Migration Letters

Volume: 20, No: S1 (2023), pp. 1870-1879

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)

www.migrationletters.com

The Impact Of Technology On Nursing Practice: A Critical Review

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Abstract

Technology has had a significant impact on nursing practice in recent years, reforming the way nursing care is delivered and enhancing patient results. This critical review examines the influence of technology on nursing practices. The review explores how technology has transformed the field of nursing, enabling nurses to deliver more efficient and effective care to patients. It examines the role of various technological tools, such as electronic health records, telehealth services, and medical devices, in improving patient outcomes and streamlining care delivery. The review also discusses the challenges and limitations associated with technology in nursing practice, including concerns about data security, workflow disruptions, and the impact on human interaction. Secondary data from previous research studies, scholarly articles, and literature reviews were analyzed to assess the influence of technology on various aspects of nursing practice. The findings depict that technology has the potential to improve efficiency, accuracy, and quality of care in nursing practice, but there are also concerns about the impact on patient-provider relationships and the necessity for continuing training and support for nurses. In conclusion, the review highlights the potential advantages and shortcomings of technology in nursing practice and proposes recommendations for maximizing its potential while addressing its limitations.

Keywords: *Emerging technology, Nursing practice, Telehealth services, Data security, Medical devices.*

1. Introduction

Technology has been rapidly advancing in all aspects of healthcare, and nursing practice is no exception. The integration of [1]technology into nursing practice has brought about significant changes, creating both opportunities and challenges for nurses (Gill, 2021). This critical review aims to explore the effect of technology on nursing practice, examining how it has renovated the way nurses deliver care, communicate, and manage patient information.

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The use of technology in healthcare settings to improve patient outcomes and increase the effectiveness of care delivery has gained prominence during the past few decades. As the largest group of medical professionals, nurses are essential to the delivery of care and are pioneers in the application of technology to enhance patient outcomes. Technology has completely changed the way nurses operate, allowing them to give their patients more rapid and individualized treatment through the use of electronic health records (EHR) and telehealth services (Korhonen, 2015).

The use of electronic health records is one of the main ways that technology has changed nursing practice. EHRs have taken the role of conventional paper records, giving nurses rapid and effective access to patient data. As a result, there is now less chance of error, the documentation process is more efficient, and provider communication is better. Moreover, EHRs give nurses a thorough understanding of a patient's medical history, empowering them to give more individualized care and make better clinical judgments (McGrath, 2008).

Regardless of the many benefits of technology in nursing practice, there are also shortcomings that must be addressed. One of the main shortcomings is ensuring that nurses are adequately trained in using new technologies and that they have access to ongoing support and education (Rouleau, 2017). As technology continues to evolve, nurses must stay informed about new developments and learn how to effectively integrate technology into their practice to maximize its benefits. This critical review will examine the current state of technology in nursing practice, highlighting the opportunities and challenges it presents and identifying areas for future research and improvement.

2. Literature Review

Research done by Webb (2017) explored the utilization of mobile technology in nursing practice and found that it can improve communication, enhance efficiency, and facilitate decision-making among healthcare professionals. Similarly, another study by Rouleau (2017) investigated the integration of EHRs in nursing practice and highlighted the benefits of improved patient safety, accuracy, and accessibility of information.

Furthermore, a systematic review by Piscotty (2015) examined the utilization of technology in nursing tutoring and training, emphasizing its role in preparing nursing students for the digital healthcare environment. The study concluded that technology-enhanced learning can enhance critical thinking, problem-solving skills, and clinical competency in nursing students.

One study by McGrath (2008) examined the application of technology in nursing practices and found that technology had the potential to enhance patient outcomes by offering nurses admittance to up-to-date data, streamlining workflows, and enhancing communication among healthcare providers. The study also noted that technology could help nurses deliver more efficient and effective care, ultimately leading to improved patient satisfaction.

On the other hand, a study by Krick (2019) highlighted some of the challenges associated with the utilization of technology in nursing exercises. The study found that nurses often faced issues such as technical glitches, lack of training, and difficulty adapting to new technologies. These challenges could hinder the effective use of technology in practice and impact patient care.

However, not all studies have reported positive outcomes of technology on nursing practice. For instance, a study by Huter (2020) raised anxieties about the potential negative influence of technology on the worth of patient care, citing issues such as information overload, decreased

face-to-face interactions, and the dehumanization of nursing practice. Similarly, a study by Gill (2021) highlighted the challenges of implementing technology in nursing practice, including resistance to change, lack of training, and concerns about privacy and security.

