Indonesian Journal of Global Health Research
Volume 6 Number 4, Agustus 2024
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

USE OF THE TECHNOLOGY ACCEPTANCE MODEL FOR ELECTRONIC MEDICAL RECORDS IN NURSING DOCUMENTATION: SCOOPING REVIEW

Novita Sari*, Ati Surya Mediawati, Kurniawan Yudianto
Faculty of Nursing, Universitas Padjadjaran, Jl. Raya Bandung Sumedang KM.21, Hegarmanah, Jatinangor, Sumedang, West Java 45363, Indonesia
*novita22004@mail.unpad.ac.id

ABSTRACT

Digital transformation in the health sector, especially in health services, where previously health facilities used manual medical records, switched to electronic medical records. The Technology Acceptance Model is a framework used to understand how users accept and adopt technology, in this case electronic medical records. This study aims to identifyuse of the Technology Acceptance Model on nurses' acceptance of the implementation of electronic medical records. This study used the scooping review method. Literature searches were obtained through 3 databases, namely PubMed and CINAHL, as well as Google Scholar with the keywords: Technology Acceptance Model, Nursing Documentation, Electronic Medical Record's. Articles were extracted manually through tabulation and analyzed using a descriptive analysis approach. The publication period in the article search is the last 10 years (2014-2024). Collecting data used manual table. There were 8 articles included in this study, where the results of the scoping showed a significant relationship between perceived usefulness and perceived ease of use on nurses' acceptance of attitudes and attitudes had a strong influence on intentions to use electronic medical records. The importance of management support in preparing electronic medical records from their usefulness and ease of use in supporting nursing service activities in health facilities.

Keywords: electronic medical record's; nursing documentation; technology acceptance model

First Received	Revised	Accepted
14 March 2024	22 April 2024	24 April 2024
Final Proof Received		**Published**
12 May 2024		01 August 2024

How to cite (in APA style)
Sari, N., Mediawati, A. S., & Yudianto, K. (2024). Use of the Technology Acceptance Model for Electronic Medical Records in Nursing Documentation: Scooping Review. Indonesian Journal of Global Health Research, 6(4), 1953-1962. https://doi.org/10.37287/ijghr.v6i4.3373.

INTRODUCTION

The development of digital technology and information systems in the health sector is currently experiencing very rapid progress (Rajkomar et al., 2018). Advances in technology and information systems provide great benefits for hospitals. One application of information system technology in hospitals that is becoming a trend in the health sector throughout the world is the use of Electronic Medical Records (RME) (Ayala Solares et al., 2020). Nursing professionals make up the largest proportion of the health workforce (Australian Institute of Health & Welfare, 2018), therefore being the highest users of RME in hospitals (Zullig et al., 2021).

Electronic medical records can be accessed via all networked computers for the primary purpose of providing health care in all health care facilities and improving the quality of care provided to patients (Nagasubramanian et al., 2020). The use of RME experiences several obstacles in its implementation, the most common of which are financial costs, time consuming, refusal of user acceptance to use RME, lack of appropriate strategies for

implementing RME, doing more tasks, limited access to computers and the internet (Groot et al., 2020).

Many studies have been conducted related to the application of electronic medical records to documentation of nursing care. Previous study stated that there was an increase in the time for carrying out documentation activities (Moy et al., 2021). Previous study states that task time, task difficulty and system usability have a direct effect on mental workload (Snyder et al., 2022). There is a significant increase in cognitive workload for nurses in the early transition phase of using electronic medical records (Chelladurai & Pandian, 2022).

Based on previous research, various models and methods have been used to review effective variables in information technology acceptance and the most valid is the Technology Acceptance Model (TAM) which considers individual variables (Rauniar et al., 2014). TAM has been developed by Fred Davis who designed the model in 1986 for the first time while doing his PhD thesis and in 1986. Davis has implemented 2 significant variables in TAM. One of them is perceived ease of use which is defined as the confidence of members of each organization in using a particular system without problems (Akman & Turhan, 2017). Another one is perceived usefulness which is defined as everyone's belief in increasing their efficiency.

