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The Impact of Healthcare Technology on Improving the Quality of Nursing Services in Hospitals

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Abstract
The tasks of nursing staff in hospitals have been increasing and becoming increasingly complex in recent decades, due to the increase in older and chronic patients, and the acuity of the pathology in hospital admissions. This has led to an increase in nursing workloads, and various studies support this. This issue has a negative impact on the quality of services provided in the hospital. Today, the use of new technologies has changed the way we live and work, which has turned into a competitive advantage. Specifically, in the field of public health, advances in technology have increased life expectancy and the capacity for clinical and therapeutic intervention in cases that previously had no possibility of effective treatment. These technologies should improve working conditions, optimize processes, reduce requests and meetings, and finally, bring quality and security to patient care.
keywords:Healthcare, Technology , Quality ,Nursing Services

1. Introduction

Hospitals play an essential role in dealing with health-related issues in the course of disease. The quality of nursing care is essential for the final outcome of patient care in the hospital [1]. The greater the quality of nursing care, the fewer the failed outcomes of nursing care. Besides, one of the most influential factors in the quality of nursing care is the use of technology. This study aimed to provide an overview in the form of an argument that explains the relationship between healthcare technology in hospitals and the quality of the services of the hospital staff, especially nursing. The results of this study show that healthcare technology in improving the skills of health workers in hospitals, especially nursing, is essential to explore because it has a significant impact on the quality of nursing care services in hospitals. The use of technology in healthcare is different and does not replace the performance of nurses. Instead, administrative performance is more effective, structured, and encapsulated, which makes it more professional and does not reduce touch and direct interaction, and can foster trust in a medical hospital. [2] The era of healthcare technology innovation is progressing so quickly that every hospital is recommended to provide nursing service technology in developing a smart hospital as one of the hospital infrastructures and facilities with technological sophistication [3]. The purpose of this research is to provide information and understanding about the role of technological services in nursing, to provide an understanding of interest and the role of integrating health

technology in nursing services, and to provide understanding and information about service quality on their nursing performance. This paper provides an overview of the expansion of the technology generation to nursing care and its relationship to improving the quality of nursing care provided in hospitals. This paper begins with an introduction, followed by two other sections. The next section will be a review of the general technology in hospital nursing, followed by a finishing section.

2. The Role of Technology in Healthcare

The role of technology in providing healthcare services can highly transform the quality of care provided to patients. Technology has transformed the nursing profession in many ways, such as monitoring patients effectively, storing patient records electronically, and helping nurses work and communicate effectively. Electronic health records can significantly improve patient care. Telemedicine, as a communication method between clinicians and patients using telecommunication, helps provide clinical support to nurses in delivering optimal treatment interventions for patients. Finally, mobile health is part of a telemedicine service that can improve patient safety in hospitals and provide efficient treatment based on patient conditions. [4]

By applying information technology in hospitals, it is expected that quality services, especially in nursing care, can improve. The implementation of IT that involves multidisciplinary care in improving the quality of service has not been fully realized to date. Injury to a patient in a hospital setting is an avoidable clinical event. A national poll shows that a significant percentage of nurses could not find a doctor when they had concerns about a patient's condition. A notable percentage of the time, patient deaths in a hospital are directly related to a clinical condition. By investing in technology to prevent medical errors, we can save a substantial number of lives in the healthcare sector. Healthcare information technology includes electronic health records, computerized provider order entry, and telemedicine. However, our healthcare systems face many challenges in adopting and implementing IT, including the lack of funding, a lack of skilled healthcare workers, and resistance to change among nurses.

