

THE INFLUENCE OF INFORMATION TECHNOLOGY ON CHRONIC PATIENT HEALTH MANAGEMENT

Awan Setiawan *¹

Teknik Informatika, Fakultas Teknik Universitas Langlangbuana Bandung
awans2425@gmail.com

Toto Suharto

Teknik Informatika, Universitas Langlangbuana Bandung
tsuharto@gmail.com

Tuhfatul Ulya

Program Studi DIII Farmasi, Politeknik Medica Farma Husada Mataram
tuhfatul.ulya@gmail.com

Abstract

The digital age has revolutionized the management of chronic patient health with advanced information technology (IT) integration. The study aims to evaluate the impact of information technology on the efficiency, quality, and accessibility of health care for chronic patients. The research method is literary study. Research results show that the use of EHRs makes it easier to access and update patient health data in real time, improving the quality of health care. Telemedicine offers facilities for remote consultation, reducing the need for frequent physical visits, thereby increasing the efficiency of care. Finally, mobile health apps and wearables provide personal and continuous health monitoring, which supports more accurate and informed clinical decision-making. The research concludes that information technology plays an important role in improving health management for chronic patients through improved accessibility, efficiency, and personalization of care.

Keywords: Information Technology, Health Management, Chronic Patients.

Introduction

Information technology (IT) has shown rapid development and impact on various aspects of our lives, in the health sector. Information Technology (IT) has become an integral part of healthcare practices and operations. (Sheikh et al., 2021). From patient data management to communication between healthcare providers, technology has huge potential to transform, modernize, and improve the quality of healthcare. (Alolayyan et al., 2020).

The quality of health care is one of the main factors affecting the well-being of the people. Focusing on the quality of services is also important for health institutions to improve patient satisfaction, reduce medical errors, and maintain a high standard of

¹ Correspondence author

care. (Kaplan, B. 2020). To assess the quality of health care, several important dimensions must be considered such as Accessibility, Patient Safety, Effectiveness, Efficiency, Equality, and Patient Satisfaction (Sittig, D. F., & Singh, H. 2020).

Steps to Improve the Quality of Healthcare Services: Improving Healthcare Power Competence, Using Technology, Protocols and Standards, Patient Feedback and Audit and Accreditation (World Health Organization. 2020).

Quality of healthcare is a dynamic aspect that continues to evolve with the advancement of science, technology, and society's expectations. (Samartzis, L., & Talias, M. A. 2020). Therefore, efforts to improve health care must be continuously undertaken to ensure that all individuals receive effective, efficient, and quality care. (Zuriati, Z., & Chiew, L. 2020).

In the health context, IT is used in a variety of ways such as Health Management Information Systems (SIMK), Electronic Medical Records (RME), Telemedicine, e-Prescribing, and mHealth. Adoption of IT in the health sector has many benefits, including improved access to health services, increased operational efficiency, improved quality of services, and improved patient satisfaction. However, there are also challenges and obstacles in the application of this health technology, such as issues of privacy and data security, access and digital gaps, as well as user resistance to technological change. (Alolayyan et al., 2022).

The use of IT in health, or what is often referred to as e-Health, has shown significant impact in improving the efficiency and effectiveness of patient care. For patients with chronic diseases, the benefits of this information technology penetration are very significant, can affect their quality of life and enable them to get better and more efficient treatment. (Alolayyan et al., 2022).

Managing chronic patients is a major challenge in the health system, given the need for sustained treatment and the complexity of its treatment. Thro this time, many chronic patients have had difficulty managing their condition. Things like treatment tracking, symptom monitoring, communication with healthcare providers, and continuity of care are important issues in managing the health of chronic patients. (Wannheden et al., 2022).

Information technology has become an important part of chronic patient health management, providing tools that help in more efficient monitoring, management, and communication between patients and healthcare providers. There are several ways in which information technology plays a key role in perfecting care for chronic patients such as Electronic Health Records (EHRs), Telemedicine, Remote Monitoring Tools, Health Management Applications, BIG Data Analytics and Artificial Intelligence (AI), and Case Management Platforms. (Okolo et al., 2024).