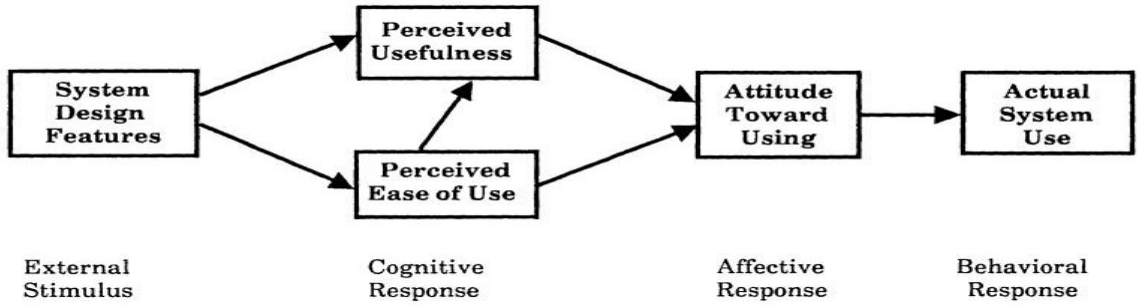

Figure 1. Technology Acceptance Model

The significant use of this model for the acceptance of new technology is determined by the users of the technology, this model is not only related to acceptance by users but also with variable explanations. This scoping review aims to answer the question of how to use the Technology Acceptance Model (TAM) for Electronic Medical Records in nursing documentation?

METHOD

A scoping review is a methodology used to search for, summarize and communicate the breadth and depth of a research topic, and can be used to examine the range of existing research, identify gaps or determine the value of conducting a full systematic review (Arksey & O'Malley, 2005). This study used Arksey and O'Malley's (2005) five-step systematic scoping review framework selected to capture the breadth, complexity and scope of literature on the use of TAM for RME in nursing documentation in health care facilities.

Step 1: Review questions are developed using the PCC (Population, Concept, Context) framework where the Population of interest is nurses working in health care facilities; The concept is that nursing documentation is carried out in the Electronic Medical Record; Context is the use of the Technology Acceptance Model (TAM).
Step 2: Initial scoping of the literature is conducted using healthcare databases to identify key concepts, develop a search strategy and establish inclusion and exclusion criteria.

Step 3: The literature search was checked independently by a health expert librarian, and carried out by the main author (NS) from 15 October to 19 October 2023 using three health care databases (Pubmed, Cinahl, Google Scholar) with the keywords: Technology Acceptance model (TAM), Electronic Medical Records, Nursing Documentation. In writing this scoping review, the researcher documented the literature search following the Preferred Reporting Items for Systematic Reviews and MetaAnalyses (PRISMA) 27-item checklist guidelines. Apart from that, researchers also used the PRISMA flow diagram to detail the number of literature identified from the search results, the screening process, the number of studies that met the eligibility criteria, and the number of studies that would be included for a comprehensive review.

Step 4: Titles, abstracts, and full texts of identified papers were screened independently by two members of the research team to exclude papers that did not meet the inclusion criteria. Inclusion criteria included English language papers, full text availability, and publication within the last 10 years (after 2013) to ensure relevance to current clinical practice and the use of TAM against RME in nursing documentation. All study designs and document types were included in the scoping review including theses and literature reviews. Exclusion criteria were limited to non-English language articles, opinion papers and those deemed not relevant to the use of TAM against RME in nursing documentation.