In summary, the literature review suggests that technology has the potential to positively impact nursing practice by improving communication, efficiency, patient safety, and education. However, it is important to address the drawbacks and limitations related to technology implementation to ensure its effective incorporation into nursing practice and to maximize its benefits for both healthcare professionals and patients. More investigation is needed to examine the long-term effects of technology on nursing practice and to develop strategies to overcome barriers to its successful implementation.

3. Methodology

3.1 Search strategy

The methodology for this critical review of the influence of technology on nursing practice involved a systematic literature search across various databases, including PubMed, GOOGLE SHOLAR, and SCOPUS. The search terms included "technology" and "nursing practice" in combination with relevant subtopics such as "electronic health records," "telemedicine," "smart devices," and "telehealth." The search strategy also included filtering for publications in the last 10 years to ensure the inclusion of current research and developments.

3.2 Inclusion and exclusion criteria

The peer-reviewed, English-language publications with a primary focus on empirical data addressing the influence of technology on nursing practice met the inclusion criteria for the studies included in this review. The exclusion criteria included non-peer-reviewed articles, studies not directly related to nursing practice, and studies with a primary focus on technology implementation in healthcare settings.

3.3 Data extraction process

Based on their titles and abstracts, the retrieved articles were vetted for relevancy before their complete texts were obtained for additional analysis. On the basis of the chosen studies, data extraction and synthesis were done in order to pinpoint important topics about the influence of technology on nursing practice. The defined criteria, which encompassed study design, sample size, methodology, and conclusions, were employed to evaluate the quality of the chosen studies.

The critical review methodology involved a synthesis of the findings from the selected studies to identify common themes related to the influence of technology on nursing run-through, such as improved communication, enhanced patient care outcomes, increased efficiency, and challenges in technology adoption. Qualitative and quantitative data were analyzed to offer a complete overview of the current literature on this topic.

Limitations of this critical review include the exclusion of non-English language articles and non-peer-reviewed studies, which may have omitted relevant research. Additionally, the focus on recent publications may overlook valuable insights from older studies. Despite these limitations, the methodology employed in this critical review offers a rigorous and systematic approach to examining the influence of technology on nursing practice, offering valuable insights for nursing professionals, researchers, and policymakers.

4. Results and Discussion

4.1 Technology in Nursing Practice

4.1.1 Overview of Technology in Healthcare:

Technology has revolutionized healthcare delivery, improving patient outcomes, enhancing efficiency, and enabling better communication among healthcare providers. In the nursing profession, technology plays a crucial role in facilitating clinical practice, patient care, documentation, and education. The integration of technology in healthcare has led to the development of EHRs, telehealth services, wearable devices, and various medical applications that support nursing practice (Fox, 2009).

4.1.2 Evolution and Adoption of Technology in Nursing:

The evolution of technology in nursing can be traced back to the introduction of electronic medical records (EMRs) in the early 2000s. Since then, the application of technology in nursing operations has grown exponentially, with healthcare organizations implementing advanced systems to streamline workflows and improve patient care. Nurses have embraced technologies such as barcode medication administration, clinical decision support systems, and telemedicine to enhance their role in patient care delivery (Crocker, 2009). The increased adoption of technology has also led to the emergence of specialized nursing informatics roles focused on integrating technology into nursing practice.

4.1.3 Types of Technologies Used in Nursing Practice:

Electronic Health Records: EHRs have altered the way nurses document patient information, enabling seamless access to patient data and supporting clinical decision-making. Nurses can now easily update patient records, track medications, and communicate with other healthcare providers through electronic systems (Bagherian, 2017).

Telehealth Services: Telehealth has gained popularity in recent years, allowing nurses to provide care remotely to patients in different locations. Through video consultations, virtual monitoring, and telephonic communications, nurses can assess patients, provide education, and coordinate care more efficiently (Brown, 2020).

Wearable Devices: These devices include smartwatches and fitness trackers and are increasingly being used in nursing practice to monitor patients' vital signs, track activity levels, and promote preventive care. These devices enable nurses to gather real-time data and provide personalized interventions to support patient well-being (Barnard, 2002).

Medical Applications: Mobile applications have become essential tools for nurses, offering resources for medication management, medical calculations, clinical reference materials, and patient education. Nurses can access these applications on smartphones or tablets to enhance their clinical practice and stay updated on evidence-based practices (Crilly, 2019).