With the wide range of applications and benefits of information technology, chronic patients can now enjoy a much higher level of independence, comfort, and effectiveness in healthcare management than in the past. (Okolo et al., 2024). However,

it is also important to ensure that these technological advances are widely accessible, including for those in remote areas or for individuals with limited resources. (Fan, K., & Zhao, Y. 2022).

In this context, it is important for us to understand how IT can play a role in managing the health of chronic patients.

The results are expected to provide useful knowledge for healthcare providers, policy makers in the health sector, and technology developers, in designing and implementing effective information technology for managing the health of chronic patients. Furthermore, the research could also serve as a reference for further research focused on the use of information technology in the context of health.

Research Method

The method of research carried out in this research is literature. Literature research method is an approach used to collect, review, and analyze existing data from various written sources such as books, journals, articles, and online documents on a particular topic. This method is commonly used in disciplines such as sociology, psychology, education, and health sciences. (Sgier, 2012; Noble & Smith, 2014).

Researchers use basic steps in conducting literary research: Determining Research Topics and Questions, Conducting Literary Searches, Selection of Sources, Reading and Recording, Organizing Literature, Writing a Literary Review, Analysis and Conclusion of Findings, and Quoting Sources (Grbich, 2012; Noble & Smith, 2014).

Result and Discussion

Information Technology in Health

Information technology has evolved from prehistoric times to modern times. Originally, humans exchanged information through language, which enabled one to understand information transmitted by others. (Talha et al., 2022). Initially, the communication used the sound of a whistle and hand signals. Later, it developed using more modern communication equipment. (Iyanna et al., 2022).

The development of information technology is also visible in Indonesia and the world, such as the use of radio, communication media, and e-commerce. Information and Communication Technology (ICT) continues to evolve over time, from simple tools to modern devices today that are also used in the field of health. (Iyanna et al., 2022).

Health information technology, often referred to as health informatics or e-health, plays an important role in improving the quality of health services, operational efficiency, and patient data management. (Elangovan et al., 2022).

Some important applications of information technology in the field of health include; 1) Health Information System (HIS). HIS provides a platform for collecting, storing, managing, and transmitting information related to the health of patients and the activities of healthcare organizations. An example of this system is the Electronic

Health Records (EHR) system. 2) Electronic health records. EHR is a digital record of patient health information that can be accessed by authorized health professionals. It provides quick access to the patient's medical history, including diagnosis, medications, immunization schedules, test results, and so on. Telemedicine is the use of information and communication technology to provide remote health services. This is especially useful in remote areas and for patients who need consultation with specialists that are not available at their location. Health Information Management (HIM) is concerned with the practice of managing health information ethically and securely, including the coding and classification of diseases and the processing of health data for research and decision-making. 5) e-Prescribing. The e-prescribing system allows doctors to send prescriptions of medicines electronically to the pharmacy, improving the safety and accuracy of the prescription while reducing medication errors. 6) Clinical Decision Support Systems (CDSS). CDSS is a computer system designed to assist health professionals in making clinical decisions. The system integrates patient data with a set of clinical knowledge to provide the best treatment recommendations. 7) Patient data portability. Information technology allows patient health data to be transported and shared securely between healthcare providers through exchange of health information. (Health Information Exchange, HIE). 8) Personal Health Records (PHR). PHR is a patient-controlled electronic medical record, enabling patients to manage, track, and share their own health information. 9) Mobile Health (mHealth). Health apps on smartphones and tablets help patients in monitoring their own health conditions through easily accessible devices such as fitness tracker devices or chronic disease management apps. 10) Big Data in Health. Processing and analysis of large-scale health data helps in epidemiological research, analysis of disease trends, and personalization of treatment. 11) Data security and privacy. With the increasing use of information technology in health, data security and privacy are becoming crucial. Regulations such as the HIPAA (Health Insurance Portability and Accountability Act) in the United States aim to protect patient's personal health information. (Elangovan et al., 2022; American Diabetes Association. 2022; Odeh et al., 2022).

The application of information technology in healthcare continues to grow with technological advances, opening up opportunities for innovation and improving more efficient and effective healthcare.

