Evaluating the Implementation of Smart Pharmacy Vending Machines in UAE Hospitals

Taif Ibrahim Ismaeil Al Mandoos

IPRJB

Evaluating the Implementation of Smart Pharmacy Vending Machines in UAE Hospitals

[1*]Taif Ibrahim Ismaeil Al Mandoos
Master of Science in Innovation and Change Management, Hamdan Bin Smart University

Abstract

Purpose: The research assesses the use of smart pharmacy vending machines in UAE hospitals with the view of enhancing operational efficiency, minimizing patient waiting time, and improving patient experiences. It seeks to explore how such technologies impact patient satisfaction and waiting times as well as explores the barriers and enablers that impact their successful implementation in the UAE health context.

Methodology: A mixed-method design is used, incorporating qualitative interviews with pharmacists and hospital administrators and quantitative questionnaires given to patients and healthcare staff in selected UAE hospitals. This allows integrated analysis of system performance measures, patient service outcomes, and stakeholder views.

Findings: The anticipated outcomes are measurable wait time reductions for patients, enhanced accuracy of dispensing medication, and greater patient satisfaction because of increased accessibility and convenience. The research also outlines enablers like active stakeholder involvement, sufficient funding, and favorable policy environments, as well as barriers like resistance to technology adoption, lack of proper training for staff, and infrastructural constraints.

Unique Contribution to Theory, Practice and Policy: The study emphasizes the necessity for specific training programs, increased awareness campaigns, and strong policy environments to encourage the uptake of smart pharmacy vending machines. The research provides useful recommendations for policymakers, hospital management, and technology developers in the UAE to join the digital health transformation agenda of the country. Moreover, the research makes a contribution to international literature on pharmacy automation and offers actionable advice to close the gap between digital innovation and traditional healthcare provision in emerging health markets.

Keywords: *Smart Pharmacy Vending Machines, Patient Satisfaction, Healthcare Digital Transformation, UAE Hospitals*

JEL Codes: *I11, I18, O33, L86*

INTRODUCTION

Both UAE healthcare systems and the world healthcare systems will increasingly utilize automation and digital technologies in the delivery of services. One of these advancements will be the use of smart vending machines in pharmacies to optimize the dispensing of medications. This advancement will promote accuracy, reduce human error, and expedite waiting times for patients, increasing overall patient safety and satisfaction. As witnessed by initiatives such as Emirates Health Services' robotic pharmacies, the UAE will continue to advance health innovation technologies. This research will discuss how automated pharmacy technologies will create a more effective, accessible, and patient-friendlier health care environment. This will also include alignment with international changes in health systems moving towards digitalization, especially pharmaceutical services. Besides enhancing operational efficiency, smart pharmacy vending machines will increase access to service for patients to pick up their prescribed medications at their convenience and reduce dependence on the pharmacy's hours of operation. These 24/7 access points will be particularly advantageous in emergency situations or for patients living in rural or underserved neighborhoods with limited or no access to a pharmacy or healthcare provider. Additionally, automated systems will allow for improved tracking of medication use, inventory management, and data analytics to improve decision-making and reduce waste. As health systems shift to more patient-centric models, these technologies will be critical to convenience, quality, and safety in pharmaceutical care delivery.

A quality improvement project at an Al Ain public hospital polyclinic pharmacy was carried out to reduce the time patients spend waiting each month until their prescriptions were filled. After the pharmacy implemented its electronic prescription system in conjunction with the Cerner Malaffi system, the time spent waiting for an individual prescription to fill in the pharmacy was reduced from 21.5 minutes to 4 minutes (Sallam, 2024). It was encouraging to note that patients positively rated their experience using the two systems together at 82% satisfaction. This observation clearly shows the potential digital systems have to improve the speed of service delivery of pharmacy services and patient satisfaction compared to traditional pharmacy processes.