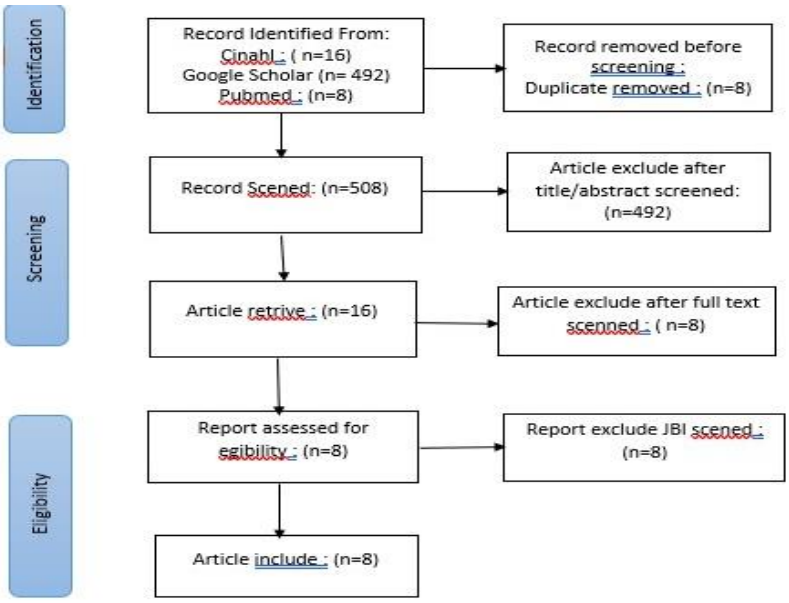

Figure 2. Data processing flowchart (Prisma-ScR)

Based on the results of initial research, the author found 516 articles from the Cinahl database with 16 articles, Google Scholar 492 articles, and Pubmed 8 articles. After that, the author carried out elimination based on 8 duplicate articles. Then the author screened the titles and abstracts and found 16 articles that matched the research objectives. The author carried out elimination based on full text and found 8 articles, then screened with Critical Appraisal using the Joana Briggs Institute (JBI) and no articles were eliminated because the results were 3 articles with 75% and 5 articles with 100%. After going through the screening process, 8 articles were obtained that discussed the use of the Technology Acceptance Model in documentation of nursing care in electronic medical records.

RESULTS

Data extraction where the researcher carries out analysis, summarizes and compiles the selected literature then reports the results in results and discussion.

Table 1.
Data Extraction

No	Author and Year	Objective	Country	Method	Results
1	(Intansari et al., 2023)	To see the quality of electronic medical records using the Technology Acceptance Model	Jakarta	Cross Sectional Study	There is a significant positive relationship that Electronic Medical Records (RME) can be used easily and with benefit
2	(Tavakoli et al., 2013)	To investigate the technology acceptance model (TAM) in EMR in the central oil industry polyclinic which is a pioneer in implementing EMR in Isfahan	Isfahan, Iran	Case Descriptive and analytical study	There is a significant relationship between data quality and perceived usefulness and perceived ease of use, there is also a significant relationship between user interface and perceived usefulness and perceived ease of use. Perceived usefulness and perceived ease of use have a significant relationship with attitudes. In addition, attitude has a significant relationship with behavioral intention to use RME. There is no significant relationship between data quality and attitudes.
3	(Barzekar et al., 2019)	To explore the factors that contribute to the use of Hospital Information Systems	USA	Cross-Sectional Study	Findings indicate a significant direct relationship between Management Support and Perceived Usefulness of HIS. Perceived Usefulness has a significant effect on attitudes. While there was no significant effect of perceived ease of use on attitudes. Attitudes have a significant effect on behavioral intentions.
4	(Alhur, 2023)	To measure nurses' perceptions of utilizing EMR in clinical practice	Saudi Arabia	Cross sectional analytical description	Perceived usefulness and perceived ease of use are closely related, so nurses accept EMR
5	(Walle et al., 2023)	To assess predictors of healthcare provider acceptance of electronic personal health record systems.	Ethiopia	Cross-sectional Study	Perceived ease of use has a significant influence on intention to use electronic personal health records, perceived usefulness and attitudes; perceived ease of use and information technology experience have a significant influence on perceived usefulness; and digital literacy and attitudes also have a strong influence on intention to use electronic personal health records. The relationship between perceived ease of use and intention to use is mediated by attitude.
6	(Alfuqaha & Alsharah, 2018)	To explore differences in the usability and ease of use of electronic health records (EHR) as perceived by nurses and	Jordan	Cross-sectional comparative	The study found that, in general, both nurses and other HCPs perceived high levels of usability and ease of use of EHRs during the Covid-19 pandemic.