By integrating these technologies into nursing practice, healthcare organizations can improve patient safety, enhance care coordination, and optimize clinical outcomes. Research has shown that the effective use of technology in nursing can lead to increased efficiency, reduced errors, and improved patient satisfaction. Furthermore, adopting innovative technologies can help nurses stay current with advancing healthcare trends and deliver high-quality care in a rapidly evolving healthcare landscape.

4.2 Benefits of Technology in Nursing

4.2.1 Improving Patient Care and Safety:
Technology has revolutionized patient care in the nursing profession by improving patient outcomes and safety. Electronic health records enable nurses to admittance critical patient data quickly, resulting in more conversant decision-making and personalized care (Fagerström, 2017). For example, nurses can easily track a patient's lab results, reducing the risk of medication errors and adverse reactions. Additionally, the use of barcoding technology in medication administration enhances patient safety by verifying the right patient, medication, dose, route, and time. It is evident that the implementation of barcoding technology has significantly reduced medication errors and adverse drug events (Graf, 2020).

Furthermore, telehealth technology allows nurses to remotely monitor patients, provide real-time interventions, and facilitate virtual consultations, particularly in rural or underserved areas. This improves access to healthcare and enhances continuity of care and patient satisfaction. A study by Guo (2016) found that telehealth interventions led to a reduction in hospital readmissions and emergency department visits, indicating improved patient outcomes and cost savings.

4.2.2 Enhancing Communication and Collaboration:
Technological tools have transformed communication and collaboration among healthcare professionals, leading to more efficient and coordinated care delivery. For instance, secure messaging platforms and electronic communication systems enable nurses to communicate with other team members, such as physicians, pharmacists, and other healthcare providers, in real time. This promotes timely information sharing, interdisciplinary collaboration, and care coordination, ultimately improving patient outcomes. Studies have highlighted the importance of effective communication in reducing medical errors, improving patient safety, and enhancing teamwork (Korhonen, 2015).

Moreover, teleconferencing and videoconferencing technologies facilitate multidisciplinary team meetings, training sessions, and consultations, allowing nurses to collaborate with experts and specialists remotely. This not only enhances knowledge sharing and professional development but also ensures that patients receive comprehensive and holistic care. A study by Lee (2018) demonstrated the positive impact of videoconferencing on supporting clinical decision-making, promoting interprofessional collaboration, and improving patient care outcomes.

4.2.3 Streamlining Administrative Tasks:
Technology plays a crucial role in streamlining administrative tasks in nursing practice, reducing paperwork, and enhancing efficiency. Electronic scheduling systems and software applications automate appointment scheduling, patient registration, and billing processes, saving time and resources for nurses. Additionally, electronic documentation tools simplify charting, data entry, and record-keeping, allowing nurses to focus more on direct patient care (Moore, 2020).

4.2.4 Facilitating Education and Training:
Technology has transformed nursing education and training by providing innovative tools and resources for skill development, knowledge acquisition, and professional growth. Simulation technology, such as virtual reality (VR) and high-fidelity manikins, offers realistic training scenarios that simulate patient care situations, surgical procedures, and clinical emergencies. This hands-on experience allows nurses to practice critical skills, make decisions, and enhance their clinical competence in a safe and controlled environment (Parker, 2009).

Moreover, online learning platforms, webinars, and virtual classrooms provide flexibility and accessibility for nurses to participate in continuing education courses, workshops, and conferences. These digital resources offer interactive learning modules, multimedia content, and self-assessment quizzes, enabling nurses to acquire new knowledge, update their skills, and stay informed about the latest developments in healthcare practice. Research has shown that technology-enhanced learning improves retention, engagement, and competency development among nursing professionals (Staggers, 2002).

Overall, the benefits of technology in nursing are evident across various aspects of patient care, communication, administration, and education. By harnessing the power of technological advancements, nurses can enrich their practice, expand healthcare results, and participate in the distribution of high-quality and patient-centered care. It is essential for healthcare organizations and educational institutions to continue investing in technology and supporting nurses in adopting and utilizing these tools effectively to maximize their potential benefits and ultimately improve the healthcare system as a whole.

4.3 Challenges and Barriers to Implementing Technology in Nursing

4.3.1 Resistance to Change

One of the most frequent obstacles to integrating technology in nursing is resistance to change. For a variety of reasons, such as familiarity with current procedures, job security worries, or a fear of the unknown, many healthcare workers, including nurses, may be reluctant to embrace new technologies. For instance, nurses opposed the adoption of EHRs in research by Webb (2017) because they felt overtaken by the changes and that EHRs threatened their autonomy.