Problem Statement

Although the use of digital technologies is increasingly present in global healthcare systems, many of the traditional pharmacy services provided across UAE hospitals will continue to be manual in nature. These age-old pharmacy services will lead to long patient wait times, medication errors, and inefficient service delivery. In turn, these issues will affect patient satisfaction, trust, and ultimately patient health. The variable and inconsistent implementation of automated technologies in hospitals across the UAE will bring to light many of the barriers to implementation. Barriers such as infrastructure constraints, lack of training, and resistance to change may impede the rollout of smart pharmacy delivery service initiatives. In particular, the adoption of smart pharmacy vending machines while part of the UAE's broader digital healthcare transformation remains at the core of this study, as they directly address patient accessibility, service efficiency, and medication safety. As such, unless these barriers are addressed, the full potential of smart vending pharmacy technologies will not be realized. This research will explore the integration, implementation, and standardization of digital pharmacy services within the UAE healthcare system and the influence of these solutions on service innovation and the patient experience. In addition, the research will explore how policies, funding, and organization readiness impact the implementation of these technologies. It will

also look into how stakeholder engagement such as healthcare professionals and patients will facilitate more efficient transitions to automated systems. By reviewing successful case studies and examining comparisons with international best practices, recommendations will be provided to address current challenges. Ultimately, addressing these challenges will be critical to advance the goals of equal, in-time, and future-ready pharmaceutical services in the UAE's healthcare system.

Research Questions

1) What will be the effect of smart pharmacy vending machines' implementation on patient wait time in hospital pharmacies?
2) Will smart pharmacy vending machine strategies change the patient's experience and be satisfied in hospital settings?
3) What are the main barriers and enablers for the effective use of smart pharmacy vending machines in UAE hospitals?

Objectives

- To evaluate the potential impact of smart pharmacy vending machines on reducing patient wait times in hospital pharmacies.
- To examine how the strategies integration of vending technology in pharmacies will enhance patient experience, including convenience, accessibility, and satisfaction
- To identify the challenges and enablers associated with implementing smart pharmacy vending machines in the UAE's hospital infrastructure

Justification

The basis for this study will be justified by the UAE's national agenda for innovation and the evolving healthcare delivery process. With increasing volumes of patients and ever-increasing demands for efficient services, the hospital systems would require smarter, faster, and more reliable pharmacy solutions. The adoption of smart pharmacy vending as a focused component of the wider digital healthcare transformation. The study will also provide insights that help inform policymakers, healthcare administrators, and technology providers on the best ways to improve healthcare performance and overall patient satisfaction. The results of this study will inform strategies for addressing resistance to change considering the feasibility of integrating these systems' connectivity into existing hospital systems.

Research Gap

While the proliferation of global healthcare digitalization efforts is significant, little research focuses explicitly on the integration, obstacles, and effects on patients of smart pharmacy vending machines within the UAE. Available studies only document a wider digital health direction. Therefore, there is a notable gap in evidence-based strategies that promote the adoption of pharmacy vending machines.

Relevance to Master's Program and Workplace

This research will have direct relevance to my Master's program at Amity University Dubai, which focuses on areas of healthcare innovation and quality management of public services and digital transformation. It will enable me to employ theoretical constructs in assisting with a real-world issue that relates to the university's vision of developing leaders in healthcare for the future. As the Deputy Head of STEAM and Innovation, my name is Taif Al Mandoos, and I will impact the professional practice by advocating the use of smart technologies in healthcare

and different public services sectors from this research. The findings would be beneficial in developing innovative service models and will support the UAE's objectives to lead in healthcare innovation and digital excellence.

LITERATURE REVIEW

Digital Health Transformation in Hospital Pharmacies (UAE Perspective)

Almeman, (2024) analyzes the current digital transformation within the global pharmacy sector, which has been driven by innovation in technologies including artificial intelligence, blockchain, and online marketplaces. It highlights the impact of technology on pharmacy service delivery and education, giving particular emphasis to the explosion of pharmacy services utilizing virtual pharmacy platforms. It draws attention to the role of telepharmacy and telehealth as more prominent delivery methods, particularly in response to the COVID-19 pandemic, which has further enhanced interest in virtual healthcare delivery. Another area of focus is the expanding cosmeceutical market through the ubiquity of online pharmacies, which indicates a shift in consumer behavior (Almeman, 2024). The study also identifies global regulatory issues and implications for the private sector to advance healthcare technology. Overall, the study shows a detailed account of advances made through digital technology that have caused dynamic shifts toward more operationally efficient, more formally accessible, and more patient-centered pharmacy practice.

