



THE USE OF ADVANCED TECHNOLOGICAL SOLUTIONS IN NURSING PRACTICE

Najah Shabab Almutairi^{1*}, Gumah Hadi Alarishi², Nawda Mubarak Al-Dosari³, Abdullah Saad Alalyani⁴, Khaled Ayedh Alazmi⁵, Saleema Mohmmad Abuhebera⁶, Fatmah Ibrahim Alshaia⁷, Fatmah Ayed Mubarrk⁸, Haya Saad Aldosari⁹, Shaqur Mohammed Shaqur¹⁰, Aisha Saud Alenazi¹¹, Sultan Awad Alotaibi¹²

Abstract

Technological developments are occurring continuously, resulting in significant changes in the realm of human wellbeing and healthcare. Technological advancements have significantly transformed the organization and structure of the healthcare industry. The healthcare industry is now seeing a revolution in which robots are being used to execute operations and tasks in a safer and more effective manner. Automated systems would be the most efficient way to strictly follow set rules and carry out nursing activities. It is crucial for nurses to participate in the process of determining whether aspects of their work may be automated. Nurses may maintain the focus on essential aspects of human care in a new system by overseeing the use of machine learning and artificial intelligence. Nursing education and research will now include a specific need for skilled nurses, rather than being primarily motivated by the necessity for robots in healthcare.

Keywords: Nursing, healthcare, advanced technology, nursing practice, challenges.

^{1*,2,3,4,5,6,7,8,9,10,11,12}ksa, ministry of health

***Corresponding Author:** Najah Shabab Almutairi

*ksa, ministry of health

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1. Introduction

With the increasing pace of technological progress, more and more nursing tasks are being delegated to robots and artificially intelligent systems. Technological advancements are now impacting every aspect of modern civilization. The discipline of nursing has been greatly revolutionized by technological advancements, which include both basic machinery and advanced technologies that use artificial superintelligence. The continuous flow of technical innovations revolutionizes the approach to human wellbeing and healthcare. The nursing profession has undergone significant changes due to the evolution of technology. These changes have revolutionized the profession by introducing digital medical records, advancements in scientific and engineering technology, and the development of more advanced medical innovations, robotics, and artificial intelligence (1,2).

Technological innovations have been developed to aid nurses in improving their work performance and delivering superior care to patients. The field of nursing has seen substantial transformation in the last three decades (3,4). Technological advancements, such as surgical robotics, have the potential to replace surgeons and nurses in surgical centers. Humanoid nurse robots could also substitute nursing staff in hospital areas. Additionally, robotic companions can provide support to individuals in need, while computerized distributing robots can take over medication management tasks. Furthermore, significant progress has been made in artificial intelligence for making important decisions in medical settings. However, nurses are facing challenges when it comes to incorporating these new innovations into their practice (5-8).

Machine learning has had a significant impact on the nursing profession, surpassing other technological advancements in recent years. Artificial intelligence in nursing has the ability to improve the efficiency of organizing patient routes and treatment plans, while also providing doctors and nurses with all the necessary information to make informed judgments (9). Artificial intelligence is already being used in several aspects of nursing, such as creating treatment plans, automating monotonous chores, managing medicine, and developing drugs. However, this is only the beginning; as a result, many nurses are concerned that the increasing use of artificial intelligence might make them obsolete.

The feasibility of artificial intelligence in clinical settings is presently possible because of the fast advancement of big data analytics methodologies and the increasing accessibility of healthcare data.

Powerful artificial intelligence techniques may effectively extract crucial medical information from large datasets, therefore aiding nurses in their decision-making processes in healthcare (10-12). Artificial Intelligence utilizes intricate algorithms to extract medically relevant information from extensive healthcare data and uses the acquired insights to assist nurses in their clinical responsibilities. Furthermore, it goes through a process of acquiring knowledge and is equipped with self-correcting capabilities that improve accuracy in its responses to input. Furthermore, artificial intelligence algorithms have the potential to reduce therapeutic and diagnostic mistakes that are inherent in human clinical practice (13-15).