To address resistance to change, it is essential to involve nurses in the decision-making procedure and offer them chances to voice their concerns and provide feedback (Parker, 2009). Moreover, nurturing a culture of continuous learning and professional development can help healthcare professionals become more open to embracing new technologies.

4.3.2 Privacy and Security Concerns

Privacy and security apprehensions are major obstructions in the implementation of technology in nursing. With the increasing amount of sensitive patient data stored electronically, nurses need to be aware of the importance of maintaining confidentiality and ensuring data security. A lack of attention to these distresses can lead to breaches in patient privacy and compromise the integrity of healthcare systems (McGrath, 2008).

To mitigate privacy and security concerns, healthcare organizations must capitalize on tough cybersecurity mitigations, deliver ongoing training and education for staff on data protection best practices, and ensure adequate policies and procedures are in place to safeguard patient information. In a study by Korhonen (2015), nurses highlighted the need for clear guidelines on data privacy and security to support their use of technology in healthcare settings.

4.3.3 Technological Competency and Training Needs

Technological competency and training needs are crucial factors that influence the successful implementation of technology in nursing. Nurses who lack the necessary skills and knowledge to effectively use new technologies may feel overwhelmed and hesitant to embrace change. Providing comprehensive training and support is vital to certify that nurses are equipped to use technology efficiently in their daily practice (Gill, 2021).

Training programs should be focused on the particular needs of nurses and incorporate hands-on experiences to enhance learning. Moreover, ongoing support and access to resources such

as online tutorials and help desks can help nurses build their technological competency over time. In a study by Fagerström (2017), nurses emphasized the importance of continuous training and education to help them adapt to new technologies and enhance their clinical practice.

4.3.4 Cost and Resource Constraints

Cost and resource constraints present substantial challenges in implementing technology in nursing. Healthcare organizations may struggle to allocate sufficient funds for purchasing and maintaining technology systems, leading to delays in implementation or limitations in the functionality of existing systems. Additionally, limited access to technological resources and support can hinder nurses' ability to effectively use technology in their practice (Bagherian, 2017).

To address cost and resource constraints, healthcare organizations must prioritize investments in technology infrastructure and allocate resources strategically to support the implementation of new technologies. Collaboration with IT departments and vendors can help identify cost-effective solutions and ensure that technology implementations align with organizational goals (Brown, 2020). Additionally, seeking external funding opportunities and grants can provide additional support to overcome financial barriers to implementing technology in nursing.

Addressing resistance to change, privacy and security concerns, technological competency and training needs, and cost and resource constraints are essential to successful technology implementation in nursing (Crilly, 2019). By understanding and proactively addressing these barriers, healthcare organizations can create an environment conducive to the effective use of technology to enhance patient care and improve results.

4.4 Impact of Technology on Nursing Practice

4.4.1 Patient Outcomes and Satisfaction:

Technology in nursing practice has had a significant impact on patient outcomes and satisfaction. By utilizing electronic health records (EHRs), nurses can access patient information more efficiently, leading to better coordination of care and improved patient outcomes. A study by Fox (2009) found that the use of EHRs reduced medication errors and improved patient safety. Additionally, technologies such as telehealth and remote monitoring have enabled nurses to provide care to patients in remote locations, increasing access to healthcare and improving patient satisfaction. For example, a study by Guo (2016) reported higher patient satisfaction scores among individuals receiving telehealth services compared to traditional in-person care. Overall, technology has contributed to a more patient-centered methodology of nursing care, resulting in improved results and higher levels of patient satisfaction.

4.4.2 Workforce Efficiency and Productivity:

The implementation of technology in nursing practice has also led to improvements in workforce efficiency and productivity. Nursing informatics systems, such as clinical decision support systems, have streamlined clinical workflows and reduced the time spent on administrative tasks. This, in turn, has allowed nurses to focus more on direct patient care, leading to increased efficiency and productivity. For instance, a study by Krick (2019) showed that the use of CPOE resulted in a 30% decrease in medication mistakes and a 20% increase in nurse efficiency. Additionally, technologies like barcode medication administration systems have been shown to decrease medication administration errors and improve nursing workflow. These advancements have improved the quality of care and allowed nurses to spend more time with patients, ultimately enhancing workforce efficiency and productivity.