No	Author and Year	Objective	Country	Method	Results
		other healthcare providers (HCPs) during the 2019 coronavirus (Covid-19) pandemic in Jordan			
7	(Alipour et al., 2016)	To evaluate the factors influencing the acceptance of HIS by doctors and nurses of Medical Sciences teaching hospital based on TAM.	Iran	Descriptive-analytic	A strong and significant correlation was found between employment level and age of respondents. "Perceived usefulness" and "voluntariness" respectively have the highest and lowest impact on the users of the respective hospital information systems.
8	(Asiri et al., 2014)	Explore the level of acceptance of electronic medical records (EMR) by nursing staff and understand their perspective on it	Saudi Arabia	Descriptive analytics	Findings suggest that there is a strong positive correlation between perceived usefulness and perceived ease of use resulting in a positive effect on nurse acceptance

Based on the results of the article selection, there are 8 articles that discuss the use of the Technology Acceptance Model for documentation of nursing care in electronic medical records. The research variables from the 8 articles above are perceived usefulness, perceived ease of use, attitudes, intentions, actual use, age, job level, and management support. The findings from the 8 articles above are that: there is a significant relationship between perceived usefulness and perceived ease of use on nurses' acceptance of attitudes and attitudes have a strong influence on intentions to use electronic medical records.

The summarized findings indicate significant positive relationships between Electronic Medical Records (EMR) and their ease of use and benefits. Data quality correlates with perceived usefulness and ease of use, as does user interface. Attitudes are influenced by perceived usefulness and ease of use, which in turn affect behavioral intentions. Management support positively impacts perceived usefulness, which influences attitudes, though perceived ease of use doesn't significantly affect attitudes. Nurses' acceptance of EMR is closely tied to perceived usefulness and ease of use. Additionally, ease of use significantly influences intentions to use electronic personal health records and attitudes, with factors like information technology experience and digital literacy playing roles. During the Covid-19 pandemic, both nurses and other healthcare professionals perceived high usability levels of EHRs. Employment level and age show a strong and significant correlation among respondents. Lastly, perceived usefulness holds the highest impact on hospital information system users, while voluntariness has the lowest, indicating a strong positive correlation between perceived usefulness and ease of use, ultimately affecting nurse acceptance.

DISCUSSION

Nurses' perceptions of usability and ease of use when designing and developing RME, may broaden system acceptance. Nurses function in active, complex, and demanding situations, making the presence of easy-to-operate tools necessary to facilitate their work (Weerasinghe & Hindagolla, 2018). In addition, nurses, as the largest users, must have a role in selecting, designing and implementing RME. Involving nurses in this process will increase their understanding of the technology and in turn its acceptance in their daily work (Abdullah & Ward, 2016).

Perceived usefulness and perceived ease of use are two key concepts in the Technology Acceptance Model (TAM) that influence the acceptance of technology, including in the context of electronic medical records by nurses. Perceived usefulness refers to an individual's belief that using technology will improve their performance or performance, while perceived ease of use relates to the belief that using the technology will be relatively easy and uncomplicated (Alfadda & Mahdi, 2021). Research has shown that the higher the perceived usefulness and perceived ease of use of a technology, the more likely an individual is to accept and adopt that technology (Rajkomar et al., 2018).

In the context of nurses and the use of electronic medical records, perceived usefulness can be related to the belief that use of the system will increase efficiency in recording and accessing patient information, as well as assist in clinical decision making (Tavares et al., 2018). On the other hand, perceived ease of use includes factors such as an intuitive interface, adequate training, and available technical support. When nurses feel that the use of electronic medical records can provide significant benefits and are easy to use, they tend to be more accepting of the technology (Schopf et al., 2019).