3. Historical Evolution of Healthcare Technology

Healthcare technology is a science that develops healthcare services in hospitals. The development of this technology has been influenced by several key historical points in the field of nursing services. As early as 4000 BC, basic surgical tools and procedures were available, making trephining a kind of operation. The first drug dates back to about the same time. Surgery and anesthesia, which we are familiar with, have been used since ancient times, but until the middle of the 19th century, anesthesia was only used in Western medicine. The discovery of X-rays in 1895 was a turning point. This enabled the interior of the body to be imaged and diagnosed in a noninvasive manner. This was the advent of diagnostic imaging. In 1897, the first radiation therapy for tumors followed, and radiation therapy for cancer was performed, which has continued to this day. All of today's diagnostic machinery, as well as modern radiation equipment, trace their beginnings back to the 19th century. Around 1950, the transition from analog-type devices to nonlinear-type devices began. The concept of mechanical calculators and analog computers was born in 1940, and electronic computers were born in 1950. System engineering was also born at the same time. Therefore, it was logical that plans for the development of EMRs began around 1950. [5]

Since then, the technology has been improved to be used in various medical fields. Healthcare in the 21st century is unthinkable without technology, a familiar term that has made a significant impact on every field and sector. The rapid development of various technologies has enabled people to invent and use a variety of state-of-the-art treatment methods along with developing advanced diagnostic methods. This progress in technology brought a massive boom

in the field of nursing services with respect to the hospital delivery mechanism. The history of nursing technology is equally important in the history of the field of medicine considering its evolution. A study of historical technology in this field is just as important as any other study. Nursing technology and hospital infrastructure have a very ancient history that can be compared with any other ancient civilization's hospital infrastructure. This technology has gotten better and better and is now a very developed and effective means of healthcare. The study of the history of nursing technology during the ages may help one learn from the trends and developments at that time. The view of technology in healthcare history can help provide a look at the past and, on that foundation, apply it to present technology and assess its pros and cons. This will represent a detailed report on historical technology which might help hospital administrators acquire knowledge of past technological advancements in hospitals, hence deduce the rise of technology use in nursing services. [6]

4. Current Trends in Healthcare Technology

Healthcare technology now serves more than disease treatment. Its developments are shaping the way nursing is practiced and the quality of nursing services. Today we witness the rise of healthcare intelligence, medicine's latest major technological advancement. Innovated with artificial intelligence, it reads X-ray scans, analyzes ultrasound images, and interprets electronic health records faster, more accurately, and more safely than clinical experts. Many health wearable devices enable the tracking of important vital signs, such as heart rate and blood glucose levels. These data can now be collected, stored, and analyzed, making possible continual monitoring of an individual's health status. Telehealth, a system of virtual alternatives used to send patient information or assessments or diagnosis methods, can replace or supplement in-person visits using data analytics to allow more personalized nursing care. [7]

Data analytics leads to every nursing patient receiving the care that specific patients need, not an average care plan that fits most people. Technology personalizes the nursing care plan by predicting individual health conditions and problems, pinpointing at-risk patients early, and providing the best treatment plan for faster recovery. Technological health wearables also encourage individuals to manage their own chronic illnesses. [8] They are designed for personal use, with the convenience of 24/7 disease monitoring to provide quick feedback on patient conditions and related health data. Remote monitoring technologies link to the healthcare system, providing real-time data from a wearable, alerting providers to changes in their rural patients' health status. Patients consistently experience improved outcomes by consistently using the monitor, including better physical health, reduced mental and emotional stress, and a better sense of control and independence. The latest technological tools are genomics and bioinformatics, used to analyze large data sets from a genomic level to a basic molecular level necessary for drug reactions, to end intersectionomics with immune monitoring. Watch for the next new practice focused on precision healthcare. These advances in technology draw an unbroken line through informatics, genomics, and now artificial intelligence, confirming that the trend is clear – the nursing care for patients of the future must be in accord with personalized care. What is the best reaction to these changing trends that are coming on the horizon? Embrace, prepare, and migrate so that we in nursing are in alignment with the new ways of care.

5. Benefits of Healthcare Technology in Nursing Services

One of the advantages of technological interventions is the improvement in the quality of nursing services for the patients who received services in the hospital. Advancements in healthcare technology can improve service efficiency, provide faster access to services to a greater pool of populations, and also improve the quality of services received by patients. Healthcare information technology could reduce medication error rates significantly. One of the improvements was made using the Computerized Physician Order Entry system that

allowed pharmacists to verify medical prescriptions before being sent to the medical ward, thus reducing the prescription error rate. [9]