Currently, nurses are responsible for carrying out these tasks; but, in the field of artificial intelligence, such work might be automated. The amalgamation of robotic technology and artificial intelligence is very likely to take place in healthcare settings (16). There is an increasing trend in medical institutions to use robotic systems for delivering medicine. Several hospitals have lately used TUG robots (17-19).

2. Nurses' Integration with Technological Advancements

In the last ten years, nurses have been inundated with technological advancements in the clinical setting. Studies have shown that the degrees of acceptability and satisfaction with innovation vary. The level of nurses' receptiveness and proficiency with technological innovations may be used as an indication of their attitude towards omnipresent technology that is specifically meant to monitor health and encourage good results. Nurses who are hesitant and resistant to adopting new technologies may have challenges in adapting to the latest innovations, considering the continuous expansion of patient-assisting gadgets in the field of healthcare technology. Individuals who embrace new technologies or ideas at an early stage may find it less challenging to integrate and adapt to these advancements. The following discussion on the most important progress in healthcare will focus on the use of electronic health records (EHRs), the acceptance of digital healthcare systems, and the use of modeling in nurse training. The study will investigate barriers, challenges, and studies related to nurse satisfaction with the innovations (20).

Contemporary nursing students are already using technology to replicate patient scenarios and get hands-on experience. Simulation is an expanding field in nursing education that serves as a link between theoretical knowledge and practical

application in a safe environment for trainees. Due to the limited availability of clinical space, nursing schools are increasingly incorporating simulation labs into their curriculum to enhance instruction and provide students hands-on training. Given their technological proficiency, several students find it simple to transition to using simulation technology, and they find the learning process to be easily managed.

A study investigated the perception of persons towards high- and low-fidelity simulation techniques in a nursing school laboratory. This was done by assessing the degrees of satisfaction and self-confidence after using different simulation methods (21). A total of eighty-six undergraduate nursing students, ranging from their first to third years, were randomly assigned to one of three groups: a group receiving pencil and paper instruction, a group using a static dummy model, or a group using a high-fidelity model.

Fonseca et al. (22) did an exploratory descriptive study to investigate the viewpoints of 14 nursing students on an instructional computer-based simulation tool called e-Baby. The e-baby simulation entails a virtual preterm newborn exhibiting various respiratory complications that trainers must attend to. The students, each using a desktop or laptop computer, had to choose appropriate evaluation techniques to monitor the oxygen levels of the preterm kid, answer questions about their interaction with the baby, and make conclusions based on the given information. Every student found the technology easy to use and said that the amount of time it took to access e-Baby was sufficient for improving their learning. Students reported encountering occasional difficulties accessing the program on certain workstations during simulated training. They also expressed a need for more time with academics to address any questions or concerns following the training. The level of contentment among nursing students with new technologies, such as computerized simulations, might potentially impact the future acceptance of technological improvements by nurses.

The electronic medication administration (eMAR) system was first introduced in 1995 at the Veterans Affairs Health Center in Topeka, Kansas. Since then, it has been adopted throughout the country. The main goals of developing this system were to improve documentation, streamline the pharmaceutical administration procedure, and minimize medication mistakes (23,24). The eMAR system functions based on the core premise of electronically identifying pharmaceuticals using barcodes and recording them in a database. A

nurse scans the drug's barcode after reading the patient's wristband barcode to give the medication. The computer verifies the link between the patient and the correct drugs, allowing the nurse to do a last check of the medication before giving it securely.

Culler, Jose, Kohler, and Rask (25) conducted interviews with surgical nurses and intensive care unit (ICU) nurses at the six and eighteen-month intervals after the implementation of an electronic medication administration record (eMAR) system. As the 18-month trial continued, there was a decrease in unhappiness with crucial eMAR features. Following a period of 18 months, the level of satisfaction with the slow registration features saw a significant improvement from 15.4% at the beginning of the inquiry to 92.3%. Similarly, at the end of the study, the satisfaction rates for a cumbersome cosigning process climbed from 30.7% to 92.3%, while satisfaction with the execution of regular medication intervals rose from 23.1% to 76.9%. While customers were generally satisfied with the longer authentication time, they still faced a significant challenge in being unable to use their credentials to log in to the eMAR system. Throughout the course of the research, the IT administrators integrated the input from the nurses and made adjustments to the system. The satisfaction ratings rose in parallel with the nurses' adaptation to and progress in the technology.