Additionally, individuals' attitudes toward technology also play an important role in their acceptance of the use of electronic medical records (Kaipio et al., 2020). A positive attitude toward technology reflects a tendency to respond favorably to the use and adoption of new technology (Rastogi et al., 2020). This attitude may be influenced by previous experience with similar technology, perceived value of using the technology, and other psychological factors (Walker et al., 2020). When perceived usefulness, perceived ease of use, and attitudes toward technology are positive, it is likely that nurses will have a strong intention to use electronic medical records in their clinical practice (Khairat et al., 2020).

The above findings have administrative level implications. Maximizing the experience of dealing with Electronic Medical Records will increase nurses' perceptions of their usefulness and ease of use, and subsequently acceptance of these systems (Dunn Lopez et al., 2021). This can be achieved by providing proper and adequate training to the system (Zhang et al., 2021). Furthermore, offering basic computer skills training sessions to all newly hired nurses would be beneficial in increasing nurses' perceptions of the usefulness and ease of use of RME. Other informatics engineering competency courses should be started as soon as nurses become students in nursing school, to sharpen their skills and prepare them to be future users of RME systems.

CONCLUSION

The use of the Technology Acceptance Model, especially the usability and ease of use components, has a very positive and significant influence on a person's attitude in using Electronic Medical Records. Therefore, the importance of management support in preparing electronic medical records is based on their usefulness and ease of use in supporting nursing service activities in health facilities.

REFERENCES

Abdullah, F., & Ward, R. (2016). Developing a general extended technology acceptance model for e-learning (GETAMEL) by analysing commonly used external factors. *Comput. Hum. Behav., 56*. https://doi.org/10.1016/j.chb.2015.11.036

Akman, I., & Turhan, C. (2017). User acceptance of social learning systems in higher education: An application of the extended technology acceptance model. *Innovations in Education and Teaching International, 54.*

https://doi.org/10.1080/14703297.2015.1093426

Alfadda, H., & Mahdi, H. (2021). Measuring students' use of Zoom application in language course based on the technology acceptance model (TAM). *Journal of Psycholinguistic Research*. https://doi.org/10.1007/s10936-020-09752-1

Alfuqaha, O., & Alsharah, H. (2018). Burnout among nurses and teachers in Jordan: a comparative study. *Arch Psychiatry Psychother*, *20*. https://doi.org/10.12740/APP/80168

Alhur, A. (2023). An Investigation of Nurses' Perceptions of the Usefulness and Easiness of Using Electronic Medical Records in Saudi Arabia: A Technology Acceptance Model: Technology Acceptance Model . *Indonesian Journal of Information Systems*, *5*(2 SE-Articles), 30–42. https://doi.org/10.24002/ijis.v5i2.6833

Alipour, J., Lafti, S., Majdabadi, H., Yazdiyani, A., & Valinejadi, A. (2016). Factors affecting hospital information system acceptance by caregivers of educational hospitals based on technology acceptance model (TAM): A study in Iran. *A JOURNAL OF MULTIDISCIPLINARY SCIENCE AND TECHNOLOGY*, *7*, 119–123.

Arksey, H., & O'Malley, L. (2005). Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*, *8*. https://doi.org/10.1080/1364557032000119616

Asiri, H., AlDosari, B., & Saddik, B. (2014). Nurses' attitude, acceptance and use of Electronic Medical Records (EMR) in King AbdulAziz Medical City (KAMC) in Riyadh, Saudi Arabia. *Merit Res Journals*, *2*.