Applications of Artificial Intelligence (AI) in the health sector are growing and have the potential to revolutionize the way health services are provided. AI can help health workers diagnose and treat patients more effectively and efficiently. For example, AI can use demographic and health data to predict disease, improve diagnosis accuracy, and adapt treatment to individual patient characteristics. Medical devices equipped with the Internet of Things (IoT) can communicate directly with health systems to provide real-time information, which can be combined with AI to optimize

the use of health equipment and resources. (Cresswell et al., 2022; UmaMaheswaran et al., 2022).

Health Management

Health management is the practice of organizing and managing a healthcare system or healthcare facility. The goal of health management is to ensure that patients receive effective and efficient care, resources are used optimally, and healthcare facilities operate smoothly. In practice, health managers work with a variety of stakeholders, including doctors, nurses, government administrations, and patients to create sustainable, patient-oriented systems. Approach and high professionalism are required for success in health management, which ultimately aims to provide high-quality health care at cost-effective rates and provide constructive feedback for the improvement of the overall health system. (Ueng et al., 2023).

A chronic patient is an individual who suffers from one or more chronic diseases, which is a long-lasting medical condition that usually lasts more than a year. Chronic disease requires long-term management and often continuous treatment, and can affect the quality of life of the patient. Common examples of chronic disease include diabetes, hypertension, heart disease, asthma, chronic obstructive pulmonary disease (COPD), chronic kidney disease, and arthritis (Young-Xu et al., 2023). This includes a multi-disciplinary approach that involves various aspects such as: 1) Treatment and Therapy: Includes routine treatment, supporting care, and alternative therapy suitable for specific conditions. 2) Routine surveillance: Regular health checks to monitor the condition and make adjustments to treatment if necessary. 3) Lifestyle and Dietary Change: Recommendations for a healthy diet, regular physical exercise, and lifestyle changes to help manage the condition. 4) Patient education: Provide patients with information and resources to help them understand their condition and the best way to manage it. 5) Emotional support: Handling psychological aspects through counseling or therapy, and offering support to cope with stress that may arise as a result of chronic illness. 6) Risk management: Identifying and managing risk factors to avoid complications or worsening conditions. 7) Care Coordination: Ensure efficient communication between all healthcare providers involved in patient care (Young-Xu et al., 2023; Ehrman et al., 2023; Senapati et al., 2023).

Challenges in managing chronic diseases include; 1) Long-term complications: Chronic disease often develops or produces additional complications over time. 2) Economic burden: The cost of long-term health care can be a financial burden for patients and their families. 3) Multi-condition management: Patients with several chronic conditions may need to manage therapies and recommendations from various healthcare providers. 4) Treatment adherence: Keeping patients committed to their treatment plan can be a challenge, especially if there are side effects or if improvements

are not immediately visible (Yach et al., 2005; Cramm, J. M., & Nieboer, A. P. 2012; Sun, X., & Li, X. 2023).

Innovative approaches, such as the use of digital technologies (e.g. health applications, wearables, and electronic medical records) and holistic care models, have been introduced to improve the management of chronic diseases. The use of telemedicine and virtual consultations also enables better access to health care and condition monitoring in real time. Managing chronic patients requires comprehensive co-operation of healthcare teams, an integrated approach, and active participation of patients in planning and implementing their treatment plans. (Cohen et al., 2024).

Health management is crucial especially in the treatment of chronic patients. The following are some of the reasons why health management is so important especially for chronic patients: 1) Managing a long-term medical condition. Health management helps in planning and implementing effective treatment strategies to help control the condition, prevent worsening conditions, and improve the quality of life of patients. Health management helps patients and their medical teams understand how best to manage chronic medical conditions, which in turn can contribute to improved quality of life. With good health management, patients can minimize the negative effects of their condition and improve their ability to perform daily activities. Patients with chronic diseases often require various types of care from various health professionals. Health management plays an important role in coordinating these treatments and ensuring that all the care teams understand the goals and general care plans of the patient. 4) Reduce the cost of health care. Chronic diseases can be expensive to manage. Effective health management can help in alleviating some of these burdens by optimizing resource use, preventing complications or other conditions that may require expensive additional care or care, and educating patients about how best to manage their condition. Health management also promotes patient education and involvement in their own care. Understanding their condition and how to manage it can help patients make better treatment decisions and feel more in control of their own health (Courcoulas et al., 2024; Li, D., Yang, H., & Hu, Z. 2024; Crowley et al., 2024).