3. Application of Electronic Health Records

In the last thirty years, there has been an ongoing effort to implement and merge electronic health records (EHRs) in order to make it easier for healthcare practitioners to share patient information and improve access to data from different places. Preliminary iterations of Electronic Health Records (EHRs) have evoked various emotional responses from nurses. However, current research suggests that the duration of exposure to a new system plays a crucial role in cultivating positive attitudes.

The first inquiries into the barriers to the acceptance and execution of electronic health records (EHRs) were restricted to doctors (26). The challenges included security issues, such as worries about unauthorized use of patient information, healthcare practitioners not being prepared to master the new computer system, and a lack of staff in the technology department to assist with EHR implementation. Recent studies have investigated the perceptions and acceptance of electronic health records (EHRs) among nurses and nursing students, as well as its usability.

Carayon et al. (27) did a research on the

implementation of Electronic Health Records (EHRs) by ICU nurses. The study included two cross-sectional survey questionnaires. The questionnaires were sent to ICU nurses at the intervals of 3 months and 12 months subsequent to the implementation of the Electronic Health Record (EHR) system. The questionnaire instrument evaluated attributes associated with technology adoption, electronic health record (EHR) usability, and EHR usefulness. The research revealed that the ICU nurses had a positive disposition towards the EHR technology, which improved progressively as they became more familiar with the program and its functionalities. Feedback was collected from ICU nurses and clinicians via scheduled meetings and assessments conducted throughout the implementation phase.

Manufacturers of electronic health records (EHRs) and other healthcare technology rely heavily on feedback from nurses who routinely use EHRs to assess satisfaction and ease of use. The study examined the encounters of nursing students as they used Electronic Health Records (EHRs) in real-world clinical environments. The research used a mixed methods approach, including questionnaires and focus groups, to gather data from a cohort of 17 students pursuing nursing and midwifery (28). The study focused on the benefits of Electronic Health Records (EHRs) in healthcare provision and the challenges associated with EHR systems. Electronic Health Records (EHRs) provide many benefits, including improved information accessibility via better data sharing, continuity of care, and expanded availability of patient records.

Another benefit was the enhanced precision of recordkeeping, since the inclusion of printed remarks made the notes easier to comprehend. The challenges associated with Electronic Health Records (EHRs) included the process of converting from traditional paper records to computerized systems, a lack of adequate computer resources at the clinical institution, and difficulties in accessing specific patient data. Improving training experiences resulted in improved impressions of the Electronic Health Record (EHR) by the students, notwithstanding the initial difficulties.

Sufficient time is essential for training and identifying necessary enhancements to increase the usability of new technologies in healthcare. The length necessary to understand and execute the new technology, as well as the availability of support in case problems arise, might impact the satisfaction of nurses with the system. Nurses have shown adeptness in incorporating innovative

strategies into the hospital environment, regardless of variations in technology use and contentment. Wearable technology is anticipated to advance rapidly in nursing because to the groundwork laid by electronic recordkeeping, simulated events, and eMAR experiences.

4. Implications for the field of nursing

People throughout the globe are becoming more knowledgeable and engaged in their own health by using social media platforms and online health apps and tools. Currently, a substantial proportion of persons are using wellness monitoring tools (29). According to this poll, 59 percent of persons already use a home health monitoring gadget, such as a glucose monitor or blood pressure tester. Additionally, 56 percent of patients engage in electronic information exchange with their physician or hospital. Patients may greatly impact the improvement of their own health by using technology that enables self-care (30).

Unlike previous technologies that were limited to gathering data in a controlled laboratory or office environment during patient visits, new technologies signify a fundamental change towards more customisation and responsiveness in patient care. Utilizing wearable technology, clinical decision support enables the generation of judgments based on a vast amount of data points, including both subjective and objective information.