Kumar MV et al., (2022) claims that the conceptualization of digital healthcare development by presenting a conceptual framework for Digital Health Technologies that is in harmony with the UN Sustainable Development Goals (SDGs), the National Health Policy of India, and the UAE Ministry of Health Policy. It introduces a Digital Health Technologies Ecosystem that would consist of the following pillars: Virtual Consultations, Tele-pharmacy, Virtual Storage, and Virtual Community (VCom) to strengthen health systems in both countries. Additionally, the study presents a Data Management and Analytical (DMA) Architecture to provide a deeper understanding of health data, using both PHC (Primary Health Care) and POC (Point-of-Care) data sets (Kumar MV, et al., 2022). This architecture is modular, scalable, and able to manage large volumes of data to support health initiatives in areas such as epidemiological surveillance, health policy implementation, and disease prevention. These propositions would also specifically target under-served and rural populations by proposing ICT-based interventions to improve health outcomes. Therefore, this study continues along the pathway of digital transformation by integrating digital transformation with sustainable health infrastructure and data-centric public health programming. Although the research indicates international digital health evolution, their focus is mostly on international markets with limited UAE-focused insights, thus creating the necessity for localized studies on digitalization within hospital pharmacies.

Barriers to Implementing Smart Pharmacy Technologies in the UAE

Al Halbusi, Al-Sulaiti, Abdelfattah, Ahmad, & Hassan, (2025) provides a macro-level examination of the current digital transformation of the global pharmacy sector, focused on the adoption of new technologies, including artificial intelligence, blockchain, and online platforms. It emphasizes how these developments are disruptively altering pharmacy services and education. Most prominently mentioned is the rapid expansion of online pharmacy platforms and the increasing importance of telepharmacy and telehealth, especially due to the impact of COVID-19. The study discusses the growth of the cosmeceutical market in digital pharmacies, a consequence of changing consumer habits in the digital age (Al Halbusi, Al-

Sulaiti, Abdelfattah, Ahmad, & Hassan, 2025). The study also addresses the regulatory burden which can vary across regions, and the role of the private sector to influence innovations in health care. It concludes by identifying trends for the future and predictions for technological advancements that will disrupt and redefine the future landscape of pharmacy, placing digital transformation as a springboard for more equitable, effective, and person-centered pharmaceutical services.

Jarab, Abu Heshmeh, & Al Meslamani, (2023) investigates the case of Qatar, utilizing the Unified Theory of Acceptance and Use of Technology-2 (UTAUT-2) framework to examine online pharmacy consumer adoption. The research analyzes 455 respondents using Smart-PLS 3.2, testing the impact of several significant factors contributing to behavioral intention—performance expectancy, effort expectancy, social influence, hedonic motivation, habit, technology trust, perceived risk, and technology awareness. Notably, word-of-mouth (WOM) recommendations significantly moderated the relationship between behavioral intention and actual adoption. The study contributes to the theoretical development of UTAUT-2 in utilizing three additional factors trust, perceived risk, and awareness demonstrating their relevance in an e-health context (Jarab, Abu Heshmeh, & Al Meslamani, 2023). The study illustrates the significance of cultural and moral dimensions in technology adoption, highlighting the practical implications for policymakers and stakeholders to improve e-pharmacy access in Qatar. The study offers a localized, evidence-based understanding of consumer acceptance and technology in digital healthcare, complementing the more generalized ideas of the first study.

Enablers and Best Practices for Successful Adoption in UAE Hospitals

Al Khatib, Awad, & Shamayleh, (2025) examines the barriers to initiating the Magnet Accreditation Model in healthcare organizations situated within the United Arab Emirates (UAE). It explains the five core components of the Magnet Model: transformational leadership, structural empowerment, exemplary professional practice, new knowledge and innovations, and evidence outcomes. The study confirms that gaining "'Magnet'" status has clear valuable outcomes for the organization and their nurses, patients, and organizations, through increased nurse job satisfaction, enhancing patient outcomes, and strengthening organizational performance (Al Khatib, Awad, & Shamayleh, 2025). Even with very positive amendments, the process of implementing it across UAE-Magnet organizations is hindered by systemic and contextual challenges. With the qualitative response of fifteen healthcare experts and an extensive review of the literature, the study identifies five significant barriers: misalignment of regulations, no improvement of working conditions, ineffective change for nurses and patients, high monetary costs, and an uncertain return of investment, and complex labor force. As a result of these findings, the study concludes that the process for implementing international healthcare standards must be contextualized to the regional needs of healthcare organizations.

