules. Examples include devices such as Fitbit, Apple Watch, portable insulin pumps, and pacemakers. Providers can now assess dynamic data from these devices in real time and deliver personalized care [4, 12]. Pharmaco-Intelligence refers to the integration of artificial intelligence and machine learning (AI/ML) in pharmacy practice to improve patient care and safety. As such, AI/ML components should become an integral part of pharmacy education, and professionals should be continuously educated on innovative topics. Given the rapid development of technology, the pharmacy training system must adapt to ensure the profession is prepared for these changes [13].

Artificial intelligence (AI) has emerged as a transformative force in healthcare, particularly in advancing patient safety outcomes. By streamlining clinical workflows, supporting decision-making, and reducing preventable medical errors, AI technologies have the potential to address some of the most persistent challenges in patient care. Systematic evidence highlights the diverse applications of AI in mitigating patient safety risks. According to Choudhury and Asan (2020), AI-based systems have demonstrated notable effectiveness in early detection of clinical deterioration, alerting healthcare providers to abnormal patterns in patient data and thereby facilitating timely intervention. Machine learning algorithms also contribute to minimizing diagnostic errors by enhancing the accuracy of image interpretation and supporting differential diagnosis [14]. In addition to clinical applications, AI can indirectly enhance patient safety by improving operational efficiency. AlDhaen (2025) emphasizes the mediating role of organizational workflows in translating AI interventions into tangible safety outcomes. In particular, institutions with higher levels of digital competence can better integrate AI into their practices, leading to optimized resource utilization and fewer adverse events [15].

Economic analyses further underscore the value of AI in hospital settings. Epelde (2024) outlines the cost-effectiveness of AI-driven technologies, citing their ability to reduce hospital readmissions, medication errors, and lengths of stay. These improvements not only enhance clinical outcomes but also reduce the financial burden on healthcare systems [16]. However, despite its promise, AI implementation in patient safety is not without challenges. Tighe, Mossburg, and Gale (2024) point out concerns related to algorithmic bias, lack of transparency in decision-making (the “black box” problem), and the potential for overreliance on automated systems. Addressing these challenges requires ongoing evaluation, regulatory oversight, and human-AI collaboration to ensure technology augments rather than replaces clinical judgment [17]. Artificial Intelligence (AI) is increasingly recognized for its pivotal role in enhancing patient safety, particularly by mitigating medication errors in clinical settings. These errors, which can arise from various stages of the medication use process, pose significant risks to patient health. The integration of AI technologies offers promising solutions to address these challenges effectively. One of the primary applications of AI in this domain is the optimization of Clinical Decision Support Systems (CDSS). Traditional CDSS often generate excessive alerts, leading to alert fatigue among healthcare providers. Graafsma et al. (2024) conducted a scoping review highlighting how AI can refine these systems by reducing irrelevant alerts and enhancing the relevance of critical warnings, thereby improving clinician responsiveness and patient safety [18]. In pharmacy settings, AI has demonstrated significant potential in reducing human-related errors. Andrew (2023) emphasizes that AI-driven systems enhance the accuracy of prescription dispensing and optimize workflow processes. By automating routine tasks and providing real-time decision support, AI minimizes the likelihood of errors that can occur due to manual processes [19]. Furthermore, AI's role extends to predictive analytics, where it can forecast potential adverse drug events before they occur. Ratwani et al. (2024) discuss how AI algorithms analyze vast datasets to identify patterns and predict complications, enabling preemptive interventions that safeguard patient health [20]. Looking ahead, the integration of AI into clinical pharmacy practice is expected to expand. Wongand Wong (2025) project that AI will become integral in various aspects of pharmacy, from personalized medicine to inventory management, further enhancing the safety and efficiency of medication use [21].

Conclusion

Artificial intelligence (AI) is revolutionizing medication safety within hospital settings by significantly reducing errors and improving patient outcomes. AI-powered systems enhance prescription verification processes by cross-referencing patient data to identify potential drug interactions, allergies, and dosage discrepancies. This proactive approach minimizes the risk of adverse drug events and ensures accurate medication administration. Moreover, AI-driven tools assist healthcare professionals in monitoring patient adherence to prescribed therapies. By providing real-time alerts and personalized recommendations, these systems support timely interventions, thereby enhancing treatment efficacy and patient compliance. The integration of AI into clinical decision support systems (CDSS) has also proven beneficial. By optimizing medication alerts and reducing alert fatigue, AI ensures that healthcare providers receive relevant and actionable information, facilitating informed decision-making and improving overall patient safety. Looking ahead, the continued advancement of AI technologies holds immense potential for further enhancing medication safety. As AI systems become more sophisticated and integrated into healthcare workflows, they will play an increasingly vital role in preventing medication errors, personalizing treatment plans, and optimizing pharmaceutical care. In summary, the adoption of AI in hospital medication management is a pivotal step toward achieving higher standards of patient safety and care quality. By leveraging AI's capabilities, healthcare institutions can foster a safer, more efficient, and patient-centered approach to medication administration.