The use of technical equipment in nursing care has the advantage of increasing the quality of patient care. With the help of technology, the quality of services given to the patients is also improving. Technology can increase patient engagement with medical professionals, resulting in continued and maximal follow-up treatment. Technology helps in the prediction of patient outcomes and monitors the changes, so that the systems are designed to handle the problem faster. Technology can provide data analysis results more quickly, which can be accessed by nurses to monitor patient health status. Technology can reduce the high levels of documentation and speed up the administrative process. The nurses can allocate more time to taking care of their patients because technology can make the work easier and more effective. Technology can be an effective and relatively easy intervention to continue treatment. [10]

6. Challenges and Barriers in Implementing Healthcare Technology

The insufficient process of implementing technology in a healthcare institution, particularly in nursing services, was related to the challenges and barriers faced by other countries, such as the high implementation cost. Moreover, experience related to information technology areas was limited. For this reason, a significant cost would be needed for system operation, support, hardware, manpower, programming, and software health informatics. In addition, system administrators, IT experts, and working staff were needed to be conducted in difficult-to-reach areas. Society also viewed that there are still numerous deficiencies in both curative and precondition cost funding, funding for rehabilitation, and improvement of health facilities such as medical care and clinics as requested. Moreover, the resources were still limited and needed to be concentrated on the progress improvement of other sectors in the country to promote health status. Consequently, the services were expected to be given to society in the public domain for free. [11]

Concisely, the challenge of implementing technology in nursing services comprises limited resources, namely costs, personnel, and often inadequate implementation facilities. Some of the other barriers to applying innovation are the challenges of securing and managing data privacy and protection. Moreover, the complexity of integration into organizations with new systems and the fact that the structure of the legacy system can be very significant to ignore. Several employees of the business often resist innovation for many reasons, including a traditional work atmosphere, ineffective technological change performance, or concerns about replacement. Top management is also not able to offer prominent financial rewards to help overcome the problems related to the execution of technology. Finally, a deficiency in planning at the implementation stage of innovation contributes to this issue. The quality of nursing services will have a substantial influence. For those who have an issue that works, technology can potentially be important. Accordingly, the identification of various current issues on the part of nurses is a concern. Many solutions in service have also been challenged by advanced technology execution, primarily automation in healthcare practice. Providing one beneficial value suggestion as a record-keeping procedure will facilitate the changing condition. Addressing the barriers to the execution of technology is fundamentally an important process as a preventive mechanism to avoid issues in advance. In order to avoid potential objectives in the provision of nursing care in hospitals, the incompatibility of symptoms will result. [12]

7. Case Studies of Successful Implementation

Case Study I: The Application of Electronic Health Records in the Nursing Service at a Hospital in Singapore Overview: The genesis of the project to install electronic health records at an acute care institution in Southeast Asia grew out of the recognition that most other tertiary healthcare providers in the region were already using electronic health records or were in the

process of implementing such systems. This had implications for the ability of patients to integrate their records from this hospital with those from the other identified local hospitals if they wanted a consultation in another institution, as well as from the point of view of international marketing. The project sought to successfully implement the electronic health records at the hospital with little or no fuss. The electronic health records implementation and the close collaboration between the nursing service and the clinical team have won the nursing service many awards at the organizational and international levels. There were several outputs from the electronic health records implementation that were aimed at achieving better workflow and communications. [13]

Case Study II: Technology Integration into Home Care The aim of the project was to install the electronic medical record at a home healthcare and hospice facility in the Midwestern United States. Emphasizing the adaptability of the health information system to the variety of care provided by home health and hospice, the project champion stated the hope that successful completion of the project would result in an efficient information system that meets the growing healthcare needs of the community the facility serves. According to the project, one result of integrating the use of technology into the nursing service was that a demographic survey of staff and how they saw the implementation of technology was conducted. The electronic care documentation went live in 2003 and the documentation was implemented in September 2005. There are, however, a number of trade publications and nursing informatics and IT presentations that have come from the many projects and awards associated with the implementation of technology into home healthcare, worth a much closer scrutiny. [14]