Kurup, Manalastas, & Ciruelas, (2024) look into the implementation of shared governance in nursing departments in the UAE to identify positive drivers and challenges to implementation. They used a qualitative case study approach, gathering data through semi-structured interviews with fifteen nurses working in a diverse range of hospital units, and applied thematic data analysis. Although shared governance can promote nurse empowerment, nurse satisfaction, and patient care outcomes, its impactful use in the UAE context is inconsistent. Key positive drivers to shared governance implementation in UAE workplaces included the support and understanding of immediate managers, while prominent challenges documented included limited senior management buy-in, nurse mindsets, and time constraints (Kurup, Manalastas,

& Ciruelas, 2024). Participants also conveyed optimism, providing suggestions to improve their organizations, even in the face of challenges they experienced. Ultimately, the study concluded that shared governance could only be successfully institutionalized through the work of senior nursing leadership re-evaluating their implementation efforts based on the experiences and realities of frontline nurses. Collectively, both studies exemplify the necessity for the appropriation of global healthcare frameworks to the new local organizational and cultural settings. These models, although nursing-focused, illustrate how organizational preparedness, empowerment, and cultural transformation are no less essential to undertaking pharmacy automation, such as smart vending machines, in UAE hospitals. Effective leadership endorsement directly facilitates easier adoption and integration of such technologies.

Impact of Automation on Patient Wait Times

Iqbal and Rahul (2019) investigate the transformative impact of pharmacy automation and robotics on the delivery of health care. Through a review of literature and case studies, the article describes how these technologies improve important aspects of practice, like dispensing medications, managing inventory, compounding medications, and counseling patients. Specifically, the article discusses how an increase in automation shapes accuracy, efficiency of operations, and patient safety during the prescription and dispensing process. The article also discusses the role of robotic systems on workflow in pharmacy and the changing role of health care professionals (Iqbal & Rahul, 2019). While the article identifies clear advantages of automation, some challenges in integration exist as well; some include issues of standardization, training, and adaptation to workflows. Overall, the review indicates that better-used pharmacy robotics can improve access to health care and improve the quality of health care.

Bin, et al., (2022) explore the real-world impact of an AI-driven digital solution that was utilized in an urgent care service in Brazil during the COVID-19 pandemic. This prospective study examined over 38,000 patient visits to determine the decrease in nonvalue-added time, and its impact on nursing screening and overall patient waiting time in the urgent care setting. This digital solution accomplished 92% of medical registration, thereby achieving a 12-minute decrease in patient waiting times while saving more than 2,500 hours in one year (Bin, et al., 2022). Although there was a slight increase of 16% in health checking time in this study, the findings demonstrate that the use of the AI solution improved efficiency without substantially interrupting clinical workflows and screening practices.

Patient Experience and Satisfaction with Automated Services

Zaman, Goldberg, Abrahams, & Essig, (2021) investigate consumer reviews on social media for the factors influencing patient satisfaction with hospital experiences. Through data analysis of Facebook reviews, researchers studied a large number of reviews to identify specific service characteristics that satisfaction is associated with, including, but not limited to, waiting time, communication about treatment, effective treatment, cleanliness, and cost. The study creates the concept of, "smoke terms," which are specific and non-emotive words that indicate patient concerns with certain service characteristics better than sentiment analysis (Zaman, Goldberg, Abrahams, & Essig, 2021). This method allows healthcare providers to identify concerns and develop servicing changes based on the stated priority within the post, ultimately giving healthcare providers a fidelity tool in the servicing management conundrum aimed at service quality and patient expectation alignment.