Health management is more than just providing medical services to chronic patients. It's about managing holistic care, educating patients, improving quality of life, and reducing costs. Therefore, the importance of health management for chronic patients is enormous.

Conclusion

Information technology (IT) has made a significant impact on the management of the health of chronic patients. The use of electronic health records, for example, helps in improving the quality of health care by ensuring that health documents are easily accessible, secure, and can be updated in real time.

Through telemedicine, patients with chronic conditions can consult their doctors remotely, enabling more efficient disease management and minimizing the need for frequent physical visits to health facilities. In addition, innovations such as mobile health apps and wearable sensors provide patients with personal health management tools that monitor patients' condition continuously, providing more complete data to healthcare providers for better clinical decisions.

References

- Alolayyan, M. N., Alyahya, M. S., Alalawin, A. H., Shoukat, A., & Nusairat, F. T. (2020). Health information technology and hospital performance the role of health information quality in teaching hospitals. *Heliyon*, 6(10).
- Alolayyan, M., Al-Rwaidan, R., Hamadneh, S., Ahmad, A., AlHamad, A., Al-Hawary, S., & Alshurideh, M. (2022). The mediating role of operational Flexibility on the relationship between quality of health information technology and management capability. *Uncertain Supply Chain Management*, 10(4), 1131-1140.
- American Diabetes Association. (2022). Standards of medical care in diabetes—2022 abridged for primary care providers. *Clinical Diabetes*, 40(1), 10-38.
- Cohen, S. P., Kapural, L., Kohan, L., Li, S., Hurley, R. W., Vallejo, R., ... & DePalma, M. (2024). Cooled radiofrequency ablation versus standard medical management for chronic sacroiliac joint pain: a multicenter, randomized comparative effectiveness study. *Regional Anesthesia & Pain Medicine*, 49(3), 184-191.
- Courcoulas, A. P., Patti, M. E., Hu, B., Arterburn, D. E., Simonson, D. C., Gourash, W. F., ... & Kirwan, J. P. (2024). Long-Term Outcomes of Medical Management vs Bariatric Surgery in Type 2 Diabetes. *JAMA*, 331(8), 654-664.
- Cramm, J. M., & Nieboer, A. P. (2012). Disease-management partnership functioning, synergy and effectiveness in delivering chronic-illness care. *International Journal for Quality in Health Care*, 24(3), 279-285.
- Cresswell, K., Domínguez Hernández, A., Williams, R., & Sheikh, A. (2022). Key challenges and opportunities for cloud technology in health care: Semistructured interview study. *JMIR human factors*, 9(1), e31246.
- Crowley, A. V., Banfield, M., Gupta, A., Raj, R., & Gorantla, V. R. (2024). Role of Surgical and Medical Management of Chronic Thromboembolic Pulmonary Hypertension: A Systematic Review. *Cureus*, 16(1).
- Ehrman, J. K., Gordon, P. M., Visich, P. S., & Keteyian, S. J. (Eds.). (2023). *Clinical exercise physiology: exercise management for chronic diseases and special populations*. Human Kinetics.
- Elangovan, D., Long, C. S., Bakrin, F. S., Tan, C. S., Goh, K. W., Yeoh, S. F., ... & Ming, L. C. (2022). The use of blockchain technology in the health care sector: systematic review. *JMIR medical informatics*, 10(1), e17278.
- Fan, K., & Zhao, Y. (2022). *Mobile health technology: a novel tool*
- Grbich, C. (2012). *Qualitative data analysis: An introduction*. Sage.
- Iyanna, S., Kaur, P., Ractham, P., Talwar, S., & Islam, A. N. (2022). Digital transformation of healthcare sector. What is impeding adoption and continued usage of