8. Ethical Considerations in Healthcare Technology

One major nursing dilemma is the difficulties associated with the ethical aspects of healthcare technology in hospitals. The use of technology in healthcare presents a number of ethical concerns. One critical ethical issue in the use of technology in healthcare is the question of patients' autonomy, particularly the prerequisites of informed consent required for the use of electronic health records and the role of artificial intelligence in medical care. Furthermore, privacy and confidentiality, as well as the governance of information, are correlated to these concerns, although they are worthy of discussion in their own right. Human responsibility to ensure equal access for everyone in the use of telemedicine and e-healthcare should likewise be underlined. Care should be taken to distinguish between high-technology reliance and the underuse of professional knowledge and judgment, because advantages and challenges often coexist in healthcare technologies. The humanistic dimensions of nursing services should be maintained despite the increasing use of healthcare technology. [15]

Failure to integrate ethics and technology in healthcare annoys hospital nurses, and they fear that the uncritical and unreflective use of healthcare technology might destroy the human dignity of patients. Since the use of technology requires the continuous collection and analysis of patient data, it is highly desirable that healthcare professionals are ethically aware in upholding ethical principles in their nursing care. In the following section, some strategies for the assessment of ethical implications of technology use and the promotion of an ethical culture in healthcare organizations will be discussed. [16]

9. Future Directions and Emerging Technologies

The role of nurses in hospitals and healthcare services is significantly impacted in the ongoing era of digitalization and high technological transformation, which further expects to cover almost all spheres of human life. New technological tools and approaches, which include telehealth, telemedicine, and device communication, are anticipated to transform the overall method of extending nursing care and nursing practice. In many hospitals and centers of learning all over the world, several technological innovations are approved and integrated into nursing practice. Therefore, over a period of time, these technologies will affect nursing

services in a significant way. There is a near future that will have an immense impact on the overall current practices of nursing services in order to enhance patient care. [17]

Research on the extension of nursing practice is expected to be carried out on areas like artificial intelligence, big data research, blockchains, and public health, robotics, sensors, and telehealth in operating rooms and post-hospital care, how technology can reduce the number of interventions in healthcare systems, precision nursing and the hospital at home, how to increase environmental factors, including technology, for better care in geriatric care, remote hands-on simulators for community training and nursing training strategies. Future research potential is warranted for the development of nursing-practice-integrated technological approaches in line with a deep understanding of the social determinants of health and the widening healthcare disparities. Interdisciplinary collaboration and scientific approaches with healthcare professionals are mandatory and significant for the expedited development and integration of technology-driven advancements into patient care. The investment and re-innovation of altering systems and transformation of the current high-tech hospital care units are essential and obligatory. As patients, family members, and other healthcare stakeholders anticipate good care, the implementation of technological advancements, both current and upcoming, is warranted in practice. Regardless of technological development, there are inevitable ethical, societal, and interpersonal issues that are anticipated to be addressed further as a priority in cutting-edge nursing practice filled with technology. Patient expectations and healthcare workers' enthusiasm toward care are anticipated to be advanced with the integration of technology. Education, updated competence, and adaptation of technology in the nursing profession are expected and anticipated. [18]

10. Conclusion and Recommendations

In conclusion, technology has been shown to have significant effects in the healthcare industry and on nursing services in hospitals, as discussed in the previous sections. The adoption of healthcare technology has revitalized the healthcare industry, leading to the overall improvement of healthcare services in hospitals. It is worth noting that healthcare technology does not replace individual skills but enhances them. From the nursing perspective, healthcare technology is not merely a tool that should be used to increase efficiency; it should be integrated with skill. Moreover, the presence of technology can indeed result in challenges, which need strategic planning and problem-solving. It is also necessary to address several ethical considerations that may arise from the use of technology, particularly in healthcare services. It is clear that all stakeholders in the hospital sector should work together through strategic cooperation, evaluated by effective government policy, to assist in the improvement of healthcare services in hospitals.

The findings of this study imply that healthcare administrators should not overlook the importance of introducing healthcare technology in their hospitals. Nurses should also be involved in major decision-making levels so they can contribute their valuable information about the benefits, needs, and ease of technology implementation. Up-to-date computer hardware, software, and internet connection must be provided by the hospital for its nursing staff. Ongoing training is recommended, which will allow nurses to become specialists in technology implementation. Policymakers should also develop a good policy based on the availability of healthcare technology in hospitals. Best practices of health literacy should be encouraged in hospitals. A positive perception and attitude from the nursing staff towards the use of technology is needed. Finally, more research is suggested to be conducted in the future, suggesting the working engagement between other stakeholders, such as software developers and nurses' points of view simultaneously.