Nilsson, Sverker, Bendtsen, & Eldh, (2021) examine the patients' experiences of using a chat-based, automated service to take medical histories in primary care. The results show that patients generally have a favorable view of the chat system, particularly for non-urgent or uncomplicated issues. They found the process easy and straightforward, appreciated the opportunity to answer questions at their own pace, and liked the flexibility of being able to communicate from anywhere (Nilsson, Sverker, Bendtsen, & Eldh, 2021). However, it was expressed that the system would not always work well for more complex issues, may not appeal to those with lower levels of digital literacy and that it can be slow in the communication process when responding asynchronously. The findings highlight the need to invest time upfront in designing digital systems to enhance user experience, accessibility, efficiency, and patient-centered care.
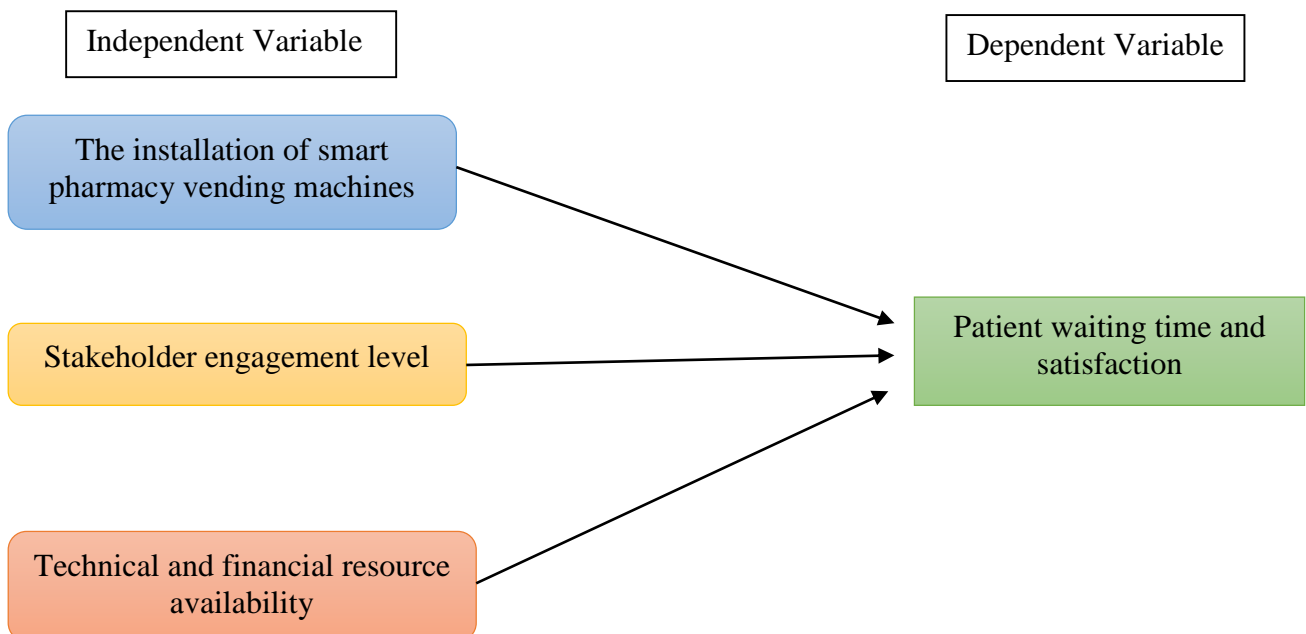
Conceptual Framework

Figure 1: Conceptual Framework

Independent Variables (IVs):

1. The installation of smart pharmacy vending machines
2. Stakeholder engagement level
3. Technical and financial resource availability

Dependent Variable (DV):

Patient waiting time and satisfaction

This study assesses the effect of smart pharmacy vending machines on patient wait times and satisfaction within hospitals in the UAE. The independent variables upon which the success of implementation revolves are: the implementation of technology, engagement of stakeholders, and availability of resources. The dependent variable, patient wait times, and satisfaction denote the efficacy of the system. A strong relationship is expected among these variables, where successful implementation and availability of resources are most likely to reduce wait times and improve user experience. Besides, stakeholder engagement may also help ensure hassle-free adoption. This analysis will shed light on which factors contribute meaningfully

towards improved road patient-centered service delivery within the healthcare infrastructure of the UAE.