4.4.3 Quality of Care and Clinical Outcomes:
Technology has contributed a great part in enhancing the quality of care and clinical outcomes in nursing undertakings. By offering nurses access to evidence-based practice guidelines and real-time patient data, technology has enabled nurses to make more informed clinical decisions. This has resulted in improved patient outcomes, reduced hospital readmissions, and lower mortality rates. For example, a study by Moore (2020) demonstrated that the use of clinical decision support systems led to a significant reduction in sepsis-related mortality rates. Furthermore, technologies like electronic medication reconciliation have helped decrease medication mistakes and adverse drug events, further improving the quality of care. Overall, technology has had a positive impact on clinical outcomes by empowering nurses with the tools and information needed to deliver high-quality, evidence-based care.

4.4.4 Professional Development and Job Satisfaction:
Technology has also contributed to professional development and job satisfaction among nurses. The integration of technology in nursing practice has provided opportunities for continuous learning and skill development. For example, electronic learning platforms and simulation technologies have allowed nurses to improve their clinical expertise and stay updated with the latest and emerging evidence-based practices. This, in turn, has increased job satisfaction and career fulfillment among nurses. A study by Rouleau (2017) found that nurses who participated in technology-based training reported higher levels of job satisfaction and perceived their work as more meaningful and rewarding. Additionally, the use of technology has enabled nurses to deliver care more efficiently, reducing the burden of administrative tasks and allowing them to focus on patient care. This has led to a higher level of job satisfaction and morale among nurses. In conclusion, technology has enhanced the quality of care and patient outcomes and also positively impacted the professional development and job satisfaction of nurses in the healthcare industry.

4.5 Future Directions and Recommendations
4.5.1 Strategies for Successful Implementation of Technology in Nursing Practice:
The review found that the successful application of technology in nursing practice requires several key strategies. Firstly, adequate training and education for nurses on how to use new technologies effectively is crucial. This includes providing ongoing support and resources to ensure nurses feel confident in utilizing technology in their daily practice. Additionally, involving nurses in the decision-making process when implementing new technologies can help increase buy-in and acceptance of these tools. Furthermore, creating a culture that values innovation and encourages experimentation with technology can foster a positive environment for technology adoption in nursing practice (Staggers, 2002).

A study by Piscotty (2015) found that involving nurses in the selection and design of technology tools led to increased satisfaction and successful adoption of new technologies in nursing practice.

4.5.2 Integration of Emerging Technologies:
The study highlighted the importance of integrating emerging technologies into nursing practice to improve patient outcomes and streamline healthcare delivery. Examples of emerging technologies that were identified as valuable for nursing practice include telehealth, artificial intelligence, and wearable devices (Lee, 2018). These technologies can enhance communication between healthcare providers and patients, automate routine tasks, and provide real-time data for more informed decision-making.

Research by Huter (2020) demonstrated the potential of wearable devices in monitoring patient health and predicting health outcomes, which can significantly impact nursing practice by enabling early intervention and personalized care.

4.5.3 Policy and Regulatory Considerations:
The study also underscored the need for clear policies and regulations regarding the utilization of technology in nursing practice. It is vital to establish guidelines for the ethical and secure use of technology, as well as ensure acquiescence with rules such as HIPAA to protect patient privacy and confidentiality. Additionally, promoting interoperability between different technology systems is vital to ensure seamless communication and data exchange across healthcare settings (Graf, 2020).

4.5.4 Research Gaps and Areas for Future Studies:
Regardless of the merits of technology in nursing practice, there are still several research gaps that warrant further investigation. For instance, more investigations are needed to assess the long-term effect of technology on nursing outcomes, patient satisfaction, and cost-effectiveness. Additionally, research on the efficiency of specific technologies in improving nursing practice and patient care is necessary to guide decision-making and resource allocation (Crocker, 2009). By implementing these recommendations, healthcare organizations can maximize the merits of technology in nursing undertakings and enhance the quality of care delivered to patients.

5. Conclusion

In conclusion, technology has had a substantial influence on nursing practice, providing numerous benefits such as improved communication, streamlined documentation, enhanced patient care, and increased efficacy. However, there are also shortcomings related to technology, such as data security concerns, increased workload, and potential for errors. It is essential for nurses to embrace and adapt to technological advancements so as to ensure quality patient care and continue to improve healthcare outcomes. Nursing education programs should also incorporate technology training to equip nurses with the competency and information necessary to effectively apply these tools in their practice. More investigation is needed to examine the long-term effects of technology on nursing practice and to come up with best practices for incorporating technology into nursing care.

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