Ayala Solares, J. R., Diletta Raimondi, F. E., Zhu, Y., Rahimian, F., Canoy, D., Tran, J., Pinho Gomes, A. C., Payberah, A. H., Zottoli, M., Nazarzadeh, M., Conrad, N., Rahimi, K., & Salimi-Khorshidi, G. (2020). Deep learning for electronic health records: A comparative review of multiple deep neural architectures. *Journal of Biomedical Informatics*, *101*, 103337. https://doi.org/https://doi.org/10.1016/j.jbi.2019.103337

Barzekar, H., Ebrahimzadeh, F., Luo, J., Karami, M., Robati, Z., & Goodarzi, P. (2019). Adoption of Hospital Information System Among Nurses: a Technology Acceptance Model Approach. *Acta Informatica Medica : AIM : Journal of the Society for Medical Informatics of Bosnia & Herzegovina : Casopis Drustva Za Medicinsku Informatiku BiH*, *27*(5), 305–310. https://doi.org/10.5455/aim.2019.27.305-310

Chelladurai, U., & Pandian, S. (2022). A novel blockchain based electronic health record automation system for healthcare. *Journal of Ambient Intelligence and Humanized Computing*, *13*(1), 693–703. https://doi.org/10.1007/s12652-021-03163-3

Dunn Lopez, K., Chin, C. L., Leitão Azevedo, R. F., Kaushik, V., Roy, B., Schuh, W., Banks, K., Sousa, V., & Morrow, D. (2021). Electronic health record usability and workload changes over time for provider and nursing staff following transition to new EHR. *Appl Ergon*, *93*. https://doi.org/10.1016/j.apergo.2021.103359

Groot, K., Veer, A. J. E., Paans, W., & Francke, A. L. (2020). Use of electronic health records in relation to standardized terminologies: a nationwide survey of nursing staff experiences. *Int J Nurs Stud*, *104*. https://doi.org/10.1016/j.ijnurstu.2020.103523

Intansari, I., Rahmaniati, M., & Hapsari, D. F. (2023). Evaluasi Penerapan Rekam Medis Elektronik Dengan Pendekatan Technology Acceptance Model di Rumah Sakit X di

Kota Surabaya. *J-REMI : Jurnal Rekam Medik Dan Informasi Kesehatan*, *4*(3 SE-), 108–117. https://doi.org/10.25047/j-remi.v4i3.3914

Kaipio, J., Kuusisto, A., Hyppönen, H., Heponiemi, T., & Lääveri, T. (2020). Physicians' and nurses' experiences on EHR usability: Comparison between the professional groups by employment sector and system brand. *International Journal of Medical Informatics*, *134*, 104018. https://doi.org/10.1016/j.ijmedinf.2019.104018

Khairat, S., Xi, L., Liu, S., Shrestha, S., & Hill, C. (2020). *Understanding the Association Between Electronic Health Record Satisfaction and the Well-Being of Nurses : Survey Study Corresponding Author : 3*, 1–9. https://doi.org/10.2196/13996

Moy, A. J., Schwartz, J. M., Chen, R. J., Sadri, S., Lucas, E., Cato, K. D., & Rossetti, S. C. (2021). Measurement of clinical documentation burden among physicians and nurses using electronic health records: a scoping review. *J Am Med Inform Assoc*, *28*. https://doi.org/10.1093/jamia/ocaa325

Nagasubramanian, G., Sakthivel, R. K., Patan, R., Gandomi, A. H., Sankayya, M., & Balusamy, B. (2020). Securing e-health records using keyless signature infrastructure blockchain technology in the cloud. *Neural Computing and Applications*, *32*(3), 639–647. https://doi.org/10.1007/s00521-018-3915-1

Rajkomar, A., Oren, E., & Chen, K. (2018). Scalable and accurate deep learning with electronic health records. *NPJ Digit Med*, *1*. https://doi.org/10.1038/s41746-018-0029-1

Rastogi, S., Tevaarwerk, A. J., Sesto, M., Van Remortel, B., Date, P., Gangnon, R., Thraen-Borowski, K., & Cadmus-Bertram, L. (2020). Effect of a technology-supported physical activity intervention on health-related quality of life, sleep, and processes of behavior change in cancer survivors: A randomized controlled trial. *Psycho-Oncology*, *29*(11), 1917–1926. https://doi.org/10.1002/pon.5524