Literature Gap

Although there is an increasing body of work relating to the digital transformation of healthcare and pharmacy services, it is clear that there is a large gap in empirical research that specifically focuses on the UAE context especially in terms of assessing the adoption challenges and facilitators regarding smart pharmacy technologies in hospitals. Existing literature addresses global trends, conceptual frameworks, and advancements in technology, but few studies explore localized barriers such as infrastructure issues, regulatory barriers, and workforce readiness. There has also been limited research examining patient satisfaction, behavioral factors of adoption; and standardization of automated dispensing technologies in UAE hospitals. This matters because without such localized insights, effective policy design and successful technology adoption in UAE hospitals may remain constrained. The present study will start to address the gap by exploring implementation practices; as well as, user experiences; within the UAE healthcare system.

METHODOLOGY

Research Design

The present study adopts a mixed methods approach to research, primarily involving both quantitative and qualitative methods in that assessment of the "smart pharmacy vending machine" on patient satisfaction and operational efficiency in UAE hospitals. This is justified by the duality between the object of research into measurable indicators such as waiting times and satisfaction scores from users and context-related issues, e.g., user experience and implementation challenges. Furthermore, integrating a mixed method improves the validity and reliability of the evidence generated: corroborating quantitative results with qualitative evidence in methodological triangulation. While the quantitative strand provides measurable evidence of performance and satisfaction trends, the qualitative component unpacks the human, organizational, and procedural dynamics involved in integrating this technology into healthcare systems.

Sampling Strategy

The qualitative interviews will utilize purposive sampling, while the quantitative surveys will employ stratified random sampling (Nyimbili & Nyimbili, 2024). The surveys would recruit subjects drawn from hospitals in different Emirates to attain geographic diversity. Patient participants would comprise those having used the vending machines, while healthcare staff would be pharmacists, nurses, and IT staff involved in the system's deployment. The desired sample size for the survey is 200 patients and 100 healthcare staff. This size is deemed statistically adequate to pick up patterns of satisfaction and usability. The interviews will select 10-15 key stakeholders according to their position in planning, operating, or performance evaluation of the vending machine systems.

Data Collection Methods

Quantitative Data Collection

To gather quantitative data, the primary research tool will be a structured survey questionnaire. The questionnaire will consist mainly of close-ended questions and a 5-point Likert scale measuring patient satisfaction, perception of wait time, ease of use, and general views on the

smart pharmacy vending experience. The staff survey will assess the usability of the system, the effects of the system on workflow, and how efficiency improvements are perceived.

The survey will be conducted in digital and printed form to enhance accessibility for potential participants. A pilot study will be conducted to test the instrument for clarity, reliability, and construct validity in preparation for the launch. Modifications will be made based on the feedback obtained from the pilot participants.

Qualitative Data Collection

To strengthen survey data, selected stakeholders such as hospital administrators, IT experts, and heads of pharmacy will be interviewed in semi-structured interviews. Interviews will examine implementation challenges, staff training processes, integration with hospital systems, and perceptions regarding influence on patients. Each session will be audio-recorded (with consent) and transcribed verbatim for analysis. Interviews will be guided by an interview protocol, which imposes a degree of standardization on the sessions while also allowing flexibility in exploring themes that arise spontaneously. Open-ended questions are expected to elicit detailed information that permits a rich examination of the participants' experiences and views.

Ethical Considerations

An informed consent procured from the subjects will originate from participation as ethical practices of research are strictly adhered to. Subjects will be told that they may withdraw at any time. Subjects would be identified by codes, and their data stored securely and accessible only to the research team. Ethical approval will be sought from the relevant institutional review board(s) in the UAE before commencing any fieldwork. Participants will also be informed of the study's purpose, expected outcomes, and how the data will be used to ensure transparency and trust.