- technology-driven innovations by end-users?. *Journal of Business Research*, 153, 150-161.
- Kaplan, B. (2020). Revisiting health information technology ethical, legal, and social issues and evaluation: telehealth/telemedicine and COVID-19. *International journal of medical informatics*, 143, 104239.
- Li, D., Yang, H., & Hu, Z. (2024). Exploring the ineffectiveness of gamification health management: a U-shaped relationship between competition and technological exhaustion. *Information Technology & People*, 37(3), 1229-1250.
- Noble, H., & Smith, J. (2014). Qualitative data analysis: A practical example. *Evidence-Based Nursing*, 17(1), 2–3.
- Odeh, A., Keshta, I., & Al-Hajja, Q. A. (2022). Analysis of blockchain in the healthcare sector: application and issues. *Symmetry*, 14(9), 1760.
- Okolo, C. A., Ijeh, S., Arowoogun, J. O., Adeniyi, A. O., & Omotayo, O. (2024). REVIEWING THE IMPACT OF HEALTH INFORMATION TECHNOLOGY ON HEALTHCARE MANAGEMENT EFFICIENCY. *International Medical Science Research Journal*, 4(4), 420-440.
- Samartzis, L., & Talias, M. A. (2020). Assessing and improving the quality in mental health services. *International journal of environmental research and public health*, 17(1), 249.
- Senapati, J., Sasaki, K., Issa, G. C., Lipton, J. H., Radich, J. P., Jabbour, E., & Kantarjian, H. M. (2023). Management of chronic myeloid leukemia in 2023—common ground and common sense. *Blood cancer journal*, 13(1), 58.
- Sgier, L. (2012). Qualitative data analysis. *An Initiat. Gebert Ruf Stift*, 19, 19–21.
- Sheikh, A., Anderson, M., Albala, S., Casadei, B., Franklin, B. D., Richards, M., ... & Mossialos, E. (2021). Health information technology and digital innovation for national learning health and care systems. *The Lancet Digital Health*, 3(6), e383-e396.
- Sittig, D. F., & Singh, H. (2020). COVID-19 and the need for a national health information technology infrastructure. *Jama*, 323(23), 2373-2374.
- Sun, X., & Li, X. (2023). Aging and chronic disease: public health challenge and education reform. *Frontiers in Public Health*, 11, 1175898.
- Talha, M., Wang, F., Maia, D., & Marra, G. (2022). Impact of information technology on accounting and finance in the digital health sector. *Journal of Commercial Biotechnology*, 27(2), 184-195.
- Ueng, K. C., Chiang, C. E., Chao, T. H., Wu, Y. W., Lee, W. L., Li, Y. H., ... & Hou, C. J. Y. (2023). 2023 Guidelines of the Taiwan Society of Cardiology on the diagnosis and management of chronic coronary syndrome. *Acta Cardiologica Sinica*, 39(1), 4.
- UmaMaheswaran, S. K., Kaur, G., Pankajam, A., Firos, A., Vashistha, P., Tripathi, V., & Mohammed, H. S. (2022). Empirical analysis for improving food quality using artificial intelligence technology for enhancing healthcare sector. *Journal of Food Quality*, 2022.
- Wannheden, C., Åberg-Wennerholm, M., Dahlberg, M., Revenäs, Å., Tolf, S., Eftimovska, E., & Brommels, M. (2022). Digital health technologies enabling partnerships in chronic care management: scoping review. *Journal of Medical Internet Research*, 24(8), e38980.

- World Health Organization. (2020). Quality health services: a planning guide.
- Writing Committee Members, Virani, S. S., Newby, L. K., Arnold, S. V., Bittner, V., Brewer, L. C., ... & Williams, M. S. (2023). 2023 AHA/ACC/ACCP/ASPC/NLA/PCNA guideline for the management of patients with chronic coronary disease: a report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. *Journal of the American College of Cardiology*, 82(9), 833-955.
- Yach, D., Kellogg, M., & Voute, J. (2005). Chronic diseases: an increasing challenge in developing countries. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 99(5), 321-324.
- Young-Xu, Y., Epstein, L., Marconi, V. C., Davey, V., Korves, C., Zwain, G., ... & Ginde, A. A. (2023). Tixagevimab/cilgavimab for preventing COVID-19 during the Omicron surge: retrospective analysis of National Veterans Health Administration electronic data. *Mbio*, 14(4), e01024-23.
- Zuriati, Z., & Chiew, L. (2020). Relationship quality of health services with satisfaction of patients in H. Hanafie Muara Bungo Hospital in 2019. *Enfermería clínica*, 30, 168-170.