REFERENCES:

1. Raza MA, Aziz S, Noreen M, Saeed A, Anjum I, Ahmed M, Raza SM. Artificial Intelligence (AI) in Pharmacy: An Overview of Innovations. Innov Pharm. 2022 Dec 12;13(2):10.24926/iip.v13i2.4839. doi: 10.24926/iip.v13i2.4839.
2. Belagodu Sridhar, Sathvik, Mohammed Salim Karattuthodi, and Sainul Abideen Parakkal. "Role of artificial intelligence in clinical and hospital pharmacy." Application of Artificial Intelligence in Neurological Disorders. Singapore: Springer Nature Singapore, 2024. 229-259.
3. Tan Seng-Keong, et al. "Personalized healthcare: A comprehensive approach for symptom diagnosis and hospital recommendations using AI and location services." Journal of Informatics and Web Engineering 3.1 (2024): 117-135.
4. Chalasani SH, Syed J, Ramesh M, Patil V, Pramod Kumar TM. Artificial intelligence in the field of pharmacy practice: A literature review. Explor Res Clin Soc Pharm. 2023 Oct 21;12:100346. doi: 10.1016/j.rcsop.2023.100346.
5. Al Meslamani, Ahmad Z. "Applications of AI in pharmacy practice: a look at hospital and community settings." Journal of Medical Economics 26.1 (2023): 1081-1084.
6. Ned Milenkovich, The Rise of AI in Pharmacy Practice Presents Benefits and Challenges. Pharmacy Times. Volume 89. Issue 7. July 24, 2023
7. Shashiashvili N. (2025). Evidence-Based Pharmacy: A Scientific Approach to Safe and Effective Medication. Georgian Scientists. Vol.7 Issue 2. 27–38. https://doi.org/10.52340/gs.2025.07.02.03
8. Shashiashvili N. (2025). Artificial Intelligence in Pharmaceutical Services and the Concept of Pharmaco-Intelligence Georgian Scientists. Vol.7 Issue 2. 69–79. https://doi.org/10.52340/gs.2025.07.02.07
9. Allam H. Prescribing the Future: The Role of Artificial Intelligence in Pharmacy. *Information*. 2025; 16(2):131. https://doi.org/10.3390/info16020131
10. Abdelhafeez Ahmed, et al. "Hospital Management Leveraging AI." SciNexuses 1 (2024): 203-239.
11. Amjad Ayesha, Piotr Kordel, and Gabriela Fernandes. "A review on innovation in healthcare sector (telehealth) through artificial intelligence." Sustainability 15.8 (2023): 6655.
12. Hugh Logan Ellis, James TH Teo, The influence of AI in medicine, Medicine, Volume 52, Issue 12, 2024, Pages 811-815, ISSN 1357-3039, https://doi.org/10.1016/j.mpmed.2024.09.006.
13. Hatem Najmaddin AH. "Advancing Pharmacy Practice: The Role of Intelligence-Driven Pharmacy Practice and the Emergence of Pharmacointelligence." Integrated Pharmacy Research and Practice (2024): 139-153.
14. Choudhury A., & Asan O. (2020). Role of Artificial Intelligence in Patient Safety Outcomes: Systematic Literature Review. JMIR Medical Informatics, 8(7), e18599. https://doi.org/10.2196/18599
15. AlDhaen F. S. (2025). AI-Powered Transformation of Healthcare: Enhancing Patient Safety Through AI Interventions with the Mediating Role of Operational Efficiency and Moderating Role of Digital Competence—Insights from the Gulf Cooperation Council Region. Healthcare, 13(6), 614. https://doi.org/10.3390/healthcare13060614

16. Epelde F. (2024). Revolutionizing Patient Safety: The Economic and Clinical Impact of Artificial Intelligence in Hospitals. Hospitals, 1(2), 185–194. https://doi.org/10.3390/hospitals1020015

17. Tighe P., Mossburg S., & Gale B. (2024). Artificial Intelligence and Patient Safety: Promise and Challenges. PSNet, Agency for Healthcare Research and Quality. https://psnet.ahrq.gov/perspective/artificial-intelligence-and-patient-safety-promise-and-challenges.