Multiple studies have consistently shown that the presence and assistance of family and friends have a favorable effect on the well-being and recovery of patients (31). By using peripheral devices, family members may get immediate notifications on any issues or possible crises, allowing them to respond accordingly. There is a need for further research in the field of nursing that focuses on evidence-based practices and utilizes widely available technologies. Nurses play a crucial role in patient care by not only interacting with patients throughout the process of adapting and acquiring new skills, but also by recognizing possible urgent situations and interpreting the information gathered. Furthermore, nurses are responsible for providing comprehensive instruction on the use of medical devices. However, it is undeniable that the bulk of research on medically relevant peripheral devices has come from fields other than nursing. In order to enhance and progress the nursing profession, it is crucial to do comprehensive study using these developing technologies. Wearable technology is an extra tool that nurses must actively engage with in order to contribute to the advancement and application of enhanced nursing care.

5. The future of technologies in nursing

To stay relevant in an ever more computerized society, nurses can enhance their compassion and assign basic nursing tasks, such as medication administration, vital sign recording, and procedure conduct, to machines, allowing them to focus on more intricate matters. By delegating mundane tasks to a computer, this method will not only alleviate nurses from their duties but also empower them to plan patient care independently with the use of artificial intelligence, while patients actively participate in their treatment. Because machines cannot understand the unpredictable aspects of nursing situations, individual nurses will be able to provide better patient care by engaging in participatory encounters that involve the use of analytical skills in clinical decision-making and the interpretation of human emotions. Person-centered care may be implemented by using a participative approach. The main focus should be on the person in need of nursing care, rather than trying to fix or replace any missing bodily parts.

Promoting the involvement of nurses in technology breakthroughs will ease the integration of a caring human viewpoint and support the recognition of humans as whole entities, regardless of their different components. A restructuring of nursing education is necessary to incorporate technological advancements and machine learning into the curriculum. Additionally, nursing research should focus more on investigating the effects of technology on the nursing profession and developing strategies for integrating technology into nursing practice. Essentially, the fact that machine advancements cannot replace nursing practice means that nurses do not have to worry about the security of their jobs. As long as nurses continue to dedicate themselves to professional growth and strive to become great healthcare providers, they will be able to overcome the challenges brought about by technological advancements and continue to practice nursing effectively (32,33).

6. Conclusion

Gaining the feedback of nurses about the specific aspects of their duties that can be automated and those that cannot is very essential. Nurses must oversee the integration of computer technology and machine learning to ensure that they continue to fulfill their duties in providing comprehensive care despite the use of new approaches. Assigning technical tasks to nurses is crucial for aligning healthcare with patients' needs. It is advisable to encourage increased involvement of nurses in technological progress. In a technologically

advanced environment, nurses would serve as administrators. Nurses have the duty of overseeing patient care and collaborating with other healthcare professionals and technologies to ensure the delivery of suitable patient care.

To enhance the participation of nurses in technological progress, it is necessary to reorganize nursing education to include machine teaching and automation. It is important to examine the challenges and potential benefits of using technology as a tool in medical care within the context of nursing education. Given the shift towards computerized healthcare settings, nursing education will need to include training that employs and is related to emerging technology. In addition to making changes to nursing education, it is recommended that more attention be given to researching emerging technologies in the field of nursing (34-37).

Research has shown that implementing person-centered care leads to higher levels of satisfaction among care recipients. Technology in healthcare serves as integral elements of caring (38-41). Through the use of technology advancements, the nurse may enhance their awareness of the persons they are responsible for and acknowledge them as active partners in their own care, rather than passive recipients of care.

In order to remain relevant in the face of advancing technology, nurses must acquire the necessary knowledge and skills to enhance and augment their existing competencies, while simultaneously adjusting to technological improvements. Continuously improving their procedural methods is an essential need for nurses to sustain their attractiveness to employers, considering the growing amount of tasks and obligations that are being assigned to machines.

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