Rauniar, R., Rawski, G., Yang, J., & Johnson, B. (2014). Technology acceptance model (TAM) and social media usage: An empirical study on Facebook. *Journal of Enterprise Information Management*, *27*. https://doi.org/10.1108/JEIM-04-2012-0011

Schopf, T. R., Nedrebø, B., Hufthammer, K. O., Daphu, I. K., & Lærum, H. (2019). How well is the electronic health record supporting the clinical tasks of hospital physicians? A survey of physicians at three Norwegian hospitals. *BMC Health Services Research*, *19*(1), 934. https://doi.org/10.1186/s12913-019-4763-0

Snyder, C., Choi, Y., Blackford, A. L., DeSanto, J., Mayonado, N., Rall, S., White, S., Bowie, J., Cowall, D. E., Johnston, F., Joyner, R. L., Mischtschuk, J., Peairs, K. S., Thorner, E., Tran, P. T., Wolff, A. C., & Smith, K. C. (2022). Simplifying Survivorship Care Planning: A Randomized Controlled Trial Comparing 3 Care Plan Delivery Approaches. *Journal of the National Cancer Institute*, *114*(1), 139–148. https://doi.org/10.1093/jnci/djab148

Tavakoli, N., Jahanbakhsh, M., Shahin, A., Mokhtari, H., & Rafiei, M. (2013). Electronic medical record in central polyclinic of isfahan oil industry: a case study based on technology acceptance model. In *Acta informatica medica : AIM : journal of the Society for Medical Informatics of Bosnia & Herzegovina : casopis Drustva za medicinsku informatiku BiH* (Vol. 21, Issue 1, pp. 23–25). https://doi.org/10.5455/AIM.2012.21.23-25

Tavares, J., Goulão, A., & Oliveira, T. (2018). Electronic Health Record Portals adoption: Empirical model based on UTAUT2. *Informatics Heal Soc Care*, *43*.

Walker, R. M., Burmeister, E., Jeffrey, C., Birgan, S., Garrahy, E., Andrews, J., Hada, A., & Aitken, L. M. (2020). The impact of an integrated electronic health record on nurse time at the bedside: A pre-post continuous time and motion study. *Collegian*, *27*(1), 63–74. https://doi.org/https://doi.org/10.1016/j.colegn.2019.06.006

Walle, A. D., Ferede, T. A., Baykemagn, N. D., Shimie, A. W., Kebede, S. D., Tegegne, M. D., Wubante, S. M., Yehula, C. M., Demsash, A. W., Melaku, M. S., & Mengistie, M. B. (2023). Predicting healthcare professionals' acceptance towards electronic personal health record systems in a resource-limited setting: using modified technology acceptance model. *BMJ Health & Care Informatics*, *30*(1). https://doi.org/10.1136/bmjhci-2022-100707

Weerasinghe, S., & Hindagolla, M. C. B. (2018). Technology acceptance model and social network sites (SNS): A selected review of literature. *Global Knowledge, Memory and Communication*, *67*. https://doi.org/10.1108/GKMC-09-2017-0079

Zhang, Q., Fu, Y., Lu, Y., Zhang, Y., Huang, Q., Yang, Y., Zhang, K., & Li, M. (2021). Impact of Virtual Reality-Based Therapies on Cognition and Mental Health of Stroke Patients: Systematic Review and Meta-analysis. *Journal of Medical Internet Research*, *23*(11), e31007. https://doi.org/10.2196/31007

Zullig, L. L., Shahsahebi, M., Neely, B., Hyslop, T., Avecilla, R. A. V, Griffin, B. M., Clayton-Stiglbauer, K., Coles, T., Owen, L., Reeve, B. B., Shah, K., Shelby, R. A., Sutton, L., Dinan, M. A., Zafar, S. Y., Shah, N. P., Dent, S., & Oeffinger, K. C. (2021). Low-touch, team-based care for co-morbidity management in cancer patients: the ONE TEAM randomized controlled trial. *BMC Family Practice*, *22*(1), 234. https://doi.org/10.1186/s12875-021-01569-8