18. Graafsma J., Murphy R. M., van de Garde E. M. W., Karapinar-Çarkit F., Derijks H. J., Hoge R. H. L., Klopotowska J. E., & van den Bemt P. M. L. A. (2024). The use of artificial intelligence to optimize medication alerts generated by clinical decision support systems: a scoping review. Journal of the American Medical Informatics Association, 31(6), 1411–1422. https://doi.org/10.1093/jamia/ocae076

19. Andrew J. (2023). Impact of Artificial Intelligence on Reducing Medication Errors in Pharmacy Settings.

20. Ratwani R. M., Bates D. W., & Classen D. C. (2024). Patient Safety and Artificial Intelligence in Clinical Care. JAMA Health Forum, 5(2), e235514. https://doi.org/10.1001/jamahealthforum.2023.5514

21. Wong C. Y., & Wong C. M. (2025). Forecasting the impact of artificial intelligence on clinical pharmacy practice. Journal of the American College of Clinical Pharmacy, 8(1), 23-30. https://doi.org/10.1002/jac5.70004

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აბსტრაქტი

ხელოვნური ინტელექტი (AI) სულ უფრო მეტად იკავებს წამყვან ადგილს მედიკამენტების მართვის პროცესების ტრანსფორმაციაში. მისი ინტეგრაცია მოიცავს არა მხოლოდ მედიკამენტების შესყიდვას, შენახვასა და განაწილებას, არამედ პაციენტზე ორიენტირებულ მკურნალობასა და უსაფრთხოების გაუმჯობესებულ ზომებს. AI-ის გამოყენება მნიშვნელოვნად ზრდის ოპერაციულ ეფექტიანობას და ამცირებს მედიკამენტური შეცდომებისა და არასასურველი რეაქციების რისკს. მისი მეშვეობით შესაძლებელია გასული პერიოდის მონაცემების, სეზონური ტენდენციებისა და პაციენტთა ნაკადების ანალიზი, რაც ხელს უწყობს საჭიროებების ზუსტ პროგნოზირებას, მოთხოვნების ოპტიმიზაციასა და დეფიციტის ან ზედმეტი მარაგის თავიდან აცილებას. AI-ით მხარდაჭერილი ავტომატიზებული განაწილების ,,კაბინეტები“ უზრუნველყოფენ ფარმაცევტული პროდუქტების სწრაფ და ზუსტ დაყოფას ინდივიდუალურ სამკურნალო გეგმებთან შესაბამისობით, რითაც უმჯობესდება მარაგების კონტროლი და მცირდება ადამიანური შეცდომების ალბათობა. ხელოვნურ ინტელექტზე დაფუძნებული კლინიკური გადაწყვეტილების მხარდაჭერის სისტემები ჯანდაცვის პროფესიონალებსა და ფარმაცევტებს აწვდის ინფორმაციას წამლების პოტენციური ურთიერთქმედებების, ალერგიული რეაქციებისა და არასწორი დოზირების შესახებ, რაც განსაკუთრებით მნიშვნელოვანია პოლიფარმაციის დროს. AI-ის კიდევ ერთი მნიშვნელოვანი ფუნქციაა პაციენტთა მედიკამენტური თერაპიისადმი დამყოლობის მონიტორინგი, რაც დროული ჩარევის საშუალებას იძლევა მკურნალობის სქემის დარღვევის შემთხვევებში. ინოვაციური ტექნოლოგიები აქტიურად გამოიყენება ფარმაცევტული ლოგისტიკის სხვადასხვა ეტაპზე, მათ შორის შენახვის პირობების კონტროლის, ტრანსპორტირებისა და მედიკამენტების პარტიების მიკვლევადობის პროცესში, რაც ზრდის მომარაგების ჯაჭვის გამჭვირვალობას და აძლიერებს ხარისხის კონტროლს. AI-ის დანერგვა ჰოსპიტალურ სექტორში მნიშვნელოვნად აუმჯობესებს მედიკამენტების მართვის პროცესებს, ზრდის პაციენტთა უსაფრთხოებას და ოპტიმიზაციას უწევს რესურსების განაწილებას. თუმცა, მისი ეფექტიანი დანერგვისთვის აუცილებელია შესაბამისი ინფრასტრუქტურის მობილიზება, სამედიცინო პერსონალის გადამზადება და ეთიკური სტანდარტების მკაცრი დაცვა.

საკვანძო სიტყვები: ხელოვნური ინტელექტი, სამკურნალო საშუალება, ფარმაკოინტელექტი, მედიკამენტური უსაფრთხოება