Data Analysis

Quantitative Analysis

The quantitative data received from surveys will be analyzed using SPSS software. Descriptive statistics (mean, median, standard deviation) will describe the responses of the participants. Inferential statistics, i.e. t-test and ANOVA will be used to compare satisfaction and perceptions of wait time across the demographic groups and hospital sites. Pearson's correlation and regression analysis will be employed to determine the relations among the variables; for instance, whether wait times in any way predict the satisfaction score or training of staff influences perceptions of efficiency. Rigor of analysis will be further assured by screening data for possible outliers and missing values.

Qualitative Analysis

Thematic analysis will be employed on interview transcripts. This is a flexible but similarly rigorous approach to identifying thematic patterns in qualitative data. Coding will be done manually and with the assistance of qualitative data analysis software (e.g., NVivo) to ensure a systematic approach to theme categorization. From this stage, open coding will proceed to identify core concepts that emerge repeatedly; from there, axial coding is done to connect themes and their sub-themes together. The major themes may include perceived advantages of automation, resistance to change, and integration into hospital workflows. These

interpretations will assist in contextualizing the results from the quantitative study for a richer understanding of the overall findings.

Reliability and Validity

In order to enhance reliability, instruments will be pilot tested and revised before full deployment. Consistency in survey administration and interview techniques will also be kept (Karunarathna, Gunasena, Hapuarachchi, & Gunathilake, 2024). Qualitative data member checking will be employed where appropriate for validating interpretations with interviewees. Triangulation of the data sources-surveys, interviews, and document reviews-will make the study's internal validity stronger. The use of mixed methods also augments external validity by offering generalizable data while retaining the in-depth relevance of the context.

Conclusion and Expected Findings

This study is aimed at assessing the impact of intelligent pharmacy vending machines on patient waiting time and satisfaction as a component of the UAE healthcare system. Mixed approaches have been utilized to allow the study to assess quantifiable enhancements in patient service efficiency and hidden intricacies of implementation, i.e., staff preparedness, available resources, and technology acceptance. The research will be designed to prove that the implementation of smart vending machines will reduce patient waiting times by a substantial level, promote efficiency in operation, and overall patient satisfaction through enhanced convenience and speed of service. It is also expected to identify both enablers like leadership buy-in, staff training, and steady funding—and barriers, like resistance from staff, unawareness, or integrating it with the existing IT infrastructure. In short, the research will advance academic knowledge by filling a well-defined research gap in UAE-specific data on pharmacy automation and providing evidence-based insights into how such technologies can transform hospital pharmacy services.

Implications and Expected Outcomes

The real-world implications of this study are significant. It can give UAE hospitals and healthcare executives practical evidence to drive strategic investment in intelligent pharmaceutical technology. It can also guide policy making on technology training, patient education, and infrastructure design for implementation without hitches. At a national level, the results might revisit healthcare policies in the UAE and provide an example for other Gulf and developing nations in hopes of launching smart health solutions. The workplace benefits are just as significant: relieving administrative stress on pharmacy staff, improving morale, and allowing pharmacists more time for clinical work. Automation is also likely to reduce human error, boost dispensing accuracy, and establish a more open, safe, and patient-focused pharmacy system. Lastly, if successful, this research could open the door to further research into other intelligent healthcare technologies like diagnostic kiosks or robotic nursing support thus broadening efficiency, cost savings, and enhanced clinical outcomes in hospital operations.

REFERENCES

Al Halbusi, H., Al-Sulaiti, K., Abdelfattah, F., Ahmad, A. B., & Hassan, S. (2025). Understanding consumers' adoption of e-pharmacy in Qatar: applying the unified theory of acceptance and use of technology. *ournal of Science and Technology Policy Management, 16(3)*, 479-505. Retrieved from https://www.researchgate.net/profile/Mohammed_Salah_Hassan/publication/377658104_Understanding_consumers%27_adoption_of_e-pharmacy_in_Qatar_applying_the_unified_theory_of_acceptance_and_use_of_technology/links/65cc62b834bbff5ba70f123a/Understanding-consum

Al Khatib, I., Awad, M., & Shamayleh, A. (2025). Understanding Implementation Barriers for Lean Magnet Accreditation in the United Arab Emirates: A Qualitative Approach. *Journal of Nursing Management, 2025(1)*, 7690350. Retrieved from https://onlinelibrary.wiley.com/doi/pdf/10.1155/jonm/7690350