References:

[1] D. Whitehead, Y. Hamidi, and H. Ebrahimi, "Relationships between lifestyle, quality of life, organizational culture and job satisfaction among nurses related to health promoting hospital (HPH) standards," Health Services, 2023. sagepub.com
[2] W. Li, R. Gillies, M. He, C. Wu, S. Liu, and Z. Gong, "Barriers and facilitators to online medical and nursing education during the COVID-19 pandemic: perspectives from international students from low-and middle-income …," Human resources for …, 2021. springer.com
[3] H. Ali, A. Cole, and G. Panos, "Transforming patient hospital experience through smart technologies," in *Design, User Experience, and Usability. Case …*, Springer, 2020. [HTML]
[4] J. A. De Leeuw, H. Woltjer, and R. B. Kool, "Identification of factors influencing the adoption of health information technology by nurses who are digitally lagging: in-depth interview study," Journal of medical Internet research, 2020. jmir.org
[5] E. Mbunge, B. Muchemwa, and J. Batani, "Sensors and healthcare 5.0: transformative shift in virtual care through emerging digital health technologies," Global Health Journal, 2021. sciencedirect.com
[6] A. Sheikh, M. Anderson, S. Albala, B. Casadei, et al., "Health information technology and digital innovation for national learning health and care systems," The Lancet Digital, 2021. thelancet.com
[7] J. Gunawan, "Exploring the future of nursing: Insights from the ChatGPT model," Belitung Nursing Journal, 2023. nih.gov
[8] MR Fu, E Kurnat-Thoma, A Starkweather, "Precision health: A nursing perspective," *... journal of nursing ...*, Elsevier, 2020. sciencedirect.com
[9] J. Al-Jaroodi, N. Mohamed, and E. Abukhousa, "Health 4.0: on the way to realizing the healthcare of the future," Ieee Access, 2020. ieee.org
[10] A. Haleem, M. Javaid, R. P. Singh, and R. Suman, "Medical 4.0 technologies for healthcare: Features, capabilities, and applications," Internet of Things and Cyber, 2022, Elsevier. sciencedirect.com
[11] H. Al-Samarraie, S. Ghazal, and A. I. Alzahrani, "Telemedicine in Middle Eastern countries: Progress, barriers, and policy recommendations," International Journal of ..., 2020. coventry.ac.uk
[12] U. Foye, C. Dalton-Locke, et al., "How has COVID-19 affected mental health nurses and the delivery of mental health nursing care in the UK? Results of a mixed-methods study," in *Health Nursing*, 2021. wiley.com
[13] P. Centobelli, E. Riccio, S. Abbate, and E. Oropallo, "Blockchain's coming to hospital to digitalize healthcare services: Designing a distributed electronic health record ecosystem," Technovation, 2023. sciencedirect.com
[14] M. Sun, T. Oliwa, M. E. Peek, and E. L. Tung, "… Patient Descriptors: Documenting Racial Bias In The Electronic Health Record: Study examines racial bias in the patient descriptors used in the electronic health …," Health Affairs, 2022. healthaffairs.org
[15] N. Naik, B. M. Z. Hameed, D. K. Shetty, and D. Swain, "Legal and ethical consideration in artificial intelligence in healthcare: who takes responsibility?," Frontiers in, 2022. frontiersin.org
[16] H. J. Silverman, R. E. Kheirbek, "Moral distress in nurses caring for patients with Covid-19," Nursing, 2021. [HTML]
[17] D. McGonigle and K. Mastrian, "Nursing informatics and the foundation of knowledge," 2024. academia.edu
[18] J. Brown, N. Pope, A. M. Bosco, and J. Mason, "Issues affecting nurses' capability to use digital technology at work: An integrative review," *Journal of Clinical Nursing*, 2020. curtin.edu.au