Almeman, A. (2024). The digital transformation in pharmacy: embracing online platforms and the cosmeceutical paradigm shift. *Journal of Health, Population and Nutrition, 43(1)*, 60. Retrieved from https://link.springer.com/content/pdf/10.1186/s41043-024-00550-2.pdf

Bin, K. J., Melo, A. A., da Rocha, J. G., de Almeida, R. P., Cobello Junior, V., Maia, F. L., & Ono, S. K. (2022). The impact of artificial intelligence on waiting time for medical care in an urgent care service for COVID-19: single-center prospective study. *JMIR Formative Research, 6(2)*, e29012. Retrieved from https://formative.jmir.org/2022/2/e29012

Iqbal, M., & Rahul. (2019). Pharmacy automation and robotics in healthcare. *The Pharma Innovation, 8*(4), 1268–1271. Retrieved from https://www.thepharmajournal.com/archives/2019/vol8issue4/PartS/13-3-39-364.pdf

Jarab, A. S., Abu Heshmeh, S. R., & Al Meslamani, A. Z. (2023). Artificial intelligence (AI) in pharmacy: an overview of innovations. *Journal of Medical Economics, 26(1)*, 1261-1265. Retrieved from https://www.tandfonline.com/doi/pdf/10.1080/13696998.2023.2265245

Karunarathna, I., Gunasena, P., Hapuarachchi, T., & Gunathilake, S. (2024). The crucial role of data collection in research: Techniques, challenges, and best practices. *Uva Clinical Research*, 1-24. Retrieved from https://www.researchgate.net/publication/383155720_The_Crucial_Role_of_Data_Collection_in_Research_Techniques_Challenges_and_Best_Practices

Kumar MV, M., Patil, J., Shastry, K. A., Darshan, S., Sastry, N. K., Moonesar, I. A., & Rao, A. (2022). ICT Enabled Disease Diagnosis, Treatment and Management—A Holistic Cost-Effective Approach Through Data Management and Analysis in UAE and India. *Frontiers in Artificial Intelligence, 5*,, 909101. Retrieved from https://www.frontiersin.org/journals/artificial-intelligence/articles/10.3389/frai.2022.909101/pdf

Kurup, S., Manalastas, A. P., & Ciruelas, J. (2024). Enablers and barriers of implementing shared governance in nursing departments: a case study from the United Arab Emirates. *Frontiers of Nursing, 11(4)*. Retrieved from https://sciendo.com/2/v2/download/article/10.2478/fon-2024-0046.pdf

Nilsson, E., Sverker, A., Bendtsen, P., & Eldh, A. C. (2021). A human, organization, and technology perspective on Patients' experiences of a chat-based and automated medical history–taking service in primary health care: interview study among primary care patients. *Journal of Medical Internet Research, 23(10)*, e29868. Retrieved from https://www.jmir.org/2021/10/e29868/

Nyimbili, F., & Nyimbili, L. (2024). Types of purposive sampling techniques with their examples and application in qualitative research studies. Retrieved from Types of purposive sampling techniques with their examples and application in qualitative research studies

Sallam, M. (2024). Enhancing hospital pharmacy operations through Lean and Six Sigma strategies: A systematic review. Cureus, 16(3). Retrieved from https://www.researchgate.net/profile/Mohammed-Sallam-10/publication/388380746_Leadership_Style_and_Lean_Management_Capabilities_in_Improving_Pharmacy_Practice_and_Service_Quality_Insights_from_Mediclinic_Parkview_Hospital_United_Arab_Emirates/links/6794ce

Zaman, N., Goldberg, D. M., Abrahams, A. S., & Essig, R. A. (2021). Facebook hospital reviews: Automated service quality detection and relationships with patient satisfaction. *Decision Sciences, 52(6)*, 1403-1431. Retrieved from https://www.researchgate.net/profile/Nohel-Zaman-3/publication/343643439_Facebook_Hospital_Reviews_Automated_Service_Quality_Detection_and_Relationships_with_Patient_Satisfaction/links/626306be8e6d637bd1f5185f/Facebook-Hospital-Reviews-Automated-Service-Q